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## **CYBERPLANNING AND CYBER DEFENSE: A MALAYSIAN PERSPECTIVE**

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### **ABSTRACT**

*Global linkages brought about through digital information networks bring immense benefits to people around the world. While technology makes our lives more convenient, it also makes us more vulnerable. Our great dependence on information technology has created a new form of vulnerability for society. Public or private life can be highly disturbed when technology is used as an offensive weapon by state and non-state actors including terrorist groups, who are able to manipulate information technology for illegal purposes.*

*Keywords: Cyber Warfare, national resilience, digital warfare, computer, internet, domain, network.*

### **INTRODUCTION**

Today information and communication technology has become the backbone of our activities, especially a medium for social networks, businesses, consumers and governments to network and communicate with one another. It appears to offer unparalleled opportunities for the creation of a “global village” and has also opened up the doors to insurmountable eventualities. The global community acknowledges the existence of a potential threat from hostile activities such cyber espionage, malicious software (malware) infection and to the high scale cyber-attack.

Terrorist organizations see this as an opportunity, as traditional and non-traditional warfare can erupt at different locations through different mediums. As traditional war wages on the actual battlefield, the cyberspace is another battlefield or should I say battlespace. It provides another avenue for criminal organizations to regroup and rethink their strategies in legitimating their efforts, whilst providing the terror organizations to recruit, plan and train virtually in the comforts of the Internet’s anonymity. Efforts to infiltrate the infrastructure of a sovereign nation could further evolve from normal hacking and denial of services, to the destruction and crippling the entire nation’s survivability or its ability to defend itself. As such cyber planning and cyber defence should be made a priority and done in a holistic manner.

## **CYBER PLANNING STRUCTURE**

A fundamental dynamic of computer security is that the defenders must continually equip themselves to protect vital information since attackers have the advantage of being able to attempt attacks at anytime. Cyberplanning is a tool, using the cyberspace as a medium, to carefully plan, execute and deliver the objectives of an operation. This activity can also be defined as digital coordination of an integrated plan, stretching across geographical boundaries.

The structure is simple: (1) identifying all devices and connections on the network; (2) set boundaries between the organization's systems and others; (3) enforcing controls to ensure that unauthorized access, misuse or denial of service events can be thwarted or rapidly contained and recovered from if they do occur; (4) in the event of an "active" attack, determine the patterns of the attack, i.e. multiple breaches, gaps on the time of the attack, etc.; and (5) reanalyzing other possible intrusion and/or other probable vulnerabilities [1].

Having an outline of how cyberplanning occurs is definitely useful. Communications via email, instant messenger software or Internet phone services with others in the network, regardless of the location, are part of the services used in the planning stage. For the terrorist, these services can provide a target suitable for them to recruit new talents for the "cause". Of course such activity could be emulated by the security forces or enforcement agencies, as a counter measure for any apparent terror attack.

## **CYBER PLANNING AND NATIONAL RESILIENCE**

Having a proper cyberplanning structure would require cooperation from all components of the government. In the terms of national resilience, civil contingencies law, doctrine and plans around the concept of resilience must be rewritten, to support our citizens and first responders as to ensure that as a nation working together to build, sustain, and improve capability to prepare for, protect against, respond to, recover from, and mitigate all hazards.

In Malaysia, national resilience is crafted towards a national security strategy, comprising: (1) a comprehensive strategy through domestic social cohesion and a stable regional environment; (2) diplomacy as the first line of defense; (3) commitment to the United Nations (UN) and its instruments for promoting peace, security and development; (4) encouragement of regional security dialogues with the aim of promoting cooperative strategy; (5) promotion of confidence-building measures (CBMs), especially in the area of crisis management; (6) emphasis on military diplomacy through contacts, exchanges, training and joint or coordinated exercises; (7) promotion of bilateral and multilateral cooperation; and (8) modernization of the Malaysian Armed Forces to defend national sovereignty and enhance national security [2].

## **CYBER DEFENSE: THE MALAYSIAN EXPERIENCE**

In June 2011, there were cyber attacks on Malaysian websites by the hacker known as “Anonymous”. According to the report from Malaysia’s Communications and Multimedia Commissions (MCMC), 51 of websites in the “*gov.my*” domain were attacked, where 41 of them suffered various levels of disruption [2]. The cause: a distributed denial of service (DDoS). The effect: inaccessibility of the “*gov.my*” websites for the public.

As a response, the Malaysia Computer Emergency Response Team (MyCERT) acted promptly to mitigate the damage caused by “Anonymous” and affected “*gov.my*” websites were quickly put back online within 24hours.

As the experience for Malaysia was quite new, it was evident to have Cyber Security Malaysia (CSM) established as the national cyber security specialist for the country. This agency, under the purview of the Ministry of Science, Technology and Innovation (MOSTI) was earlier known as the National ICT Security and Emergency Response Center (NISER) in 1997, to monitor Malaysia’s e-security aspect [3]. In addition, CSM also acts as the national cyber security policy implementer, the national technical coordination center and the cyber threat research and risk assessment center.

Based on this experience, Malaysia’s dependence on cyberspace means that the underlying infrastructure and networks must be reliable and that governments should adopt a holistic approach to protect itself against any offensive actions. It is important to note that to build an effective national cyber defense capability, dynamic collaboration among the private sector, the government law enforcement community and the national security community is essential. Another element of cyber defense that must be taken into account is the supply chain. The supply chain has become so globalized that it contains scores of vulnerabilities, some of which could cause catastrophic damage.

## **DIGITAL WARFARE**

In order to understand whether a hostile action in cyberspace is war-like, it is necessary not just to observe the event, but to also assess and establish the actor’s intent. For example, if a cyber attack is to seek personal gain through criminal means, the attack should be considered as a criminal act and must be dealt with, accordingly [3].

It is worth pointing out that there is a counterpoint to this discussion. There are many individuals in the security world who feel the concept of digital warfare is not a real concern, rather that true physical warfare is the real threat, and that no digital warfare attack, at any scale, could equal the terror and damage of a physical attack.

The image of an individual, sitting at a computer, waiting to press the one keystroke that will take down the Internet, is indeed well-overboard. In the past, if an individual or a nation wanted to target or otherwise electronically attack another nation, organization

or part of some infrastructure that could cripple the daily operation or any critical security foundation, a very high level of skill was required [4]. Today, no longer does an individual need to have a high level of skill for a complex attack, today he or she can simply download a hacking tool, enter the target's information and the automated tool will initiate the attack. However, the sophisticated attackers are creating more complex attacks constantly.

## **CONTINGENCIES**

In addition to cyber defense, proper contingency measures should also be in place, to further remove probable threats that may occur inadvertently. An organization should properly identify critical information, indicators and vulnerabilities of its database or systems. (1) Proper contingencies would include (2) indentifying critical information, (3) analyze threat to that critical information,(4) analyzing vulnerabilities to that critical information, (5) assessing the risk if the vulnerabilities are to be exploited and (6) applying appropriate measures to mitigate risk factors [5].

In identifying critical information, it is also pertinent to remember that the process undertaken in protecting vital information is more important rather than attempting to protect all information and it is essential to focus limited resources on protecting information that is most critical to successful operations.

For an organization or governments to analyze the threat to critical information, it requires research and analysis to identify likely cyber criminals who may attempt to obtain information regarding your operations. Questions such as who might be the cyber criminal, what are their goals or objectives, what actions might they take and/or what critical information does the cyber criminal already have on your operations, should be analyzed and thought over thoroughly, to ensure proper measures be taken to prevent any infiltration or breach.

To analyze the vulnerabilities of the identified critical information, it requires examining each aspect of security that seeks to protect critical information and then comparing those indicators with the threats identified. Common vulnerabilities include poorly secured mobile devices that have access to critical information, lack of policy on what information and networked equipment taken home from work or taken abroad on travel, storage of critical information on personal email accounts or other networks and lack of policy on what information can be accessed within the unsecured networks.

Vulnerabilities' assessment can be undertaken using through these two recommended components: (1) analyzing the vulnerabilities identified in the previous action and identify possible measures to mitigate each one; and (2) specific measures must be selected for execution based upon a risk assessment done by the organization itself. Risk assessment requires comparing the estimated cost associated with implementing each possible

measure to the potential harmful effects on operations, resulting from the exploitation of a particular vulnerability.

## **CONCLUSION**

Finally, while operational security has its origins in securing information important to military operations, it has applications across the community today. In a commercial context, operational security is the process of denying hackers the access to any information about the capabilities or intentions of an organization by identifying, controlling and protecting evidence of the planning and execution of activities that are essential to the success of any operations.

Proper cyberplanning is therefore important to ensure the security and stability of a nation and its digital boundaries. As such, an organization should look into the need for the operational security structure.

Taking this into view, the threat of any cyber attack is real and the low cost of mounting attacks has made defense indeed a challenging task. Therefore, we should prepare ourselves for the impending new forms of warfare and factor cyber defence into all stages of national security planning.

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## **MALAYSIA'S STRATEGIES AND APPROACHES TO MAJOR POWERS**

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### **ABSTRACT**

*Malaysia's relations with major powers has been consistent and in line with the principles of its foreign policy of non-alignment introduced since 1970. It has good relations with all the major powers of the West as well as those in the Asian region, even though the hierarchy and category of importance may be differentiated depending on the factors that shaped their relations. The international system, regional political and security environments, economic interest and domestic elements played an important role in influencing their relations. Malaysia has developed strategies and approaches to maintain good relations with these countries but without compromising its own national interest. This paper aims to look at some of the strategies and approaches used, and invariably described as balancing, countervailing, hedging; and their utility in maintaining stability in Malaysia's relations with major powers.*

*Keywords: Cold War era, international relations, non-alignment, balancing, hedging, band wagoning, civilizational Islam.*

### **INTRODUCTION**

In general, Malaysia has always maintained close political and economic relations with the major powers of the West such as the United States, France and the United Kingdom, and to a certain extent Russia. In the Asian region, relations with big nations such as Japan and India have been traditionally good. Consolidation of relations with China is of comparatively recent endeavour, in comparison to these countries due to the regional political and security environment prevailing throughout the Cold War era.

As in most cases, geography is an element that helps to shape a country's foreign policy. Malaysia is a small country in terms of population (28 million) and in comparison to other ASEAN countries. Moreover, it consists of two parts, West and Eastern parts, separated by South China Sea, an area of potential conflict and rivalry between regional and extra regional states. So for Malaysia, its interest in maintaining South China Sea as an area of peace and security is prompted not only by the potential benefits that regional countries may gain, but also to keep the nation politically and territorially intact. In

matters of defence and security, the South China sea can be said to be of high importance to Malaysia as it is a bridge—waters that connect, or may divide the nation.

Historically, Malaysia was colonised by Britain, hence its close political, social and cultural relations with the former colonial master. British influence embraces many aspects—political, social, and cultural, defence and economics. Malaysia is still a member of the Five Power Defence Arrangement (FPDA) in 1971, whose members include Britain, Australia, Singapore and New Zealand. Prior to the establishment of FPDA, Malaysia's security was assured by Britain within the framework of Anglo Malayan Defence Agreement (AMDA) since independence. Because of the close links between Britain and the United States, it followed that the US had an early access to strengthening of relations with Malaysia. The influence of these two 'Anglo-Saxon' nations has an important consequence for the direction of Malaysia's foreign policy, that the West is not only traditionally Malaysia's friend, but also a reliable one. Both the US and the UK are important economic and trade partners, nonetheless since 1980s, Malaysia tried to diversify its reliable friends and put emphasis on economic interests that go beyond the confines of its relations with these two powers. In this manner, Malaysia was able to expand and deepen its relations with other powers such as China, Japan and France.

The 1970s can be said to be the turning points in Malaysia's relations with the major powers. In 1970, Malaysia announced a shift in its foreign policy from that of a pro-West and anti communist foreign policy to that of non-alignment. The diplomatic recognition of China by Malaysia in 1974 can be said to be the culminating point in its policy of reassessing its foreign policy, especially vis-a-vis the major powers. By recognising North Vietnam in 1973, Malaysia made an attempt to distance itself from staunchly anti –communist stance of US in Vietnam. In 1971, the AMDA was dissolved and replaced by the Five Power Defence Arrangement (FPDA), symbolising the country's continuing need for external security and defence protection, but without being over-reliance on one major power. In 1970, Malaysia was also accepted into the non-aligned movement (NAM) and has since taken active role and participation in the movement. By the 1980s with Dr Mahathir Mohamad as Prime Minister, Malaysia entered into a phase of its foreign policy known as that of "active internationalism." This policy remains until today, but conducted in a different style by Dr Mahathir's successors.

## **STRATEGIES AND APPROACHES: FROM POLITICAL TO DEVELOPMENTAL**

Malaysia has been described by many as a developmental state. The theory of developmental state contends that states have a strategic role to play in taming domestic and international market forces and harnessing them to national needs [1]. It is also argued that domestic policies and economic development have a close relationship with the external situation. Besides the external economic and political situation, the success of a developmental state's strategies and policies is also influenced by its relationship with

the so-called hegemonic state. For the purpose of discussion, hence it will be termed as a major power. Elaborating on this, scholars argued that in general, these major powers provided the political and military security which contributed greatly and positively towards the economic development of smaller countries in East Asia during the Cold War and after. In a way, and theoretically, the close relations between Malaysia and major powers such as the United States, Britain and Japan contributed to its economic development.

## **BALANCING, COUNTERVAILING AND HEDGING**

Scholars or academics are fond of providing big words to express simple ideas. Some of them have described Malaysia as a “middle power” with aspirations and ambitions, said to have emerged during the tenure of Tun Abdul Razak (1970-1976), that it had become increasingly prominent during the Mahathir era. Words such as “middlepowermanship” has been coined to reflect the country’s foreign policy postures, strategies and actions of the country in its attempt to balance, hedge and countervail the foreign policies of major powers [2]. Basically, in promoting its postures, policies and actions, Malaysia has more often than not employed methods of persuasion and “attraction” rather than hard power. The elements involved which constitute “middlepowermanship”, are:

- a. the aspirations of a state to increase its own influence in the regional and global environment in the pursuance of interests beyond narrowly defined goals,
- b. attempts to change the regional and global environment in accordance with certain self-consciously enunciated goals beyond those of mere state survival, that is beyond the short-range core values of state survival,
- c. carrying out any of the above in the face of competition, countervailing pressures, or even conflict with other states, lesser powers and major powers ,
- d. carrying out any of the above by providing leadership to other states in the pursuance of their own foreign policy objectives,
- e. a propensity to use international organizations and institutions to pursue the above goals [3]

Whether or not Malaysia has used all of these in its foreign policy towards the major powers can still be productively being discussed. But suffice to say that many of these elements are employed by Malaysia to secure its national interests.

## **RELIABLE FRIENDS, BUT INDEPENDENCE OF ACTION**

Although it is important to acknowledge the role of major powers in providing political stability and economic development of states in East Asia, it is equally important to understand that these states do not entirely submit themselves to the dictates of these powers. This is especially so in the case of Malaysia. Malaysia has shown considerable firmness of position when it comes to protecting its national interests even if this is disagreeable to some of these major powers. Most of the time, it tried to find a balance between protecting its own interest with that of not antagonising these powers. This to a certain degree may be likened to “walking on a tight rope”. Some Prime Ministers are more vocal than others in articulating their policies according to manner and style they feel comfortable with. But all, since the first Prime Minister, independence of action has been important factor to bear in mind. An example that is frequently mentioned was Malaysia’s refusal to join SEATO even at a time when its foreign policy was considered as “pro-West and anti Communist” under its first Prime Minister. Such attitude would also be found in later years under different Prime Ministers.

## **ENGAGING THE WEST AND THE UNITED STATES**

Politically, ideologically and economically, Malaysia identified itself with the ‘West’ or ‘free world’ since it’s the early years of its independence. But along the way, adjustments and modifications of positions in certain issue areas were made taking into consideration its national interest. Thus its foreign policy naturally followed this direction closely. Despite some political rhetoric at some point, Malaysia’s close economic, security and defence relations with Western major powers remain close. In the words of former Prime Minister, “the U S and Malaysia have a profound and deep relationship, beneath the occasional and political rhetoric, there are strongly positive numbers. Malaysia is the US 10th largest trading partner and for Malaysia, the US is not only our largest trading partner, but also an important source of investments.”

This leads to a situation where one may consider for example Malaysia-US relations as ‘ambivalent’ in the sense of having close economic relations, yet, politically cautious, especially under Dr Mahathir as Prime Minister. While their close economic relations are openly acknowledged by both sides, Malaysia-US security and defence relations have been kept deliberately low-profile. Nevertheless, that did not stop the two countries from having security and military cooperation. Since 1984, for example, the two countries are engaged in Bilateral Training and Consultation (BITAC) on security/ defence, also in the Acquisition and Cross-Servicing Agreement and joint military exercises since 1995. One may interpret this as part of Malaysia’s response to the power asymmetry in its relations with the U.S, therefore will accept opportunities to maximize returns out of cooperation with a major power.

There is continuity within the successive Malaysian political leadership in the country’s firmness in maintaining its position on international issues and those affecting

bilateral relations with major powers. For example, in 2004, soon after he took over the office of Prime Minister from Dr Mahathir, the new Prime Minister, Tun Abdullah Ahmad Badawi, maintained the previous policy positions on the issues of Palestine, Iraq and global terrorism. . He reiterated during his visit to the US some of Malaysia's concerns about Iraq, Palestine and the direction in which the war against terrorism was taking. He mentioned that the Muslim world still needs some of demonstration of good faith from the United States in addressing the root causes of terrorism, in particular the unresolved question of Palestine, the transfer of sovereignty to the Iraqis, and the UN should be fully engaged when it stands in defence of the sovereignty and territorial integrity of member states [3].

There are other areas of cooperation which Malaysia wished to promote, for example in education, defence and in counter –terrorism initiatives. Since the event of September 11, 2001, Malaysia has extended its full cooperation in ensuring that the international network of terror is crippled and eventually eliminated. To this end, the Malaysian government, with the support of the US has set up in Kuala Lumpur the Southeast Asia Regional Centre for Counter-Terrorism (SEARCCT) as part of this engagement policy in combating terrorism. . In general, Malaysia is positive to the US re-balancing /pivots towards Asia for many reasons. Still, it does so without being seen as an all-out support for activities or policies that may create tension or nervousness, especially vis-à-vis China, an Asian major power with which Malaysia has close relations.

In summary, one can conclude that in Malaysia's viewpoint, its attitude towards major powers follow the belief that cooperation outweighs tension. During the Mahathir years, relations with the West, particularly with the U.S would become fractious due to his assertive foreign policy postures. Still, this did not lead to breakdown of relations or that that Malaysia was ready to change its relations with the US. What it did was to reflect the idea of "rejecting dominance, embracing engagement." [4]. It may be said that this sort of foreign policy hedging characterizes the overall Malaysia's foreign relations with the Western hegemonic world [3].

Malaysia's relations with Europe focussed for a long time on the UK. This is quite normal for reasons mentioned above. But since Dr Mahathir's era, he attempted to forge closer political economic, defence and social linkages with France. Despite such efforts, I would like to say that relations between the two countries can be said to be less visible than that between Malaysia and the two Anglo-Saxon nations.

Malaysia has not encountered major problems and issues in its relations with Russia for many reasons. In the past, Russia, despite its major power status, was isolated or insulated from Malaysia because of its ideological differences under the communist system. Also there is no domestic factor(s) to pressure Malaysia to look for a specific strategy or approach that urged Malaysia to enhance its relations with Russia. But there is cause for enmity either. Russia is being 'buffered' by many countries and interests to be of direct concern or threat to Malaysia. So paradoxically, this can create an opportunity of mutual benefits in many areas, especially in social, economic and defence.

## **RELATIONS WITH CHINA**

Perhaps one of the most straightforward trajectories of relations between Malaysia and a major power is in Malaysia-China relations some has said that its relations with China constitute “an early phase of Malaysia’s middlepowermanship.” Malaysia recognised the People’s Republic of China only in 1974, the first ASEAN country to do so. It gained much political mileage from that action, domestically and internationally. Malaysia’s proposal of ZOPFAN was given much more credibility as a result of the diplomatic recognition of China, and created improved relations with Indonesia and Vietnam. In the post Cold War period, Malaysia’s relations with China saw a perceptible shift in the form of “hedge diplomacy” [5]. This policy of “hedging” may mean different things to different people, but for our purpose, I would like to qualify it as “optimistic, positive, but with a small dose of caution. Openly Malaysia has said that it does not see China as a threat, rather an opportunity. Arguable, one can say that Malaysia-China relations can be described as “from enemy to friends.”

The most important area of cooperation between them is in economic and trade relations. As a result of Mahathir’s visit to China in 1999, there was a signing of MOU which committed Chinese investments of US 1 billion to Sabah. Dr Mahathir’s successor, Prime Minister Abdullah made a visit to China, ahead of both his US and Japan visits. This was seen as an “interesting geostrategic move “by many. By that time, Malaysia has become the largest Southeast Asian trading partner with China, with a massive US\$20 billion in two way trade. On the political front, Malaysia’s opposition to U.S multilateralism in the post 9/11 era, and the conduct of its war on terror resonated with China’s overall posture against American hegemony [3]. Malaysia’s ‘hedging ‘ US and China is even more valid during Abdullah’s period wherein Malaysia capitalized on the rise of China’s economic and political presence regionally while maintaining stable relations with the United States globally [6]. To further consolidate Malaysia-China relations, current Prime Minister, Dato’ Seri Najib Tun Razak evoked the positive development of relations between the two countries, which was started by his father, the second PM of Malaysia. The Chinese responded well to this sentiment of closeness that goes beyond the usual diplomatic niceties and trade opportunities.

How can one describe Malaysia’s response or policy towards China? Is it a balancing strategy? If we are to define balancing strategy as having the characteristics of entering into alliance with the US to counter check and contain the growing power of China, then the answer is no. While Malaysia, like many other countries in the region, subscribed to “force modernization”, it does not do so with targeting China. Neither is it bandwagoning, for bandwagoning would have meant that Malaysia accepts a subordinate role to China, or aligns itself politically and militarily with China, or would take into consideration China’s “core interests” before making every major foreign policy decisions. Balancing would not be strategically unnecessary and politically counter-productive, economically unwise. Bandwagoning is politically undesirable and strategically risky, though it may be economically gainful. Therefore Malaysia’s approach to China, in the words of

some scholars can be said to be that of a “hedging strategy” [5] which may explain its behaviour under certain conditions.

## **RELATIONS WITH OTHER MAJOR POWERS**

India is an emerging power. But Malaysia’s relations with India is not based not on this newly acquired status for between them, there is a long historical and cultural links have kept them close all these years. There is no “historical baggage” or ideological differences to intervene negatively in the development and consolidation of their relations. The presence of an important Indian minority in Malaysia facilitated the continuity of these relations in social, cultural and economic areas. Both countries identified themselves as part of “democratic world/ free world.” During his visit to India in December 2004, Prime Minister Abdullah Ahmad Badawi pointed out to the many similarities between India and Malaysia and stressed that “Like India, Malaysia is striving to sustain massive economic growth in order to ensure social justice and provide opportunity for education and employment.” Malaysia has become India’s largest trade partner in ASEAN. Current economic cooperation puts emphasis mainly on satellites, construction, railways and ICT, biotechnology etc. Prime Minister Abdullah was honoured with an honorary doctorate from the Jamia Milla Islamic University for his promotion of Islam Hadhari or “civilizational Islam, which became the most visual label of his tenure as Prime Minister. Today, besides the close existing bilateral relations, Malaysia and India engage each other in many other multilateral forums.

Japan is another Asian power that became an important focus of Malaysia’s external relations especially since the 1980s. It was Dr Mahathir who officially started the “Look East Policy” in 1981 in an attempt to ride the first economic wave that came with the Japanese economic miracle. Dr Mahathir stated in no uncertain terms that Japan and South Korea were Malaysia’s role models [3]. Some believed that this was also to counter balance the economic dominance of the US and the West. Today, while Malaysia maintains close cooperation with Japan in many areas, the ‘Look East Policy’ has somewhat lost its ‘oomph’ especially now that its main proponent is no longer at the helm of the government and that Malaysia, like many others turned its attention to the actual and potential ascendance of China and India as Asian economic powerhouse.

## **CONCLUSION**

How can we describe these strategies and approaches? With the US and the West, not much adjustment was needed because of long established friendly relations and commonalities in terms of ideology and political system. The end of the Cold War did not affect their relations as much as Malaysia’s relations with major powers of different political system. But today ideology no longer plays an important role in states interactions. Economics have become a driving force in interstate relations. Malaysia

has incorporated this strategy of close economic relations with major powers; it does so within the accepted norms and framework of maintaining political stability and peace with major powers. This is important because after all, Malaysia is a small country and must be mindful of the asymmetry in power relations. Viable policies have been introduced to allow the country to progress steadily towards becoming a politically and an economically respected nation, but it could not adopt policies or strategies that would create enmity or arouse mistrust and suspicion of its neighbours as well as of major powers. Malaysia's continued prosperity and security depend on "attraction and persuasion" approaches in its external relations. In sum, strategies such as 'counter-balancing', equidistance or equi-proximity, even ambivalence, hedging maximizing opportunities and reducing tensions have proven beneficial for a 'middle power' such as Malaysia. So while certain idealism shapes the aspirations of a middle power, its expectations and the expectations of others towards the country should be guided by realism and prudence in a world dominated by major powers

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## **TRANSNATIONAL SECURITY THREATS AND NON-TRADITIONAL SECURITY CHALLENGES**

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### **ABSTRACT**

*This paper is set within the context of the inter-dependent nature of our globalised world and examines transnational security threats and challenges and their impact on the Region. Some security threats arise from non-state actors while other security issues are generated from non-human sources. Each nation-state now faces issues relating to human security, health and bio-security, cyber security, as well as piracy and terrorism while other security challenges relate to the effects of failed or failing states, extremist ideologies and actions by non-state actors.*

*This paper addresses the broadened notion of security from states to societies and the issue of transnational security challenges and their impact on the Region.*

*Keywords: Non-traditional security, transnational security, threats, hazards, securitization, human security, non-state actors.*

### **INTRODUCTION**

In the past the world has faced threats to security as a result of politics, failed diplomacy and military action. Today, the world faces a new class of threat which includes those generated by non-state actors and some hazards arising from non human sources. These are often referred to in the literature as non traditional security issues [1], or sometimes as transnational security threats [2]. Many, if not most, are both non-traditional and transnational in nature.

An underlying premise of this paper is that the realist definition of security is too limited to provide an adequate conceptual framework to analyse or assess transnational security issues because, in considering such issues, the nation-state is not the sole referent. Nonetheless, territorial integrity is a valid and relevant referent, as noted by Newman, ‘*Traditional conceptions of state security are a necessary but not sufficient condition of human welfare*’ [3]. The realist equation of security with territorial integrity, ignores the interconnected globalised world of the twenty-first century in which the notion of sovereignty is ‘*far more elastic than it once was*’ [4]. As noted by Dupont, ‘*realism is incapable of capturing the determining changes in the international and East*

*Asian security environments and of grasping the requirements of an extended security praxis*' [4]. Consequently, the referent objects of security today, which include societies and human collectives, require an expanded theoretical construct. While non-traditional security issues and those of a transnational nature have risen in prominence in policy circles there has been a lack of definitional clarity in the literature.

## **THE BROADENED NOTION OF SECURITY**

Much has changed since the Cold War period in which games theory, brinkmanship and nuclear strategy were at the forefront of much decision making. Of the 120 armed conflicts during the Cold War, most were between states. By contrast, since 1989 the majority of conflicts have been internal [4]. In 1994, just after the end of the Cold War, the United Nations Human Development Report stated that the concept of security had, *'for too long been interpreted narrowly: as security of territory from external aggression, or as protection of national interests in foreign policy*' [5].

The Report emphasised human security. Yet, in the 1990s, non traditional security issues were peripheral and of marginal significance to strategic and foreign policy considerations associated with international security. There was little understanding that human security enhances state security. The concept of human security today remains a sensitive one within the policy community of South East Asia. As noted by the Policy Roundtable on Asian Non Traditional Security in July 2012, *'the term human security' is still not used in major ASEAN documents*' [6].

Actions by non-state actors at the start of the new millennium prompted new thinking, and issues which were once peripheral to the security of a nation-state have now become central to security concerns of both states and people and reflect a shift from the once dominant realist perspective. The imperative for a change in thinking and approach was recognised by policy and decision-makers who began with the assumption that transnational issues presented a different set of analytic challenges than did more traditional threats targeted primarily at nation-states.

The concept of security is essentially a contested term [7], and an enduring characteristic of the security concept is its ambiguous nature. Like the concept of security, the concepts of non traditional security and transnational security threats are also contested concepts. The difficulty of defining security, conceptually, is compounded by the different cultural, ideological and cognitive frameworks that differentiate nation-states and national responses [8]. This argument could reasonably be applied to the concepts of non traditional security and transnational security threats. Such ambiguity may not necessarily be a bad thing. As noted by Dupont [8], the very ambiguity of the concept of security makes it attractive as an organising principle in the Asia-Pacific region where generalised statements of principles are preferred to the more precise, legalistic prescriptions common to Western tradition.

## NON-TRADITIONAL SECURITY

While there may be no authoritative definition for non-traditional security, there are common themes and characteristics within definitions. One definition of non-traditional security threats is, '*challenges to the survival and well being of peoples and states that arise primarily out of non-military sources, such as climate change, cross-border environmental degradation and resource depletion, infectious diseases, natural disasters, irregular migration, food shortages, people smuggling, drug trafficking, and other forms of transnational crime*' [9]. The issues identified in this definition have a number of common characteristics. First, they are generally non-military in nature; secondly, they are transnational in scope; and thirdly, they are quite rapidly transmitted. Nonetheless, the definition blends security threats by non-state actors with hazards arising from non-human sources which pose risks and warrant priority attention but which may not lead to actual security threats. This blending of threats and hazards contributes to definitional ambiguity.

Non-traditional security threats have also been defined as those which are framed in contrast to traditional security threats and refer to factors other than military, political and diplomatic conflicts but which can pose threats to the survival and development of a sovereign state and human kind as a whole [10]. This particular definitional perspective also offers a number of distinctive characteristics in comparison with traditional security threats. For example, these types of threats can affect both government institutions and civilian populations; and originate from non state actors and natural causes, rather than actions by nation states. Secondly, the indirect effects can cause significant economic losses to a region; examples from the Asia-Pacific region include the Asian financial crisis in 1997, and the Severe Acute Respiratory Syndrome (SARS) outbreak of 2002-2003, and the recurring outbreaks since 2003 of the highly pathogenic avian influenza (H5N1) virus known as 'bird flu' which has a sixty percent mortality rate [11] in those affected [12]. However, as noted by Zhang, there are examples that demonstrate traditional security and non-traditional security do not, in fact, exist independently of each other. Instead, he argues, they could be different stages of manifestation of the same issue [13].

Because non traditional security threats originate from non state actors, they are likely to be more unpredictable than traditional security threats. As a corollary, the traditional constraints on the speed and spread of a threat, which are usually found in inter state security issues, are typically absent. Consequently, traditional response mechanisms, in particular those favoured from a realist perspective, are insufficiently flexible and thus, inadequate.

A further and comprehensive definition of the concept of non-traditional security was put forward by Ullman in 1983, who defines a threat to national security as, '*an action or sequence of events that threatens drastically and over a relatively brief span of time to degrade the quality of life for the inhabitants of a state, or threatens significantly to narrow the range of policy choices available to the government of a state or to private, non governmental entities (persons, groups, corporations) within the state*' [14]. Ullman's

definition has since been refined so that it is interchangeable with non-military concerns in the literature [15].

## **TRANSNATIONAL SECURITY THREATS**

Like the concepts of security and non-traditional security, there is no single authoritative definition of the concept of transnational security threats. The term has been defined as a, '*paradigm for understanding the ways in which governments and non-state actors – functioning within and across state borders – interact and affect the defence of states and their citizens*' [16]. Wesley [17] makes the point that perhaps the most mistaken geopolitical understanding of the origins and dynamics of transnational threats was put forward by Barnett [18] who argued that the greatest transnational threats come from those states least connected to the flows of globalisation. Implicitly this refers to fragile or failed states and Barnett's view is countered, to some degree, by the assertion by Wesley and others [19] that there is no causal connection between fragile states and transnational threats. Yet it is evident that when states collapse, human and global securities are threatened and present opportunities for non-state actors.

Transnational threats have little regard for political or territorial boundaries and emanate from both non-state actors and could develop from non-human sources, and they need to be understood in terms of the transnational context in which they operate. Such threats challenge the survival and well-being of peoples and states and arise primarily from non military sources.

The involvement of insurgent and extremist groups in criminal activity has shifted transnational activities from a purely criminal context onto the security agenda. As noted in a report to the US Congress in 2010, '*Threats posed by a crime-terrorism nexus may be particularly challenging, as the scale and nature of their cooperation are believed to vary widely and limited anecdotal evidence largely serves as the basis for current understanding of the problem*'. However, the report also went on to note that, '*there remains an intelligence and research gap in the prevalence, threat, and future trends associated with criminal-terrorist links*' [20], resulting in little evidence regarding whether the security impact of such relationships are, in fact, increasing, decreasing or maintaining the same level of historical activity. Nonetheless, globalisation offers criminal and terrorist groups an effective means to operate across porous state borders as they function in a 'transactional' [21] way, meaning they form, disperse and reform in different permutations for specific projects and as required.

Transnational security threats can take many forms such as unregulated population migration, which is associated with people smuggling and trafficking, present unprecedented challenges. Energy and food security, and threats to their respective supply chains highlight regional as well as individual nation-state vulnerabilities. Economic threats, in the form of money laundering, fraud and extortion together with cyber security threats which were previously referred to as *white-collar* crime are now

on the security agenda of most nation states. Non state actors can also generate threats arising from hazardous situations. For example, bio weapons associated with infectious diseases and pandemics are real security concerns. Environmental security threats can arise from climate change and natural disasters. These issues can be difficult to neutralise because they are, '*transnational in scope defying unilateral remedies and requiring comprehensive political, economic, social responses, as well as humanitarian use of military force*' [22]. Such a comprehensive response is beyond the capacity of the narrow realist response mechanism.

These types of threats predominately by non-state actors are complex and bring with them a challenging set of issues which have a significant impact on the defence and security of states, their economies, their people, and their well being. Transnational crime, illicit drug production and smuggling; terrorism, piracy and cyber security are all non traditional security threats carried out by non state actors in the Region and, in some instances *perhaps*, sanctioned by some states. Such threats contribute to a complex causally interrelated process that impacts on security and needs to be addressed by appropriate responses and through improved structural frameworks.

## **IMPACT ON AND CHALLENGES FOR THE REGION**

As noted by Jaspardo and Taylor [23], transnational and non-state threats including international organised crime, terrorism, illicit trafficking (in drugs, wildlife, humans, arms, etc.), piracy, infectious disease, and illegal migration flows are major concerns in Southeast Asia. The Council for Asian Transnational Threat Research (CATR) report in 2010 noted that individual countries face a broad spectrum of internal threats but the boundaries between internally-driven and externally driven threats and challenges were blurring.

The origin and impetus of these unstructured non-traditional transnational security threats is a source of debate in the literature but there appears to be a growing consensus. It has been argued that globalisation, trade liberalisation, the rise of new media; migration and displacement are all contributing to transnational security threats [24].

There is a increasing recognition that many transnational security threats are proving to be more severe and more likely to inflict harm to a greater number of people than conventional threats of inter-state wars and conflicts [25]. Nation-states in the Region face a new suite of challenges from these threats. In 2003 it was reported in *The Strait Times* [26] that financial volatility, transnational terror and infectious disease represented a new breed of transnational threats to countries in the Region, and that their eradication was unlikely because they are likely to be a recurring theme into the future arising from external forces '*interacting closely with the internal vulnerabilities of states*'. Those issues identified in 2003 have been recurring themes in the Region and may have been exacerbated by the complexity of other issues which have been securitized as well as by the lack of effective structural measures within and across nation-states.

The effect and impact on nation-states in the Region from transnational security threats have common characteristics whereas additional characteristics have been identified for specific types of threats. Terrorism and other forms of violent ideological extremism give rise to social and economic marginalisation which feed instability and radicalisation; whereas unregulated population movements have had a political impact on the willingness and ability of some nation-states to accept refugees and how illegal migrants are treated. The 2010 CATR report noted, for example, that the steep rise in illegal migrants to Malaysia resulted in a high percentage of them being imprisoned. The follow-on effect has been the spread of organised crime networks in human trafficking including child and sex workers as a further consequence [27].

Not all forms and manifestations of transnational activity are threats to nation-states and the well being of their people. As noted by Jenkins and Bond [28], some criminal activities are less disruptive to daily societal functions due, in part, to institutionalised mechanisms of social control and cohesion. Consequently, not all transnational issues are or become security threats rather, they warrant priority attention. With the increased number of issues being securitized, this distinction has often been blurred by policy makers and in the literature. Further research to clarify this issue is required.

Transnational security issues have raised concern among policy makers for several reasons. First, the negative impacts of such issues are not confined to the territorial boundary of a nation-state but they cross borders and affect other countries. Secondly, transnational security threats are known to cause serious damage to the economic, social and political development at the systemic level creating economic, social and political instability. Thirdly, nation-states are limited by being sovereign-bound with limited national-level legislation [29].

Notwithstanding the work and achievements of consensus-based organisations such as ASEAN, generally in the Region there remains a lack of effective transnational collaborative mechanisms or legal regimes. The absence of these mechanisms to coordinate effective Regional responses presents difficulties because the nature and pattern of criminal activity is fluid and fluctuates. Consequently, it is difficult to deal decisively with most transnational threats and the sheer geographic and cultural diversity of this Region makes any single approach to the impact of transnational security threats almost impossible.

The challenge of how to address both the cause and the effect of these security issues remains real for regional leaders, particularly because such security threats do not necessarily pose a direct challenge to territorial sovereignty, but rather to the authority of the nation-state and effective government [30]. Accordingly, these threats require a different way of thinking about security that goes beyond the boundaries of conventional response and which will ultimately enhance the Region's defence and security of states and people.

The future relies on moving away from a predominantly reactive posture. Instead, bilateral and multilateral relationships, alliances and partnerships are critical. Context specific strategies are necessary to make a difference for ‘*real people in real places*’ [31] when preparing for and dealing with transnational security threats, many of which may be fast moving or Black Swan events – that is, low probability high impact events beyond the realms of normal expectations. Development of such an approach will require the collaboration of policy makers and researchers in academia and think tanks.

## CONCLUSION

The new class of transnational security threats in the twenty-first century do not respect state borders and many of them are non traditional security threats perpetrated by non state actors. When analysing issues it is necessary, first, to discern between issues which require priority attention and those which are, in fact, security threats that warrant the full weight of a security response. Secondly, because a number of these threats are high impact, hard to predict, rare Black Swan events they do not always emerge slowly. Thirdly, it is necessary to distinguish between those issues which, from the outset are transnational security threats and those which may become ones.

Many security threats do not lend themselves easily to domestic or national responses, and the most effective responses may not always be state centric. Therefore, developing Regional multilateralism may offer a way forward which has the potential to present a flexible and practical mechanism to improve the defence and security of individual nation states as well as overall within the Region. Indeed, the inter-relationships of partnerships and interconnecting networks within the Region offer a sound basis to strengthen defence, security and mutual assistance. Such shared responsibility materially assists in identifying future security threats before they happen and ensures effective future resilience across the Region.

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## **WEAPONS OF MASS DESTRUCTION TERRORISM AND SOUTH ASIA**

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### **ABSTRACT**

*South Asian region is witnessing a decade long ongoing war with a major presence of external powers. This is the region where one fifth of nuclear weapon states in the world reside and some of the most dreaded terrorist organizations operate. The region is perceived to be looming in the show of possible usage of Weapons of Mass Destruction (WMD). This article debates on the issues of WMDs and the political environment that have led to their development. It further analyses the likely potential of usage of such weapons either by the state (most likely a covert usage) or high profile non-state groups within the region and possible future trends.*

*Keywords: Weapons of Mass Destruction, Terrorism, Nuclear Biological and Chemical, Chemical Weapons Convention Committee, Nuclear Non-Proliferation Treaty*

### **INTRODUCTION**

In 2003, the United States (US) invaded Iraq fearing the threat from Weapons of Mass Destruction (WMD). The rest is history! This one case is adequate enough to prove how states fear the threat from WMDs and what actions they are ready to take to address this threat. The word WMD has been in the lexicon of international security for many years. Various theories have been in vogue about the origin of the term WMDs and what it actually means. As per some, the term “weapons of mass destruction” was first coined on December 28th, 1937 as a reference to bombing of cities during the Spanish Civil War. The term became popular in the US after the Second World War in reference to atomic and hydrogen bombs. Since then, the use of term has varied to a great degree; however, in today’s parlance, it is generally used for weapons capable of killing large numbers of people [1].

Commonly, the WMD category is being used for a group of weapons capable of causing mass casualties, namely nuclear, biological and chemical (NBC). There have been cases where missiles have also been discussed in this category of weapons. Normally, when these weapons are being discussed it is assumed that the delivery platforms for them are also being considered in the backdrop. Hence, missiles do form a part of any debate on WMDs either directly or indirectly.

The subject of WMDs is vast and can be viewed from a variety of perspectives. The world understood what damage a nuclear weapon can do during the Second World War. Yet, during the early years of Cold War, the danger of nuclear war within the domain of conflicts between two states was much more real. Subsequently, over the years, the majority of the world appears to have become far more civilized. Consequently, during the last few decades, particularly after the end of the Cold War, many in the world have started raising concerns about issues like human rights, global warming and climate change, as well as usage of heinous weapons in wars, like vision damaging lasers, permanent disability causing landmines etc. It is therefore reasonable to expect that no sane nation would resort to the usage of WMDs in future. At the same time no acceptable global norms exist towards banning all types of WMDs. Forward looking and developed states are still holding on to their nuclear weapons arsenals. Some states in the world are still suspected of attempting to develop nuclear weapons.

On the other hand, there is an increasing danger that the usage of WMDs in some form or other could be made by non-state armed groups, especially terrorist organizations. It is perceived that the 21<sup>st</sup> century terrorist is looking at these weapons not only as 'weapons for destruction' but also for 'mass disruption' because of the peculiar characteristics of these weapons especially in terms of their 'fear-factor' and psychological impact.

Luckily, the widespread global proliferation of WMDs has not taken place. Even today such weapon, or the potential to create such weapons, lies in the hands of few state actors. There are few regions of the world where the danger from these weapons looms large with chances of both state and non-state actors using it. This chapter analyses the role of these weapons in South Asia.

Under the backdrop of the existing geo-political situation in general and South Asia in particular, this chapter attempts to discuss the threat from WMDs for the region in the context of both state versus state as well as state versus non-state scenarios. The paper focuses on perceived distinctions between these weapons, the political environment that have led to their development, likely potential of usage by the rogue nations or high profile non-state groups within the region, and possible future trends.

## **WEAPONS OF MASS DESTRUCTION IN SOUTH ASIA**

The geographical extent of the region of South Asia is at times viewed differently. Some consider South Asia as a region only comprising of India and Pakistan while others prefer to describe this area as Southern Asia. SAARC (South Asian Association for Regional Cooperation) is an effective multilateral arrangement addressing economic and political issues of the region. For purpose of this paper, South Asia is defined as a region comprising of SAARC countries. The countries are India, Pakistan, Bangladesh, Nepal, Bhutan, Maldives, Sri Lanka and Afghanistan. Amongst this group, with regards to WMDs there are basically two important countries and they are India and Pakistan.

However, other small states also have relevance particularly when WMDs are being discussed from terrorism point of view.

Since the end of Second World War, there have been a number of treaties dealing with the limitations, reductions, and elimination of weapons of mass destruction and/or their transport systems (generally called delivery systems) [2]. Two categories of weapons of mass destruction, namely, biological and chemical weapons, have been outlawed by international treaties. The treaty for banning biological weapons called Biological and Toxic Weapons Convention Treaty (BTWC) came into being in 1975 and the Chemical Weapons Convention Treaty (CWC) in 1997.

The remaining category of nuclear weapons, however, continues to play a major role in the larger geopolitical discourse on security. These weapons remain instruments of national and collective security, the possession of which has been sought to be legitimised on a selective basis through the permanent extension of the Nuclear Non-proliferation Treaty (NPT) in May 1995 [3]. These nuclear weapons exist in the 'security realm' of few nation-states and are likely to dominate the global strategic discourse for many years to come.

The nuclear weapons are even considered by some as weapons capable of stopping conflict amongst two states or at least the weapons, which could avoid the escalation of conflict. Several political theorists argue that the presence of nuclear weapons on both sides can prevent another major war. By making the risks of war unthinkable, the logic goes; nuclear weapons create a balance of terror, sobering leaders and necessitating dialogue, as happened between the USA and the USSR during the Cold War [4].

On the other hand, the tragic attacks of 9/11 have forced all 'terrorism infected' states to think differently about their national strategy. Particularly the anthrax attacks in the US immediately after 9/11, killing relatively less number of people (five), but creating major panic and causing substantial loss to economy has raised concerns about WMD terrorism manifold. It is even feared that it may be impossible to address WMD threats by conventional means alone. Today, the most feared threat is that from the use of WMD. At the same time, cynics argue that the threat of WMD terrorism couldn't be overemphasized in the present context of conventional terrorist attacks. However, evidence suggests that terrorist perceptions are changing and the use of WMD as a terror tool cannot be completely ignored.

## **NUCLEAR SCENARIO**

In South Asia, India and Pakistan are nuclear weapon states that exist outside the framework of the NPT. The situation in the region is unique since in this case states sharing geographical boundaries have nuclear weapons (India's other neighbour China is also a nuclear weapon state). India and Pakistan have fought four wars during last sixty years and one of these (Kargil) was fought when both the nations had already

demonstrated their nuclear weapon capability. India's relations with nuclear Pakistan have remained strained for most of the period after both the countries proved their worth as 'nuclear weapon states (NWS)' in 1998.

The region of South Asia has been identified by some commentators in the world as a 'nuclear flashpoint', but some analysts are of the opinion that calling South Asia as a nuclear flashpoint is not justified and is indicative of a western bias. However, it needs to be emphasized that the tensions amongst both states have mostly remained in a state of flux and it has been observed that the tensions increase substantially when a major terrorist attack takes place on Indian soil with an obvious Pakistani footprint. Coercive diplomacy was seen in South Asia after the attack on the Indian parliament in December 2001. In retaliation for the attack, India launched a massive mobilization of troops on the border with Pakistan, demanding an end to terrorism. The mobilization ended almost a year later with questionable results. Nuclear deterrence was one of the main reasons why India could not go ahead with its threat [5].

Both the states have done significant investments in the delivery platforms for their nuclear weapons. The major investments have been in the field of missiles. Also, their air forces are capable enough to launch nuclear munitions. India proposes to have a nuclear triad, with distinct land, sea and air components. In India the overall command of the nuclear units is under the civilian control at the apex level. Technically, Pakistan's nuclear arsenal is overseen by a National Command Authority (NCA) which was set up in 2000 and is headed by the President with the Prime Minister as its vice chairman. Key cabinet ministers and the heads of the army, navy and air force are also members of the NCA, which controls all aspects of the country's nuclear programme, including deployment and, if ever necessary, the use of the weapons [6]. However, it is generally perceived that the military is the key with regard to the management and control of the nuclear weapons. Pakistan has no policy like India's no first use in respect of the usage of nuclear weapons.

India, through a draft nuclear doctrine (published on August 17, 1999), has announced its plans to develop a minimum nuclear deterrent (MND) force comprising of a triad of nuclear delivery systems, air, mobile land based launchers and sea based platforms. This doctrine contains four major attributes: 1) No first use of nuclear weapons, 2) Credible Minimum Nuclear Deterrence, 3) Command and Control, and 4) Survivability. The first two are somewhat related. In the "no first use" clause, India asserts it will not be the first to initiate a nuclear strike. However, should deterrence fail, India's MND will ensure a retaliatory capability to inflict punishment to her adversaries. The authority to release a nuclear weapon resides in the Prime Minister, or his designated successor(s). The final element, survivability, encompasses not only the survivability of command and control, but also of the forces themselves. These forces will be based on a triad of delivery assets to ensure redundancy for survivability [7].

At various fore, India has emphasized that it does not envisage the usage of nuclear weapons under any circumstances and believes that they are the weapons of deterrence.

However, India reserves the right of using the nuclear weapons in case of a nuclear attack by the adversary and would retaliate to any nuclear strike with a massive counter attack. In January 2003, India announced a formal command structure for its nuclear arsenal. The announcement included elements established in India's draft nuclear doctrine of 1999, including its goals of maintaining a "credible minimum deterrent" and "no first use," but added a new caveat that India "will retain the option" of using nuclear weapons in retaliation for a major attack by biological or chemical weapons [8].

## **CHEMICAL AND BIOLOGICAL WEAPONS**

The Asian region is unique in terms of having experienced various WMD disasters. With regards to WMD, Japan could be said to have been both the prey and the predator. The Second World War ended with the dropping of the nuclear bombs over Japan. But in late thirties Japan had also been responsible for using biological weapons in China. Fortunately, no usage of WMD has ever taken place in the South Asian region. Particularly with regards to Chemical and Biological weapons (CB weapons), there has been little interest shown by the states of the region.

India's record in regard to chemical weapons is a bit muddled. This is essentially because after denying the possession of chemical weapons for many years, in June 1997, India became one of the six states that declared possession of chemical weapons stockpile and production facilities. India is yet to finish the destruction of its stockpiles. However, since India declared possession of chemical weapons it is correctly following all global norms towards their destruction and has not faced any criticism in this regard from any of the concerned international agencies.

India is an original signatory to the CWC (signed on January 14, 1993). India was also amongst the first 65 countries to ratify this treaty in September 1996. Immediately after India's admission, a four-person Organization for the Prohibition of Chemical Weapons (OPCW) inspection team visited a laboratory in Gwalior to verify India's compliance with the CWC in July 1997. Currently, India is in the process of destroying these weapons in accordance with its obligations to the CWC. By 1999, India destroyed more than one per cent of its declared stockpiles to meet the requirement of the convention for the first phase of Category 1 chemical weapons destruction.

Phase II of the convention required the destruction of 20 per cent of its stockpile by April 29, 2002. By November 2003, India had destroyed 45 per cent of its declared Category 1 stockpile six months ahead of schedule. By the end of 2004, India had destroyed 1.7 metric tons of toxic waste that it had declared as Category 1 chemical weapons, all of its declared Category 2 and all 1,558 of its Category 3 chemical weapons. In fact, by the end of October 2004, OPCW had carried out 16 inspections in India. By 2005, from among the six possessor states, India was the only one to meet its deadline for verified CW destruction and for inspections of its facilities by the OPCW. It has also incorporated all three CWC schedules of chemicals into its national export control list.

India has succeeded in destroying almost more than 75 per cent from the entire stock. The 11th session to the conference of the state parties to the CWC concluded in Hague on December 8, 2006 had extended India's term for total destruction to April 28, 2009 [9]. India succeeded in sticking to this deadline and the India government notified to the Organization for the Prohibition of Chemical Weapons (OPCW) on March 26, 2009 about the fulfilment of its obligations to "completely destroy" its declared chemical weapons stockpile.

Pakistan, which is also a signatory to CWC and BTWC, has always denied that they have any interest in this field. Also, hard evidence to prove Pakistani interest in biological weapons and chemical weapons programme is scarce. But, certain circumstantial evidence raises doubt about their interest in these weapons. Probably, Pakistan has the potential and the intention to develop and produce offensive CB systems. As per few reports Pakistan probably has interest in the acquisition of technology related to biological and chemical weapons programme. Some assessments based on intelligence inputs indicate that Pakistan has manufactured weapons for blister, blood choking and nerve agents. It is believed that China could have been a possible supplier of technology and equipment in this regard. Pakistan has numerous munitions systems which could be used to deliver chemical warfare agents, including artillery, aerial bombs and missiles. Baloch nationalists have often accused Pakistani security forces of using chemical weapons, namely phosphorus gas against Baloch rebels and civilians [10]. India believes that Pakistan used chemical weapons against its soldiers in Siachen in 1987. However, on official front there is agreement between India and Pakistan on complete prohibition of chemical weapons, which was signed in 1992. It commits both the governments to become regional signatories of CWC [11]. According to US reports (1996), Pakistan had been conducting research and development with potential biological warfare applications. It is not known whether this potential has since been realized [12].

## **CHEMICAL, BIOLOGICAL, RADIOLOGICAL, NUCLEAR TERRORISM**

Terrorist exploits "asymmetric" tactics with the aim of creating havoc in public mind. They might look for weapons, which are unconventional, highly lethal, deliverable through different means, have the ability to create impact and panic, and are easily procurable and cheap. CBRN (chemical, biological, radiological, nuclear) weapons satisfy most of these criteria.

Asia has again been a region where the non-state actors have used the WMDs effectively. During 1995 a Japanese cult Aum Shinrikyo had successfully used a chemical agent Sarin in a Tokyo subway, killing 15 people. On another occasion, followers of Osho (Rajneesh) had attempted to poison salad bars in Oregon, US. However, they had their roots in India and at that point of time were operating from the US because they had been forced to leave India (after moving out of the US, it is again operating in India with a different name). However, there have been no noticeable incidences of terrorists using WMDs on or from South Asian soil.

A new age of terrorism could be said to have begun in 1993 with the first attempt to destroy the World Trade Centre by causing one tower to topple on to another with the aim of killing all those in the towers as well as in the adjacent buildings and the streets. During the last decade, the world has witnessed many successful or unsuccessful forms of unconventional terrorism. In the South Asian context, the emphasis of terrorist groups has mostly remained towards using conventional forms of terrorism where bomb blasts, indiscriminate firing over crowded population centres, etc have been the main tools and tactics. In states like India terrorists in few cases have followed atypical methods like taking religious places under seize (incidences like Hazratbal Mosque incidence).

Even with terrorists opting for new tools and tactics to create terror, it is generally perceived that they may not opt for WMD terrorism. This is mainly because rarely is religious violence completely apolitical. It seems more likely that religious terrorists will think twice before executing any act that will make it harder for them to achieve their desired political aim. "Also given the need for sustaining public attention in an age when the media seeks drama and new scoops every day, terrorist incidents need to have a finite quality that produces an instant result. Chemical, biological or even radiological weapons offer no such instantaneous result but tend to act over a prolonged period. This lingering effect coupled with the inability of terrorists to control these weapons once they are used makes them somewhat unfit for terrorist operations" [13]. Under such circumstances, will such terrorists really resort to WMD terrorism? Many analysts feel that the use of WMD by terrorists under such circumstances seems unlikely.

However, in spite of little historical evidence being available regarding the usage of WMDs by the state or non-state actors and very less probability of the occurrence of such attacks, there is a growing concern about the possibility of the usage of these weapons due to various reasons. First, the world community as a whole is more worried about WMD terrorism because of the phenomenon of new terrorism, which is fundamentally different from the earlier versions of terrorism. Second, the behavioural patterns of present generation terrorism have shown change. In South Asia the terrorism is politically motivated and various terrorist groups operating here adopt violent means only to a limited extent. They are essentially using violence as a tool for bargain. Be it Kashmir, Nepal or Sri Lanka, they are fighting for a piece of land. But, at the same time, the Islamists groups are getting support from global terrorist networks like Al Qaeda. Such groups are religious fanatics and have been found to be more interested in mass casualty terrorism and total destruction. Such terrorist groups are expected to be more likely to use WMDs. It may also be noted that LTTE, while operating in Sri Lanka used more violent means and their philosophy was different from other groups operating in the region.

There have been few incidences in the region which give indications that the non-state actors either independently or with a covert state support have interest in using such type of terror tools. For instance, some sketches and calculations to make a helium powered balloon bomb filled with anthrax were found in Kabul office of an NGO headed by Bashiruddin Mehmood, one of the two Pakistani nuclear scientists detained in Islamabad

for questioning their alleged links with Osama bin Laden [14]. The “most chilling” items found included small bags of white powder and the “mass of calculations and drawings” of weather balloons with arrows indicating the suggested height of 10 km or 33,000 feet [15].

In the year 2002, the reputed magazines like Time and Far Eastern Economic Review had alleged that Bangladesh had become a safe haven for Taliban and Al-Qaeda fighters. This report that Bangladesh has become a “cocoon of terrorism” was taken with some suspicion at that point of time. However, subsequently many sources have claimed that terror outfits are flourishing in Bangladesh. There are even evidences of Al Qaeda’s link with a particular media group in Bangladesh [16]. From WMD point of view, an argument could be made that since Al Qaeda has known interests in WMD and since they are trying to establish themselves in Bangladesh it is important to keep this country also under check for possible WMD terrorism.

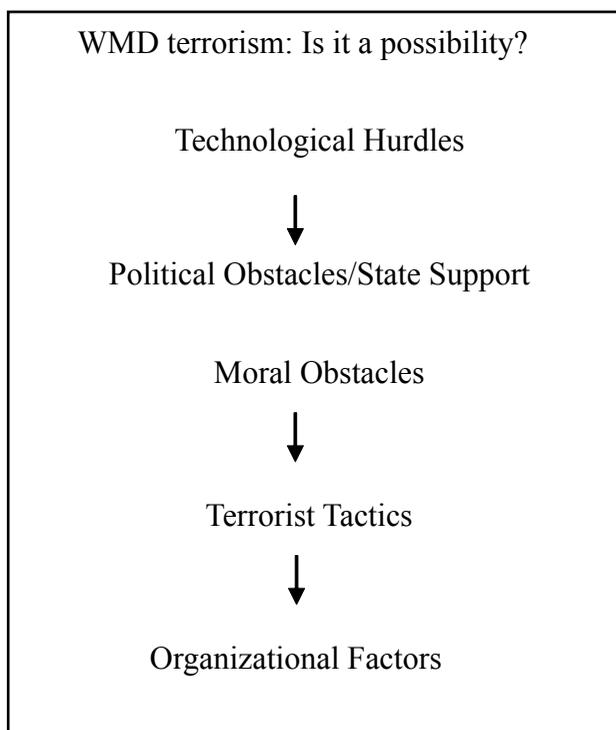
Sri Lankan intelligence sources have claimed many times that the Tamil Tiger leader V Prabhakaran had acquired chemical weapons. There is enough evidence available to prove that the LTTE had built up stocks of Cyanide and Potassium during the ceasefire period [17]. Also, there were reports that on few occasions LTTE had actually used chemical weapons. However, no substantial evidence was put forth to prove this charge. Both, the Sri Lankan government and LTTE, on a number of occasions, accused each other of using banned chemical weapons.

It has also been felt that the growth of chemical and biotechnology industry in the region could help the non-state actors to manage both hardware as well as the software to produce the WMD terror weapons. More importantly the threat from radiological terrorism is assumed to be the most probable because of the easy availability of the radioactive material either from hospitals or private/public laboratories.

## **TERROR ASSESSMENT**

It is difficult to explain WMD terrorism merely in terms of cause-effect relationship by arguing that since terrorists have not used this weapon so far they are not likely to use it in future. There is a need to critically analyse various dimensions of many other factors, which may explain WMD terrorism in detail. Table 1 indicates the broad categories of factors which in combination may explain the relevance of this threat in the present context.

**Table 1: Broad categories of factors explaining WMD terrorism threat**



In the South Asian context, a threat assessment could be carried out based on above ‘Relevance Tree’. This model could be applied to various organizations operative in the India, Sri Lanka or Nepal.

A broad analysis based on the above chart with terror groups like, Al Qaeda, LeT indicate that it is likely that such groups are capable of causing WMD terror and would not face any obstacles to launch such attacks. What might have prevented them till date, and is likely to prevent in near future, is a own cost benefit analysis to opt for such tools.

From the terrorist’s point of view, it is important to understand that in 21st century the manufacture of some kinds of WMD weapons do not pose much of a challenge to the groups which are becoming more technology savvy with every coming day. They understand that such weapons if used in whatever crude format they may be could cause extensive and acute panic. More importantly such attacks could raise the level of lethality to a new high and could force the state to hold talks with them.

## **NET ASSESMENT**

There are various perceptions being formed about the WMD terrorism. However, the purpose of a net assessment is not to measure such perceptions, but to try to scale

military, financial and political reality. Figure 1 and 2 attempts to scale the threats emanating from WMD in near and distant future. This assessment is done based on the author's understanding of the exact nature of threat based on the existing literature and the formal and informal discussions carried out with the experts in the field.

- Chances of hoax cases are maximum
- Usage of CBR weapons - a possibility
- Instability in Pakistan: Radical elements may use them; accidental blast could be a possibility. Pakistani Taliban needs to be watched for its growth within the state and its investments towards WMDs.
- Terrorists may procure a sub kiloton nuclear device from the existing 'Nuclear Networks'-possible mostly with state help
- American troops in Afghanistan could be the likely targets

**Figure 1: Assessment of near future weapons of mass destruction (WMD) threat to South Asia (5 years)**

- Suppose Pakistan becomes a failed state but Kashmir issue still remains unresolved: An Accidental Nuclear War?- Possibility could not be ruled out
- Assume the situation that Pakistan remains a stable state but no solution in sight for Kashmir issue: In such scenario desperation may drive Al Qaeda to opt for WMDs
- Designer bio-weapons could also be threat to the region with expected growth in biotechnology
- Agro terrorism is another area of biological weapons where states in the region should remain careful because the economy of the region is predominantly based on agriculture and terrorists could opt for such weapons to cause significant economic damages.

**Figure 2: Assessment of distant future weapons of mass destruction (WMD) threat to South Asia (5-10 years)**

## CONCLUSION

South Asia is region where two out of the nine nuclear weapon states reside. Also, the region is marred by terrorism and few lethal groups like Taliban are operative in this region. Similarly, Al Qaeda has significant influence over the region and is likely to enhance its activities in the near future. In likely Indo-Pak war scenario as both states have nuclear weapons; neither is likely to intentionally launch an all-out war. But, Pakistan's refusal to institute a no-first use policy for its nuclear weapons is designed to keep the Indians guessing as to when Pakistan might use its nuclear weapons. In addition, India understands that the absence of rational decision-making, unclear intentions, and a more declarative command and control structure in Pakistan keeps the probability of

overt or covert WMD conflict in the region greater than zero. Particularly, the increasing influence of Taliban in Pakistan is dangerous for the security of the region. In conclusion, it could be said that though the WMD threat for the region is not definitive, it remains a possibility.

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## **EXTENDED CONTINENTAL SHELF CLAIMS IN EAST ASIA: INTENSION FOR LEGAL CLARITY, POLITICAL DILEMMA IN REALITY**

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### **ABSTRACT**

*East Asia is home to many maritime disputes, e.g. China vs. Japan in the East China Sea and the multiple overlapping claims in the South China Sea. The submissions by the coastal states to the Commission on the Limits of the Continental Shelf, driven by the deadline of May 2009 (or ten years after the enter in to force for the United Nations Convention on the Law of the Sea by the State Parties, has resulted in ongoing debate on whether these submissions have helped clarify the maritime claims in East Asia or have created even more complicated situation for the maritime dispute settlement process. This article explores the submissions to the CLCS by the coastal states, and discusses the legal contribution arising from these submissions. It then analyzes the legal and political implication for maritime dispute management in the East China Sea and the South China Sea.*

*Keywords: Exclusive Economic Zone (EEZ), Continental Shelf (CS), United Nations Convention on the Law of the Sea (UNCLOS), International Tribunal for the Law of the Sea (ITLOS),*

### **INTRODUCTION**

East Asia is home to many outstanding maritime disputes. The territorial dispute over the Diaoyu Island between China and Japan, and maritime delimitation of Exclusive Economic Zone (EEZ) and Continental Shelf (CS) in the East China Sea, has drawn increasing attention in this region. The multiple overlapping claims in the South China Sea, especially in the Spratly Islands has always been a nagging problem between China and other Southeast Asia claimant states, which is now gradually becoming a flashpoint in Asia Pacific. Adding to the old story of competing claims, the deadline of May 2009 for coastal states to submit to the Commission on the Limits of the Continental Shelf (CLCS) the 2 information regarding the outer limits of continental shelf beyond 200 nautical miles has brought a new dimension to the existing maritime dispute. This paper reviews the

submissions to the CLCS by the Northeast and Southeast Asia countries and the following communications among the relevant states in regard to these respective submissions. It discusses the legal implication arising from these submissions, e.g. clarity of maritime claims, as claimed by some international law scholars [1]. It also raises the questions relating to the relationship between CLCS and other international institutions established under the United Nations Convention on the Law of the Sea (UNCLOS), such as the International Tribunal for the Law of the Sea (ITLOS) based in Hamburg, Germany, and International Seabed Authority (ISA) based in Kingston, Jamaica. Through analyzing the political implication for maritime dispute management in the East China Sea and the South China Sea, the author challenges the argument that the submissions by the coastal states in East Asia has enhanced prospects for regional cooperation in this disputed maritime domain. Legal, the submissions by the coastal states of East Asia has clarified the maritime claims in these regions. In reality, however, the submissions have served as a direct cause of the increasing tensions in troublesome East Asia waters.

## **SUBMISSIONS BY NORTHEAST ASIA COUNTRIES**

Article 76 (8) provides, that information on the limits of the continental shelf beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured shall be submitted by the coastal State to the CLCS set up under Annex II of United Nations Convention on the Law of the Sea (UNCLOS) on the basis of equitable geographical representation. Upon receiving the submission, the CLCS shall make recommendations to coastal States on matters related to the establishment of the outer limits of their continental shelf. It also provides that the limits of the shelf established by a coastal State on the basis of these recommendations shall be final and binding. 3 According to Annex II, Article 4 of UNCLOS, the timeline for the submission along with supporting scientific and technical data as soon as possible but in any case within 10 years of the entry into force of CLCS for that State. On the issue of a possible further extension beyond 10 years of the time period for making submissions to the Commission, as proposed by the Pacific Island Forum States [2] several delegations recognized that such an extension would accommodate the needs of developing countries, which lacked the requisite expertise and resources to fulfill the requirements of article 4 of annex II within the prescribed period. A draft decision was prepared by the Group [2] which was subsequently adopted by the Meeting of States Parties [2]. The decision provides that, for a State for which the Convention entered into force before 13 May 1999, the date of commencement of the 10-year time period for making submissions to the Commission is 13 May 1999, which makes May 13 2009 the deadline for a lot of coastal states regarding their submission to the CLCS.

In Northeast Asia, both China and the South Korea submitted preliminary information to the CLCS by the deadline. The preliminary survey, in China's submission on May 11, 2009, relates to an extended continental shelf area beyond 200 nm to the western slope of the Okinawa Trough in the East China Sea. China also stated that it reserves the right to make outer continental shelf submissions relating to areas in the

East China Sea and elsewhere in the future [3]. In its Preliminary Information regarding the Outer Limits of the Continental Shelf, South Korea informed the CLCS the status of preparation on surveying in the East China Sea and the intended date of making a submission [4].

Japan is much faster than its neighbors. Its submission to the CLCS on 12 November 2008 covered seven distinct regions located to the south and southeast off the main islands of Japan, namely: the Southern Kyushu-Palau Ridge; the Minami-Io Io Island region; the Minami-Tori Shima Island region; the Mogi Seamount region; the Ogasawara Plateau region; the Southern Oki-Daito Ridge region; and the Shikoku 4 Basin region [5]. Japan admitted that there was potential overlap between Japan and the US in the areas from Haha Shima Islands and Minami-Tori Shima Island and from Minami-Io Io Island; and between Japan and the Republic of Palau in the area from Oki-no-Tori Shima Island.<sup>8</sup> The US, in its note verbale to the UN Secretary General, while pointing out the potential overlap, stated that it does not object to Japan's request that the Commission consider the documentation in its submission relating to the aforementioned areas and make its recommendations are without prejudice to the establishment of the outer limits of its continental shelf by the United States, or to any final delimitation of the continental shelf conducted subsequently in these areas between Japan and the United States [6]. Palau seems to take the same approach as the US, noting the potential overlap but not objecting to Japan's request [7].

Unlike the US and Palau, neither China nor South Korea has potential overlap with Japan in the areas covered in Japan's submission. Their objection to Japan's submission in the area of Oki-no-Tori Shima is related to the concept of -Island and -Rock, which was indicated in a serials of note verbale to the UN Secretary General by both countries'<sup>11</sup> [8]. China expressed the view that -while exercising such right in establishing the outer limits of their continental shelf beyond 200 nm, States Parties shall also have the obligation to ensure respect for the extent of the International Seabed Area (The Area), which is the common heritage of mankind, and not to affect the overall interests of the international community as a whole [9]. It pointed out that -the Oki-no-Tori Shima Island is in fact a rock as referred to in Article 121 (3). Therefore, China wishes to -draw the attention of the members of the Commission...to the inconformity with the Convention with regard to the inclusion of the rock of Oki-no-Tori Shima in Japan's submission [9]. South Korea has expressed similar views as China [10]. Japan, however, argued that the interpretation of that Article 121 of UNCLOS did not fall within the 5 mandate of the Commission and was not referred to in the rules of procedure. It thus requested the Commission not to take into account the position expressed in the two notes verbales [11].

The CLCS considered this issue at its meetings on 20 April 2009, [5] 1 October 2009 [12] and 30 April 2012 [13]. In its CLCS/74 report, the Commission stated that

*“Addressing the Southern Kyushu-Palau Ridge Region (where the Okinotorishima is located—**emphasized by the author**), the Commission noted that, in accordance with*

*the decision taken by the Commission at its twenty-fourth session (see CLCS/64, para. 26), the Subcommittee had prepared the draft recommendations on all parts of the submission. The Commission also recalled that, according to the same decision, it would not take action on certain parts of those recommendations until it decided to do so. The Commission also took note of all the relevant communications received from China, Japan, Palau, the Republic of Korea and the United States of America, including the most recent communications received from China, Japan and the Republic of Korea.” [13].*

The Commission voted on the proposal to take action on the part of the draft recommendations relating to the Southern Kyushu-Palau Ridge Region. The proposal did not receive a two-thirds majority of votes: out of 16 members, 5 were in favour, 8 were against and 3 abstained. The Commission considered that it would not be in a position to take action on the parts of the recommendations relating to the Southern Kyushu-Palau Ridge Region until such time as the matters referred to in the communications referred to above had been resolved [13].

## **SUBMISSION BY THE SOUTHEAST ASIA COUNTRIES**

The situation in the Southeast Asia seems more complicated. Some submission did not articulate much discussion or debate. Indonesia's submission on 16 June 2008 which covered the area of North West Sumatra, was the first partial submission [14]. Indonesian has started consultations with neighboring States to explore the possibility of making a joint submission in respect of the area of the South of Sumba and North of Papua [5]. The submission by Myanmar [15] on 16 December 2008 did not generate objections by its neighbouring countries since the submission was not the subject of any dispute [12]. The submission of the Philippines on 8 April 2009 was a partial one in the Benham Rise region. No note verbale of protest concerning the submission from any other coastal State had been made [12]. The Philippines reserved the right to make future submissions in other areas [12]. Brunei also submitted to the CLCS its preliminary information [16].

Situation in the South China Sea, where some submissions in this region cover, is much more controversial and has generated heated debates upon the submission. On 6 May 2009, Malaysia and the Socialist Republic of Viet Nam submitted jointly to the CLCS, covering the area in respect of the southern part of the South China Sea [17]. The CLCS was informed that -there are unresolved disputes in the area covered by the submission, and stated that the submission does not prejudice matters relating to the delimitation of boundaries between States with opposite or adjacent coasts [12]. China and the Philippines reportedly objected to this joint submission strongly, as indicated from their note verbale to the UN Secretary General repetitively [18]. Both countries claimed that the area covered in this joint submission is under their jurisdiction. The common consensus is that a vast area of the South China Sea is in dispute, which requires prior consent from all the dispute states before the submission to the CLCS [12]. Hence, China requested the CLCS in its note verbale to the UN on 9 May, 2009, -not to consider

the Joint Submission by Malaysia and the socialist Republic of Viet Name [19]. China also attached to this note verbal a map (the U-shape Line Map), stating that -China has indisputable sovereignty over the islands in the South China Sea and the adjacent waters, and enjoys sovereign rights and jurisdiction over the relevant waters as well as the seabed and subsoil [19]. The Philippines, in its note verbale to the UN dated on August 4, 2009, states that -In cases where a land or maritime dispute exists, the Commission shall not consider and qualify a submission made by any of the States concerned in the dispute [20].

Viet Nam separate submission to the CLCS on 7 May 2009, in respect of the North Area (VNM-N) [21], also encountered strong protests from its neighbours, especially China and the Philippines. Though Viet Nam is of the view that the area is not the subject of any overlap and dispute, [12] the CLCS was informed that there is a common understanding that the area of continental shelf in this submission of overlapping interest by several coastal States. Thus both China and the Philippines requested the CLCS to refrain from considering the Unilateral Submission by the Socialist Republic of Viet Nam [22].

At its 24<sup>th</sup> session, the CLCS decided to defer further consideration of the submission and the notes verbales until such time as the submission is next in line for consideration as queued in the order in which it was received. The Commission took this decision -in order to take into consideration any further developments that might occur throughout the intervening period during which States may wish to take advantage of the avenues available to them, including provisional arrangements of a practical nature as contained in annex I to its rules of procedure [12].

## **LEGAL IMPLICATION OF THE SUBMISSIONS TO THE CLCS**

### **Legal clarity**

The submissions to the CLCS have aroused a debate among international law scholars. Some speak highly of the value of these submissions to the CLCS. McDorman argues that -Following May 2009 there is some clarity and even a trend of South China Sea claimant states not utilizing the insular features of the Spratlys as base points for the EEZ and continental shelf claims [1]. This argument is also supported by Beckman who claims that as a result of the actions of the ASEAN claimant States with respect to the extended continental shelf, -their claims have been clarified in several respects [23]. For example, the 200 nm of the EEZs of Malaysia and Viet Nam have been declared and their coordinates have been published and circulated. In addition, the adjacent boundaries within 200 nm between Brunei and Malaysia have been clarified by a bilateral agreement between Brunei and Malaysia [23]. In addition to that, according to Beckman, Malaysia, Viet Nam and Brunei seem to have taken the position that -the islands over which they claim sovereignty in the South China Sea are not entitled to more than a 12 nm territorial sea. This is implied from the fact that they did not claim an exclusive economic zone

from any of the features in the South China Sea, but only from the baselines along the coast of their mainland [23]. Though the maritime boundary between Malaysia and Viet Nam of their extended shelves are left undefined, -this would give the two States the sovereign right to explore and exploit the natural resources of the sea bed and subsoil on the shelf [23].

Beckman also holds that the Philippines' archipelagic baselines, adopted in February 2009, is in conformity with the provisions in Part IV of UNCLOS. Therefore, -it can be inferred that it has finally given up on its rectangular territorial claim based on the coordinates in the 1898 Treaty of Paris and has brought its archipelagic claim into conformity with UNCLOS [23]. Beckman argues that the Philippines has also clarified its claim to the islands in the Kalayaan Island Group (KIG) and to Scarborough Shoal by stating that these features will be governed by the regime of islands in Article 121 of UNCLOS. This means that that it will measure its 12 nm territorial sea from the islands using the general rule on baselines, and not by archipelagic baselines. However, it has not clarified whether it intends to treat all of the features as -rocks that are only entitled to a 12 nm territorial sea, or whether it intends to claim that some of the features are islands entitled to an exclusive economic zone and continental shelf of their own [23].

In the author's view, this is only the scholarly assumption without confirmation from the respective authority, which does not necessarily stand for the official positions of these States. It seems that none of these claimant parties have made it clear whether they will apply Island Regime under UNCLOS to their occupied features. Song argues that at least some of the islands in the SOUTH CHINA SEA, which have bigger size and are able to sustain human habitation and economic life of their own, are entitled to claim an EEZ and continental shelf, for example, the Itu Aba (Taiping Dao). Other insular formations can almost certainly be considered as rocks or other features which are not entitled to claim EEZ and Continental Shelf of their owned, as provided by Article 121 (3) of UNCLOS [24].

Beckman argues that the claim of China is clarified to a limited extent. By attaching the U-shaped lines map in their Note Verbale to the UN, objecting to the submissions of Malaysia and Viet Nam, the PRC has officially given notice to the international community that this map is significant to its claim in the South China Sea, including the Spratlys. Before 2009, it was not clear whether the PRC had officially based its claim on the map [23]. However, McDorman argues that the situation of China is less clear. -The dotted lines map and the implied argument of historic waters is from another year. Of course, historic waters is a recognized regime in the modern international law of the sea, despite not being dealt with in a substantive manner in the LOS Convention [1]. He holds the view that -historic waters as an international basis for an oceans claim involving an area many hundreds of miles distant from the nearest significant mainland coast or island feature seems inconsistent with modern international law of the sea [1]. Nguyen and Amer also criticize the unclear position of China. They note that China's claim in the -relevant waters within the U-shape line does not have coordinates. And -the Term

-relevant waters does not specify whether or not they relate to the EEZ, the continental shelf, or both [25].

Indonesia, which is not a claimant State, is critical of China's Notes Verbale. Indonesian's Note Verbale of 8 July 2010 raised two concerns. First, that the U-shaped line map attached to China's Note Verbale lacks a basis in international law and upsets the balance established in UNCLOS. Second, that China should act consistently in applying UNCLOS, and follow the same reasoning on rocks and islands in the South China Sea as it had articulated with respect to the claim of Japan over Okinotorishima [26]. China, in response, in its 14 April 2011 note verbale to the UN, further stated,

*“Since 1930, the Chinese Government has given publicity several times the geographical scope of China's Nansha and the names of its components. China's Nansha Islands is therefore clearly defined. In addition, under the relevant provisions of the 1982 United Nations Convention on the Law of the Sea, as well as the Law of the People's Republic of China on the Territorial Sea and the Contiguous Zone (1992) and the Law on the Exclusive Economic Zone and the Continental Shelf of the People's Republic of China (1998), China's Nansha Islands is fully entitled to Territorial Sea, Exclusive Economic Zone (EEZ) and Continental Shelf.” [27]*

China seems to clarify its claims over the jurisdiction to be authorized to the Spratlys through this statement. However, two important messages are still missing from this statement. First, it is not clear whether it means all the features of the Spratlys are entitled to EEZ and Continental Shelf, or only those which fulfil the criteria as Island Regime defined by Article 121, are entitled to such zones. Second, it still does not give explanation of the legal status of the U-shape Line. Unlike its government who remains silent on this issue, the Chinese scholars have for long time a debate on the legal status of the U-shape Line. Currently, the theory of -sovereignty + UNCLOS + historic rights prevails among the Chinese scholars. According to this theory, China enjoys sovereignty over all the features within this line, and enjoys sovereign right and jurisdiction, defined by the UNCLOS, for instance, EEZ and continental shelf when the certain features fulfil the legal definition of Island Regime under Article 121 of UNCLOS. In addition to that, China enjoys certain historic rights within this line, such as fishing rights, navigation rights and priority rights of resource development [28].

### **The Relationship between CLCS and ITLOS**

Questions have been raised on the relationship between CLCS and other international institutions established under the UNCLOS, such as the International Tribunal for the Law of the Sea (ITLOS). A first question is related to the options available whenever an issue arises regarding the interpretation or implementation of provisions of the Convention on the establishment of the limits of the continental shelf. The final responsibility for fixing the outer limits of the continental shelf lies with the costal State. Nevertheless, the outer limits of the continental shelf will only be -final and binding if they are established on the basis of the recommendations of the Commission.

In addition, the issue relating to the interpretation of the Convention is likely to be of interest for other States Parties to the Convention [29]. Incidentally, -CLCS could also be interested in obtaining an advisory opinion. However, the possibility of a requesting an advisory opinion does not automatically flow from the mere existence of an interest [29]. Nevertheless, this lack of legal personality would not prevent the Commission from suggesting that States Parties could, by a resolution, transmit such a request for an advisory opinion to ITLOS [29]. In these circumstances, channelled through the Meeting of States parties, the ITLOS may be asked to provide an advisory opinion, according to Article 138, paragraph 1, of the Rules of ITLOS [29].

The next question relates to what could be done by a State which disagrees with parameters used by a coastal State to establish the outer limits of its continental shelf. For example, there might be objections on the baselines being used by the coastal States to calculate the limits of its maritime areas. It may indeed be preferable for the State concerned to take action before the limits are considered -final and binding. Likewise, States may consider that the outer limits, as fixed by a coastal State, are not actually based on the recommendations of the Commission [29].

Another question to address is which States could have legal standing to institute an international case. -An action against a coastal State regarding the establishment of its extended shelf could be taken by e.g., sponsoring States of contractors involved in activities in the seabed dispute area, developing States interested in the implementation of Article 82 of the Convention or – generally – all States Parties to the Convention [29]. The process leading to the extension of the continental could be more complex where disputes exist regarding the limits of the continental shelf between States with opposite or adjacent coasts. In this regard, Article 76, paragraph 10, of the Convention provides expressly that Article 76 is -without prejudice to the question of delimitation of the continental shelf between States with opposite or adjacent coasts. If a submission to the Commission involves such a dispute, in practice this element by itself does not necessarily constitute an obstacle for the consideration of the submission by the Commission [30]. For example, the existence of a dispute does not prevent the Commission from considering the submission if all States parties to the dispute get their prior consent thereto or on the basis of a joint submission by the States concerned. This is the argument taken by China and the Philippines in their request to the CLCS not to consider the joint submission of Malaysia and Viet Nam and the separate submission by Viet Nam in the disputed areas of the South China Sea. Hence, the submission will not be examined if a formal objection is raised by a State party to the dispute. In such a case, it will be necessary to first settle the dispute before the matter can be handled by the Commission. Recourse could then be made to the judicial means provided for in Part XV of the Convention, including the ITLOS [29].

In the context of delimitation disputes, the question has been asked whether a judicial body could draw a line beyond the 200 nm limit before the matter is examined by the Commission. In this respect, the International Court of Justice (ICJ) in its Judgment of 8 October 2007 in the case concerning territorial and maritime dispute between Nicaragua

and Honduras in the Caribbean Sea stated that -[i]t should also be noted in this regard that in no case may the line be interpreted as extending more than 200 nautical miles from the baselines from which the breadth of the territorial sea is measured; any claims of continental shelf rights beyond 200 nm must be in accordance with Article 76 of UNCLOS and reviewed by the Commission on the Limits of the Continental Shelf established hereunder [32]. However, the importance of this finding should not be overestimated since this particular question was not the subject of arguments by the parties in the case. On this matter, the view could be taken that the issue is not unfamiliar to judicial bodies and presents similarities with questions arising out of a bilateral delimitation disputes which involve a junction point with a third State. The existence of such a junction point does not mean that the bilateral dispute cannot be settled, at least on the understanding that the latter shall not prejudice the solution to be given to the former. Likewise, nothing seems to prevent a court from drawing a line beyond 200 miles if it is made clear that the line would be operative subject to a determination to be made by the Commission on the basis of Article 76 of the Convention.

In the Bangladesh/Myanmar case, the ITLOS was asked to delimit three maritime boundaries between the two states: the territorial sea boundary, the single maritime boundary between the EEZs and continental shelves of the two states, and the boundary of the continental shelf beyond 200 nm from the parties' baselines. The judgment is notable for maintaining what appears now to be the settled case law of international courts and tribunals regarding delimitation of single maritime boundaries, and for being the first occasion on which an international court or tribunal has delimited a continental shelf boundary beyond 200 nm and considered the issue of - grey zones (i.e. zones on one side of a maritime boundary that are beyond the 200 nm of the states on the other side of the boundary) [33].

The first issue for the ITLOS to consider was -whether it had jurisdiction to delimit the continental shelf boundary beyond 200 nm, and if it did, whether it was appropriate to exercise that jurisdiction [33]. The ITLOS concluded that its jurisdiction to delimit the continental shelf applied to the shelf in its entirety [34]. However, whether it should exercise that jurisdiction is much less straightforward. The Rules of Procedure of the CLCS provides that the CLCS shall not consider submissions relating to an area where there is a dispute unless both/all parties to such a dispute give their consent [34]. Both Bangladesh and Myanmar have made submissions to the CLCS. Bangladesh has not given its consent to consideration of Myanmar's submission by the CLCS [34]. In the present case, the ITLOS decided that it was competent to and should delimit the continental shelf beyond 200 nm. It pointed out that such delimitation would not impede the CLCS in exercising its functions, [34] and that without delimitation, the establishment of the outer limits of the continental shelves of Bangladesh and Myanmar might remain unresolved, given the lack of consent by the two states to the CLCS considering the matter [34].

This judgment of ITLOS has an implication for the submissions in regard to the South China Sea area. Malaysia and Viet Nam might cite the Bangladesh/Myanmar Case

to counter argue with China and the Philippines that they might ask ITLOS to delimit the outer limit of continental shelves in the disputed areas, the result of which could be helpful for the CLCS in preparing its recommendation. However, this proposal will not be taken, as China, in 2006, had made a declaration under Article 298 to exclude maritime delimitations from third party compulsory dispute settlement, including the ITLOS. To make the situation more complicated, unlike the Bangladesh/Myanmar Case, the South China Sea dispute involves multilateral competing claims over territorial sovereignty over the Spratlys.

The extended continental shelf areas only exist in the South China Sea if the disputed features of the Spratlys are considered as -rocks defined by Article 121 (3) of UNCLOS, which will be not entitled to claim EEZ or Continental Shelf. If these features, occupied by several claimant states, are authorized by the states to be Islands, which are entitled to generate EEZ and continental shelf, no area of potential extended continental shelf beyond 200 nautical miles exists. Article 298 does not prima facie exclude disputes over the interpretation or application of Article 121 from compulsory procedures entailing a binding decision if a State has otherwise so elected [34]. A State may try to raise the specific question of whether a particular feature is a rock or an island under Article 121 without asking a tribunal or court to be involved in the actual maritime delimitation. Such a decision could then be used by a State in influencing negotiations over the boundary.

### **CLCS and ISA**

The outer limit of continental shelf involves not only the rights and interests of coastal States, but also the common interests of the entire human community. Article 136 of UNCLOS provides that the 'Area' beyond national jurisdiction and its resources are the common heritage of mankind. All rights in the resources of the Area, including the seabed, ocean floor and subsoil thereof beyond national jurisdiction, are considered widely as the common heritage of mankind, are vested in mankind as a whole, on whose behalf the International Seabed Authority (ISA), an autonomous international organization that administers mineral resources in the Area, shall act.

To determine the outer limits of the continental shelf of the coastal States is also to identify the extent of the Area, which has great influence on the interests of the international community in the Area as a whole. All State Parties -should fulfil in good faith the obligations assumed under the Convention as required by Article 300, exercise the rights endowed by the Convention in such a way as not to constitute abuse of the rights, and strictly implement provisions of the Convention to ensure that the submission of the outer limits of the continental shelf is established on a sound legal basis [35]. The coastal States, while exercising the rights created by the Convention legally and properly, should have due regard to the Area as the common heritage of mankind to ensure the balance between their rights over the outer continental shelf and the interest of mankind.

Questions raised by the international community on the submissions to the CLCS, in essence, are for the purpose of maintaining the interests of mankind and the principle of

common heritage of mankind. On February 6, 2009, the Chinese Government in its note verbale to the UN Secretary-General, pointed out that Japan's definition of the inner and outer limits of the continental shelf on the base point of Okinotorishima was beyond the jurisdiction of CLCS, and requested CLCS not to take any action on that particular part of Japan's submission [36]. Later on, the Government of the Republic of Korea issued a similar note verbale [37].

Given the complexity of such issues which touch upon the exercise of rights over the Area, it is likely that they will need to be further examined by the States parties to the Convention. That said, it may be observed that these questions raise problems of interpretation of the Convention. In this respect, suffice to say that an option available to State Parties would be to request a legal opinion from the ITLOS on the basis of its advisory functions [29].

## **POLITICAL REALITY RESULTING FROM THE SUBMISSIONS TO CLCS**

Legally, as many legal specialist point out, the submissions by the coastal states of East Asia has clarified the maritime claims in these regions. In political reality, however, the submissions have served as a direct cause of the increasing tensions in troublesome East Asia waters. The argument, that the submissions by the coastal states in East Asia has enhanced prospects for regional cooperation in this disputed maritime domain, meets with great challenge.

### **Continuing Spat on Maritime Issues in Northeast Asia**

The dispute between China and Japan in the East China Sea has lasted for decades, involving maritime delimitation and the sovereignty of Diaoyu/ Islands (Senkaku in Japanese). Japan and South Korea have sovereignty dispute over the Dokdo Island (Takeshima in Japanese). The conflicting perspective on the Okinotorishima, which does not involve competition of territorial sovereignty, is another field of battle between Japan and China, and between Japan and South Korea, adding a new dimension to the existing territorial and maritime dispute. The Okinotorishima, located on the Palau-Kyushu Ridge in the Philippine Sea, is claimed by Japan as its territory. Geologically, the islets are an atoll, built on the Kyushu-Palau Ridge, the westernmost part of the Izu-Bonin-Mariana Arc System. The area has three tiny individual islets: Higashikojima ("Eastern Islet"), Kitakojima ("Northern Islet"), and Minamikojima ("Southern Islet") [38].

The Okinotorishima has been described as a feature being maintained above the sea level during the high tide through man-made channel [39]. Between 1987 and 1993 the government of Tokyo and later the central government built steel breakwaters and concrete walls, to stop the erosion of Okinotorishima, which today leaves only three of the five rocks that were present in 1939 above water; in 1988 the Japan Marine Science and Technology Center built a marine investigation facility which it has since maintained

following typhoon damage. On March 16, 2007, a light beacon was installed by the Japan Coast Guard. The beacon is plotted on the hydrographic chart [40]. When the Democratic Party of Japan-led government headed by Prime Minister Yukio Hatoyama came to power in 2009, it wasted no time in declaring that Japan is allocating US\$7 million in 2010 to create a facility on Okinotorishima in a bid to firmly establish yet another foothold there. This may seem like a large sum, but it represents less than 3% of the total amount spent thus far by Japan to sustain this remote island. Hundreds of millions of dollars have been allocated by the Japanese over the past two decades [41].

No country challenges Japan's sovereignty claims over Okinotorishima. However, concerns are raised on the legal status of this feature. Japan claims an EEZ over 400,000 square km (154,500 square miles) around Okinotorishima. Jon Van Dyke, a law professor, has suggested that the situation is similar to the failed British attempt to claim an EEZ around Rockall, uninhabited granite outcropping in the Atlantic Ocean. The UK eventually dropped its claim in the 1990s when other countries objected. Van Dyke has further asserted that it is impossible to make "a plausible claim that Okinotorishima should be able to generate a 200 nautical mile zone" [42].

Van Dyke's academic opinion was in line with the Chinese policy, which was expressed later, and with growing insistence, during bilateral talks. On 22 April 2004, Chinese diplomats stated during bilateral talks with Japan that they regarded Okinotorishima as an atoll, not an islet, and did not acknowledge Japan's claim to an exclusive economic zone (EEZ) stemming from Okinotorishima [43]. South Korea objects to Japan's request in its 2008 Submission, also on the ground that Okinotorishima is considered as a - rock that cannot have any exclusive economic zone (EEZ) or continental shelf. These two countries have a territorial dispute over Tokdo Island, which remains a major irritant in Japan-South Korea relations. The conflicting interpretation of Okinotorishima being Rock Or Island, adds a new dimension to the existing dispute between the two countries.

Confronting Van Dyke's criticism, Kuribayashi, a professor of law at Toyoeiwa University, insists that the Japanese claim is justifiable as there is no definition of a -rock in international law, and a country can claim its own EEZ and continental shelf based on its possession of coral reefs [39]. Kuribayashi defended his position in the Report on Promoting Economic Activities in Okinotorishima, published by the Nippon Foundation (Nippon Dankai). This Japanese private foundation has been criticized for advancing right-wing and nationalist goals in the deceptive guise of a charity [39]. It has shown a particular interest in the disputed rocks as part of its maritime programme [44]. Okinotorishima is not Japan's first foray into making artificial islands [45]. The Japanese government is turning its costly investments in these technologies into a form of environmental diplomacy. The Tokyo Government and the Nippon Foundation are promoting their efforts in island-growing as a means of overcoming environmental disaster [45].

Japan took a further step to consolidate its claim over maritime jurisdiction of Okinotorishima. Its submission in 2008 to the CLCS covers seven regions, one of which is the Southern Kyushu-Palau Ridge where Okinotorishima is located. Indicated by this submission, Japan not only claims 200 nautical miles of EEZ and continental shelf, it also looks further at exploring the possibility of an extended continental shelf from Okinotorishima. China's note verbal on 6 February 2009 to the UN, with an objection of Okinotorishima being included in the recommendation by the CLCS, reiterates its insistent position.

There are two ways to understand the rationale of Chinese government. First of all, from a legal perspective, China is concerned that the vast maritime area generated from Okinotorishima, if Island Regime of UNCLOS applies to it, will infringe the area of High Sea and the Area. Second, though China does not lay claim to Okinotorishima, as argued by some, it does have a military interest in keeping Okinotorishima from being declared part of Japanese maritime jurisdiction zone, because it is situated in midway between Taiwan and Guam, a US territory in the Pacific [45]. Meyer continued to argue, -the rocks would be located along the ideal route that an American fleet, including submarines, would take in the event of American military engagement with China to support Taiwan 'Were such a situation to arise, China might well want to place its submarines in the area in order to delay the arrival of US Navy vessels without being annoyed by what would have been, until then, an essentially pro-Taiwan Japan' [45]. This argument, though it might sound reasonable, does not seem to have a major impact among the academic field, neither in political debate. Taiwan's scholars take a similar approach with China with regard to the legal status of Okinotorishima [46]. With the increasing relationship across the Strait ever since Ma Ying-jeou took power in 2008, the cross-strait cooperation on maritime issues increases at a steady pace, given the recent development of the Diaoyu Island dispute and the South China Sea dispute, where both China and Taiwan have similar claims. Japan's submission to the CLCS, and the consequent objection by both China and South Korea, has added a new dimension to the existing territorial and maritime dispute in the region of Northeast Asia. This new dimension, along with the historical problem as well as the continuously rising nationalism, has increased the uncertainty to the regional security environment.

### **Post-Submission Development in the South China Sea**

There might be more clarity on the claims in both the East China Sea and the South China Sea. Or at least, what is presented is the good intention of the coastal states, on the one hand, exercise their rights of claiming the outer limits of the continental shelf under Article 76 of UNCLOS, on the other hand, sending to the international law scholars the message that they won't claim EEZ and continental shelf from the insular features that they occupied. In reality, however, the post-submission development in the South China Sea seems to halt back the maritime dispute settlement progress and poses obstacles for regional cooperation. In February 2009, the Philippines Congress passed its Archipelago Baseline Bill, laying claim to Scarborough Shoal (sovereignty also claimed by China) and a number of islands in the South China Sea. On 6 May 2009, Malaysia and Viet Nam

lodged a joint submission with the CLCS. Viet Nam also lodged a separate submission in relations to the north-western part of the central South China Sea. These extended continental shelf submissions have served to highlight existing disputes and appear likely to add an extra dimension to them. Indeed, there are already indications that the situation is escalating.

There is a Domino effect starting from May 2009 with most submissions to the CLCS occurring. The Philippines's Archipelago Baseline Bill faced immediate responses from other claimant states in the South China Sea, especially from China and Viet Nam [47]. The joint submission of Malaysia and Viet Nam and Viet Nam separate submission were immediately protested by China and the Philippines through their note verbales to the UN Secretary General, as discussed above. China, in particular, included, for the first time, in its note verbale, a map of the U-shape Line [48]. China's note verbal aroused immediately strong reaction among the regional states and also international community [49]. Politicians, scholars of international law and international relations, media all point to the legal implication of the U-shape Line. China's ambiguity on the interpretation of this line triggers concerns and suspicions from other claimant states in the South China Sea. Military built-up, national legislation, nationalism are all propagated effects from the Submissions. Among all these incidental consequence, the increasing engagement of external states (or out-of-the-region states), especially the US, triggers further the escalating tension in this region [50].

2010 witnessed the escalation of the controversy in the South China Sea, with US's increasing presence in this region, and with a serial of US-Sino spats on the South China Sea dispute. In March, as first reported by a Japanese media and followed by US medias, Chinese officials told two visiting senior Obama administration officials that China would not tolerate any interference in the South China Sea, now part of China's "*core interest*" of sovereignty. In July, US Secretary of State Hillary Clinton made a statement at the 10th ASEAN regional forum (ARF) that the disputes over the highly sensitive South China Sea were a "leading diplomatic priority" and now "pivotal to regional security" [52]. This backdrop certainly contributed to increasing concerns in Beijing who sees Hillary's statement as a signal that US will change its neutral position on the SCS dispute and back other claimant states, especially Viet Nam.

The tension in the South China Sea has continued to escalate in 2011 with a series of events among the claimant states. Viet Nam in May accused China of cutting the exploration cables of an oil survey ship. In a similar incident in June, it claimed a Chinese fishing boat had "intentionally rammed" the exploration cables of another of its boats. Yet, China insisted that its fishing boats were chased away by armed Viet Nameese ships in the incident. According to China's Foreign Affairs spokesman, the fishing net of one of the Chinese boats became tangled with the cables of a Viet Nameese oil exploring vessel, which was operating the waters claimed by China, and was dragged for more than an hour before it was cut free. China accused Viet Nam of "gravely violating" its sovereignty and warned it to stop "all invasive activities." In June, Viet Nam held live-fire exercises

in the SCS amid high tensions with China over disputed waters. Chinese state-media denounced the exercises as a military show of force to defy Beijing.

Standoffs have also taken place this year between Chinese and Philippine vessels. In March, two Chinese maritime surveillance ships reportedly ordered a Philippine survey ship away from an area called Reed Bank. The Philippines later sent in military aircraft [52]. President of the Philippines Benigno Aquino's office said on June 13 that it was renaming the South China Sea as the "West Philippine Sea," as tensions with Beijing mount over the disputed area. Starting from May, the Philippines Navy has removed foreign marker posts that were placed on reefs and banks, part of the much-disputed Spratly group of islands. U.S. Secretary of State Hillary Clinton said the United States would honour its mutual defence pact with Manila and offer the Philippines affordable weapons. This is, certainly, interpreted by Beijing as another signal of US changing its policy on the South China Sea Dispute.

Adding to the complex picture are the competitions of the claimant states through various channels, i.e. launching diplomatic campaigns, organizing academic conferences. Viet Nam, since 2009, has organized three South China Sea related conference on a yearly basis. In July 2011, the Philippines organized with Viet Nam the International Conference of -The South China Sea: Toward a Region of Peace, Cooperation, and Progress. The Philippines also invited maritime and legal experts from Southeast Asia in September 2011 to discuss a Philippine proposal for conflict prevention over disputed territory in the South China Sea. China held the conference of -Implementing DOC: Maintaining Freedom and Safety of Navigation in the South China Sea in December 2011. In second half year of 2012, an International Conference on -Peace, Stability in SCS and Asia-Pacific: ASEAN unity & power engagement in the region will be held in September held by CASS-India (Centre for Asian Strategic Studies-India) and IODAS (Institute of Defense and Security Studies, Indonesia). Viet Nam will hold its fourth conference on the South China Sea in November, followed by a conference of joint development in the South China Sea in December to be held in China. The Indonesian-hosted "Workshops on Managing Potential Conflict in the South China Sea" will be continuing on a yearly basis. All these have pointed to the trend of a new dimension of competition over the South China Sea dispute.

## **CONCLUSION**

East Asia is home to many maritime disputes, e.g. China vs. Japan in the East China Sea and the multiple overlapping claims in the South China Sea. May 13 2009 is the deadline for a lot of coastal states regarding their submission to the CLCS. Hence May 2009 has served as a critical time period for the development of many existing maritime disputes in the world, adding to the old story of competing claims.

In Northeast Asia, Japan's submission to the CLCS has received concern from the US and Palau over the potential overlapping claims. It has also been objected by China and

South Korea due to the legal status of Okinotorishima which is regarded as a rock and is only entitled to 12 nm of territorial sea. Japan, however, argues that the Okinotorishima meets the requirement of Island Regime of UNCLOS Article 121, and shall be entitled to its own EEZ, Continental Shelf and extended continental shelf. The CLCS, upon its failure to receive a two-thirds majority of votes on 20 April 2012, considered that it would not be in a position to take action on the parts of the recommendations relating to the Southern Kyushu-Palau Ridge Region until such time as the matters referred to in the communications referred to above had been resolved. The outcome of this recommendation will no doubt arouse debate and tension among these three Northeast Asia states.

In the troublesome South China Sea, the joint submission of Malaysia and Viet Nam and separate submission of Viet Nam in May 2009 has triggered off a series of communications to the United Nations Secretary General. Through these communications, many international law scholars have come to a conclusion or observation that many claimant states in the disputed South China Sea have clarified their claims, while China still remains unclear on its South China Sea claims.

The relationship between CLCS and other international institutions established under the UNCLOS, such as the ITLOS, ISA, are explored in this paper. Through analyzing the political implication for maritime dispute management in the East China Sea and the South China Sea, the author challenges the argument that the submissions by the coastal states in East Asia has enhanced prospects for regional cooperation in this disputed maritime domain. Legally, the submissions by the coastal states of East Asia has clarified the maritime claims in these regions, in reality, however, the submissions have served as a direct cause of the increasing tensions in troublesome East Asia waters. The argument, that the submissions by the coastal states in East Asia has enhanced prospects for regional cooperation in this disputed maritime domain, meets with great challenge.

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## **COOPERATION WITHIN THE ASEAN PLUS THREE CONTEXT: INCIDENTAL OR COINCIDENCE?**

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### **ABSTRACT**

*The way forward for ASEAN to be competitive and a renown regional grouping is by strengthening her political and security, economic and socio-cultural cooperation with other developed countries in the region. Thus by creating a caucus known as the ASEAN Plus Three (APT), which comprises ten ASEAN Member States and three East Asian nations – mainly PR China, Japan and Republic of Korea – further enhancing the ASEAN organization, through mutual cooperation and understanding in 20 broad areas. But, was it merely a coincidence, due to the Asian Financial Crises of 1997 or was it based incidentally, through the “Asia for Asians” slogan, forged during the Second World War by Japan? This article will provide some insights and observations to the creation of the ASEAN Plus Three Cooperation.*

*Keywords: ASEAN, ASEAN Plus Three, ASEAN Plus Three Cooperation, East Asia Study Group, East Asia Vision Group, Asian Financial Crisis.*

### **INTRODUCTION**

The ASEAN Plus Three cooperation began in December 1997, with the convening of an informal summit among the leaders of ASEAN and their counterparts from China, Japan and the Republic of Korea (ROK), at the sidelines of the 2<sup>nd</sup> ASEAN Informal Summit in Malaysia. The ASEAN Plus Three Summit was institutionalized in 1999 when the Leaders issued a Joint Statement on East Asia Cooperation at their 3<sup>rd</sup> ASEAN Plus Three Summit in Manila. The ASEAN Plus Three Leaders expressed greater resolve and confidence in further strengthening and deepening East Asia cooperation at various levels and in various areas, particularly in economic and social, political and other fields.

A number of key documents have been adopted to set the direction for ASEAN Plus Three cooperation. These include the Report of the East Asia Vision Group (EAVG) of 2001 and the Report of the East Asia Study Group (EASG) of 2002. Subsequently, to facilitate and to assist the ASEAN Plus Three co-chairs to coordinate and monitor ASEAN Plus Three cooperation, the ASEAN Plus Three Unit was established at the ASEAN Secretariat in December 2003 to fit the purpose.

## **THE BEGINNING OF COOPERATION: THE ASIAN FINANCIAL CRISIS 1997**

The East Asian Financial Crisis was a period of financial crisis that gripped much of Asia beginning in the summer of July 1997 and raised fears of a worldwide economic meltdown or financial contagion. It is also commonly referred to as the East Asian currency crisis or locally as the IMF crisis.

The crisis started in Thailand with the financial collapse of the Thai baht caused by the decision of the Thai government to float the baht, cutting its peg to the USD, after exhaustive efforts to support it in the face of a severe financial overextension that was in part real estate driven. At the time, Thailand had acquired a burden of foreign debt that made the country effectively bankrupt even before the collapse of its currency. The drastically reduced import earnings that resulted from the forced devaluation then made a quick or even medium-term recovery impossible without strenuous international intervention. As the crisis spread, most of Southeast Asia and Japan saw slumping currencies, devalued stock markets and asset prices, and a precipitous rise in private debt [1].

Though there has been general agreement on the existence of a crisis and its consequences, what is less clear were the causes of the crisis, its scope and resolution. Indonesia, South Korea and Thailand were the countries most affected by the crisis. Hong Kong, Malaysia, Laos and the Philippines were also fairly hurt by the slump. China, India, Taiwan, Singapore and Vietnam were relatively unaffected. Japan was not much affected by the crisis but was going through its own long-term economic difficulties. However, all of these Asian countries saw their currencies fall significantly relative to the United States dollar, though the harder hit nations saw extended currency losses.

Although most of the governments of Asia had no national debt and seemingly sound fiscal policies, the International Monetary Fund (IMF) was forced to initiate a \$40 billion program to stabilize the currencies of South Korea, Thailand, and Indonesia, whose economies were hit particularly hard by the crisis. In Japan, which had already been in a state of profound recession due to a highly inefficient banking system laboring under mountains of bad debt (much of which up to that point had been relatively invisible because of the established Japanese banking practice of hiding the losses of major customers), the United States intervened to stop a precipitous slide in the value of the yen by agreeing to buy some \$2 billion worth of the Japanese currency. In doing so, the United States hoped to increase the value of the yen, which had fallen to its lowest point in some eight years [2].

The efforts to stem a global economic crisis did little to stabilize the domestic situation in Indonesia, however. After 30 years in power, President Suharto was forced to step down in May 1998 in the wake of widespread rioting that followed sharp price increases caused by a drastic devaluation of the rupiah. The effects of the crisis lingered through 1998. In the Philippines growth dropped to virtually zero in 1998. Only

Singapore and Taiwan proved relatively insulated from the shock, but both suffered serious hits in passing, the former more so due to its size and geographical location between Malaysia and Indonesia. By 1999, however, analysts saw signs that the economies of Asia were beginning to recover [3].

### **ASEAN Plus Three: An Incidental Cooperation?**

Since the 1997 financial crisis, there has been a growing trend toward regionalism in East Asia. In addition, increasing regionalism elsewhere has made it necessary for East Asia to focus more on securing common regional interests in the multilateral trading arena. This trend toward East Asian economic integration has been accelerating under the ASEAN Plus Three (APT) framework.

In 1998, ASEAN Plus Three established The East Asian Vision Group (EAVG) of eminent persons which reported in 2001. In turn in 2001 the East Asian Study Group was established. In 2002, ASEAN Plus Three received the Final Report of the East Asia Study Group [4]. In 1999, a Joint Statement on East Asia Cooperation [5] was issued on the topic of East Asian integration by ASEAN.

The APT framework is an important element for fostering East Asian regionalism. The APT leaders at the Manila summit in November 1999 agreed on broad economic cooperation, and resolved to promote economic linkages among East Asian countries toward integrating the ASEAN region with China, Japan and ROK.

The APT framework has a multi-layered structure, consisting of three levels: ASEAN+3, ASEAN+1, and ASEAN. The APT summit has been held annually and ministerial meetings in foreign affairs, economics and finance were established permanently in 2002 to discuss various issues and regional cooperative programs. Eight ministerial meetings have been held so far, including the Senior Officials Meeting (SOM) and Senior Economic Officials Meeting (SEOM). Moreover, the establishment of diverse cooperative channels such as the East Asia Vision Group (EAVG), the East Asia Study Group (EASG) and the Vice Finance Ministerial meetings has strengthened systematic fundamentals for intra-regional cooperation.

As a consequence, the EASG was inaugurated in 2001 and the final EASG report encompassed 26 projects, including 17 short-term projects and nine mid-to-long-term research plans. As a means to further strengthen cooperation, the EASG recommended that the annual APT summit meetings be developed into the East Asian Summit (EAS) and also advocated the formation of an East Asian Free Trade Area.

However, the APT process has already been overshadowed by the ASEAN-China initiative towards a comprehensive economic cooperation agreement, which includes the free trade agreement (FTA) that was signed in 2002. After China agreed to the FTA with ASEAN, Japan, confronted with losing its position of leadership on East Asian economic cooperation, eagerly pursued general cooperation with ASEAN and promptly agreed to

an FTA with Singapore. In addition, the Japanese government hosted a Japan-ASEAN summit in December 2003 and held the Japan-ASEAN commemorative summit as a prelude to firmer economic relations with ASEAN.

As shown in the process of its FTA negotiations with China, ASEAN has tried to woo Japan, Korea and India into establishing closer economic partnership with economies in Southeast Asia. Interestingly, regional integration under the ASEAN+1 process may provide an important building block for establishing an East Asian integrated market. Although APT countries have taken different standpoints on the EAFTA, they held the common belief that an EAFTA would help boost intra-regional trade and investment as suggested by the East Asia Study Group (EASG).

In terms of the regional cooperation frameworks that currently coexist in East Asia, Korea should exploit each and every one, be they small or large, including EAS, ASEAN Plus 3, and ASEAN Plus 1. Korea should contribute to building a collective security system in East Asia by promoting EAS to the level of diplomatic and security cooperation, while developing APEC into an OECD for the Asia-Pacific region. Then, ASEAN Plus 3 would evolve into an East Asian Free Trade Area (EAFTA) in trade and strengthen the Chiang Mai initiative in finance.

### **Cooperation Misconceptions: Commonness in Regionality or Economy-Politics?**

Through commonality of the Asian region in socio-culture and historical values, ASEAN together with China, Japan and ROK developed cooperation in both economics and politics (ecolitics) aspects. But in the midst of enhancing cooperation with regard to its common pull-factor, this 'coalition' appears to be taking shape towards establishing an Asian financial institution. Most ASEAN Plus Three meetings address the issue of regional finance, besides promoting economic and technological exchange within the region. Therefore, the idea of a unified Asia has long derailed from its original concept and if not taken seriously, the ASEAN Plus Three congregation will soon be nothing than a mere cooperation.

China, as the emerging economic superpower of the east and strongest controller of the US dollar overseas, has long eyed the ASEAN caucus. Japan on the other hand has moved towards technological advancements and financial assistance, in which ASEAN Member Countries are eagerly to accept assistance of. For ROK, it is still on the cards, waiting patiently for its grip to strengthen in the aspects of industry, financial, technical and technological cooperation.

For ASEAN Plus Three to unify to support its own vision of the international economy, all thirteen states will first have to overcome the considerable tensions that exist between them. While the need for economic unity could well promote conciliation in the security realm, the obstacles are significant. Moreover, there is no clear economic model that it can defend or promote, though all thirteen states strongly support a Westphalian understanding of the international system, and most agree that the state potentially has an

extensive role to play in the organization of the domestic economy. Even if these obstacles could be overcome, the long-term implications for ASEAN remain uncertain. While ASEAN may have an initially important role to play in realizing the ASEAN Plus Three caucus, the effectiveness of such instrument is contingent in relations between the Plus Three powers. If these countries did resolve their differences enough to make the ASEAN Plus Three a real possibility, then ASEAN's role as a regional intermediary would decline.

As time goes by, most of the academia wondered if this cooperation will move further or will stumble. Financial crisis, it seems, was the basis for this cooperation and it is hoped that this cooperation will never again rely on another financial crisis to take place.

### **REGIONAL FACTORS: ANOTHER POINT FOR COOPERATION?**

The most important antecedent of ASEAN Plus Three is, of course, ASEAN itself. Although ASEAN has provided an important foundation for the development of a wider grouping, there are some important differences in the formative dynamics of both groupings that merit brief emphasis. ASEAN, as noted earlier, was very much a product of the aftermath of the decolonization process, the Cold War and the great power contestation that continues to grip the region. Regionalization – or the private sector-driven economic integration manifest in denser trade and investment flows – was not a decisive force in encouraging closer political cooperation in Southeast Asia. On the contrary, intra-regional trade is still modest between the non-complementary and essentially competitive economies in most of ASEAN [6].

It is important to remember that ASEAN is composed of a number of small economies, the structure and development of which has been profoundly shaped by firstly colonialism and latterly by the activities of more powerful economic and political forces from outside Southeast Asia [7]. In other words, there have been integrative forces encouraging economic regionalization, but these have emanated from countries like Japan, which are outside the smaller ASEAN grouping and are an expression of wider East Asia forces. At the level of regionalization, therefore, an expanded ASEAN Plus Three grouping that takes account of such pan-regional forces makes intuitive sense.

The underlying logic of the broader East Asian region's multi-tiered development experience, in which Japan pioneered an industrialization process that spread initially to South Korea, Taiwan and then onto Southeast Asia and China, has led to a flurry of initiatives designed to consolidate regional integration. The ASEAN Free Trade Area (AFTA), for example, reflected Southeast Asia's incorporation into region-wide production networks [8]. More recently, both Japan and China have moved to consolidate their economic relations with Southeast Asia through bilateral trade agreements [9].

Plainly, competition rather than cooperation between Japan and China – as they attempt to realize their respective regional leadership ambitions – may have a good deal to do with such initiatives. However, the attempt to enhance regional autonomy by

institutionalizing and increasing intra-regional trade and investment is also a reflection of a more fundamental and enduring reality; the 1997-98 East Asian crisis and its aftermath dramatically brought home to East Asia's political and economic elites just how dependent they are on external markets and how vulnerable they are to outside political pressures [10]. The crisis was consequently a watershed at a number of levels and led to a number of crucial political and economic initiatives that have given impetus to the ASEAN Plus Three project.

## **CONSOLIDATION OR CONFLICT?**

It is important to emphasize that the idea of a specifically East Asian grouping to represent the possible collective interests of the region is not new or something exclusively associated with the crisis and its aftermath. The East Asian Economic Caucus (EAEC) proposed by the former Malaysian Prime Minister Tun Dr. Mahathir Mohamed was frustrated by a combination of US opposition and a directly consequential Japanese ambivalence [11]. Equally significantly, ASEAN Plus Three has continued to develop momentum despite the fact that it is essentially Mahathir's vision in another guise.

Political cohesion, as expressed in common outlooks and positions and in the exercise of collective leadership, is an essential prerequisite for regional economic integration. Economic integration depends to a large extent on political will, driven by political as well as economic considerations, and inspired by long-term political vision. Without a higher degree of political cohesion, real economic integration is not possible. Conversely, regional economic integration is a necessary condition for political cohesion, as well as for the competitiveness of the region. As the European experience has shown, political cohesion needs to be built on economic foundations, which gives countries an economic stake in regionalism. For this reason, these two endeavors – political cohesion and economic integration – need to be undertaken in an interrelated way. The intimate linkage between them ought to be clearly recognized and vigorously acted upon.

In some ways, this should come as no surprise: despite the frequently noted diversity of the East Asian region which provide ASEAN Plus Three with a potential basis for regional identity and consolidation. Moreover, the members of ASEAN Plus Three had already begun to forge common perspectives through inter-regional initiatives like the Asia-Europe Meeting (ASEM). Indeed, the fact that such an exclusively East Asian grouping appeared a more 'natural' expression of an identifiable region reveals how misconceived those analyses which continues to focus on a wider 'Asia-Pacific regionalism' actually are [12]. The key question for ASEAN Plus Three is whether the sorts of initiatives it has undertaken will be able to build more successfully on its putative regional identity.

## **Observations**

Given the number of political, economic and strategic variables currently in play, it is wise to keep in mind about the dangers of prediction – especially about the future. However, it is possible to identify key dynamics that are likely to shape regional outcomes and extrapolate from existent trends.

The first observation to make about ASEAN Plus Three is that, like other regional organizations such as APEC and the narrower ASEAN grouping, it promises much but has arguably delivered relatively little so far. Like ASEAN and APEC, ASEAN Plus Three is displaying signs of institutional consolidation and has spawned a plethora of Summits, Senior Official Meetings and working groups in areas such as finance and trade, political and strategic cooperation, as well as energy and environmental cooperation [13]. Such initiatives clearly help to give institutional ballast to the region, build confidence and identity, and may ultimately prove to be important parts of an effective regional institutional infrastructure. At present, however, they are more reminiscent of the, possibly well-intentioned, efforts of APEC to promote economic reform and facilitate integration through the establishment of functionally-oriented working groups and the like. Like APEC, ASEAN Plus Three's adherence to the 'ASEAN way' of consensus and voluntarism [14], and lingering concerns about establishing a powerful secretariat that might ultimately threaten national autonomy is also likely to make the development of effective and binding regional initiatives much more difficult.

Second observation: the diversity of governance in East Asia. In East Asia, by contrast, not only are there profoundly different levels of development, modes of governance and potentially disparate policy perspectives as a consequence, but the regional mega-economies of Japan and China are also integrated into the global economy in ways that make the identification, let alone the implementation of common policy positions inherently problematic. This is not to say that there are not important historical forces that might encourage greater regional economic and even political cooperation, but whether the desire for a greater sense of regional identity can overcome the different policy positions that fundamentally different economic structures generate, to say nothing of overcoming the long-standing regional rivalries that exist between Japan and China, is a moot point.

Third observation: the potential influence on the course of East Asian countries' development emanates from outside the region. Directly or indirectly, the US continues to exert a critical influence on East Asian regional development. Significantly, the effect of American influence appears to vary across issue areas: while America's intervention in the region's post-crisis development had the effect of accelerating the process of regional political and economic cooperation, it seems safe to predict that the trajectory of East Asian regionalism will continue to be profoundly influenced by American actions and essentially reactive as a consequence. The only question now is whether such constraints will ultimately spill-over into the economic sphere and make even that aspect of the ASEAN Plus Three regional integration less feasible? From what it is viewed,

the foreseeable of the ASEAN Plus Three will be marked by a form of 'reactionary regionalism' in which regional initiatives are designed to mediate and moderate external influences.

## **CONCLUSION**

As competition is building up within the ASEAN caucus itself, it is very important to be aware on the types of challenges and constraints in integration. Furthermore, as a competitive ASEAN generates higher economic growth, coupled with stable regional politics and heightened security efforts, development gaps within the region needs to be addressed, in ensuring ASEAN prosperity is shared among over her 550 million inhabitants. This will ensure equal knowledge distribution and skills upgrade, for her inhabitants to be competitive, participate and benefit from the regional integration and future sustainability of ASEAN.

After a series of failures, ASEAN and its neighbors created another regional grouping the ASEAN Plus Three, established in 1997 and institutionalized in 1999. The significance of this grouping was demonstrated in the response to the Asian Financial Crisis of 1997. ASEAN Plus Three appeared to take the role of community building in East Asia and as a result, the status of ASEAN Plus Three is unclear with the existence of the more recent East Asia Summit established in 2005 following this process and involving all the members of ASEAN Plus Three, together with India, Australia and New Zealand.

At the 1st East Asia Summit held in Kuala Lumpur on 13 December 2005, the leaders of ASEAN Plus Three, Australia, India and New Zealand met to study a regional cooperation mechanism to create an East Asian community. However, the Asian Regionalism presents many characteristics difficult to modify and overcome in the future. In addition, the enlargement of EAS will face two challenges. First, there is not still an agreement on the members and the model of institution that the future community should follow and second, who will be tasked to play the leadership role in the East Asia community building has not been confirmed yet. The construction of an East Asia community is still an ongoing process [15].

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- [15] In order to further strengthen and deepen regional cooperation, various ASEAN Plus Three cooperation bodies could conduct research and/or studies in areas of mutual interest to all East Asia Summit countries, to serve as an institutional mechanism for broad-based social exchanges and regional cooperation in East Asia.

## ANALYSIS OF INFLUENCE ZONES OF MOUNTAINS EXTRACTED FROM MULTISCALE DIGITAL ELEVATION MODELS

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### ABSTRACT

*Previous studies have demonstrated that influence zones provide a useful tool to express the topology and compute various structures of terrains. However, these studies have only applied on single scale terrain models, and it was noted that variation in scale could significantly affect the computed influence zones, and consequently, the computed terrain properties. To this end, this study is motivated by the current lack of understanding of the effect of scale variation on influence zones. The study is conducted via the analysis of influence zones of mountains extracted from multiscale digital elevation models (DEMs). Multiscale DEMs are generated using the lifting scheme. The average areas of influence zones of mountains extracted from the generated multiscale DEMs are then computed. It is observed that as the scale increases from 1 to 3, the average area of influence zones reduces due to reduction in sizes of the extracted mountains and increase in number of mountains because of division of mountains into smaller mountains. As the scale increases from 3 to 20, the average area of influence zones increases due the removal of small mountains. A power law relationship is observed between the average area of influence zones of the extracted mountains and scale. The scaling exponent of this power law, which was named as a fractal dimension, indicates the rate of change of average area of influence zones of mountains extracted over varying scales.*

*Keywords: Multiscale digital elevation models (DEMs); mountains; influence zones; power law relationship; fractal dimension.*

### INTRODUCTION

If  $P_1, P_2, \dots, P_n$  are disjoint sets, then the influence zone of  $P_i$  is the locus of those points which are closer to  $P_i$  than to any other set [1-3]. Influence zones have been widely used in various applications, including image segmentation [4-7], catchment extraction [8-10], sensor-based exploration in unknown environments [11-14], characterisation of water bodies [15-18], face recognition [19-21], analysis of DNA microarray images [22-24], multipath planning [25-28], and terrain-based information fusion and inference [29-32].

Glinton et al. [29, 30], Moet et al. [31] and Sycara et al. [32] demonstrated that influence zones provide a useful tool to express the topology and compute various structures of terrains. Glinton et al. [29, 30] and Sycara et al. [32] employed influence zone-based terrain analysis to compute several important military tactical positions, including avenues of approach, defensible areas and engagement areas. However, the methodology was only applied on single scale terrain models, and it was noted that variation in scale could significantly affect the computed influence zones, and consequently, the computed tactical positions.

To this end, this study is motivated by the current lack of understanding of the effect of scale variation on influence zones. The study is conducted via the analysis of influence zones of mountains extracted from multiscale digital elevation models (DEMs).

## **METHODOLOGY**

### **Generation of Multiscale DEMs**

Scale variations can constrain the detail with which information can be observed, represented and analysed. The term scale refers to the combination of both spatial extent, and spatial detail or resolution [33-36]. Changing the scale without first understanding the effects of such an action can result in the representation of patterns or processes that are different from those intended due to loss of detail, and variations in terrain parameters and landforms [33, 36, 37-42]. Hence, feature detection and characterisation often need to be performed at different of scales measurement. Wood [43, 44], Wu et al. [41], Drăguț et al. [42], and Drăguț and Eisank [36] demonstrated that analysis of a location at multiple scales allows for a greater amount of information to be extracted from a terrain about the spatial characteristics of a feature.

In this paper, multiscaling is performed using the lifting scheme [45, 46], which is a flexible technique that has been used in several different settings for easy construction and implementation of traditional wavelets and second-generation wavelets, such as spherical wavelets. It has proven to be a powerful multiscale analysis tool in image and signal processing [47-49], which has received recent attention in geospatial analysis [50-53]. Lifting consists of the following three basic operations:

#### **Step 1: Split**

The original data set  $x[n]$  is divided into two disjoint subsets, even indexed points  $x_e[n]=x[2n]$ , and odd indexed points  $x_o[n]=x[2n+1]$ .

#### **Step 2: Predict**

The odd and even subsets are often highly correlated. This correlation structure typically local and hence, it is possible to accurately predict the wavelet coefficients  $d[n]$  as the error in predicting  $x_o[n]$  from  $x_e[n]$  using the prediction operator  $P(x_e[n])$ . The predict step uses a function that approximates the data set (Equation (1)). The

difference between the approximation and actual data replaces the odd elements of the data set (Equation (2)). The even elements are left unchanged and become the input for the next step in the transform.

$$P(x_e[n]) = \frac{1}{2}(x_e[n] + x_e[n+1]) \quad (1)$$

$$d[n] = x_0[n] - P(x_e[n]) \quad (2)$$

### Step 3: Update

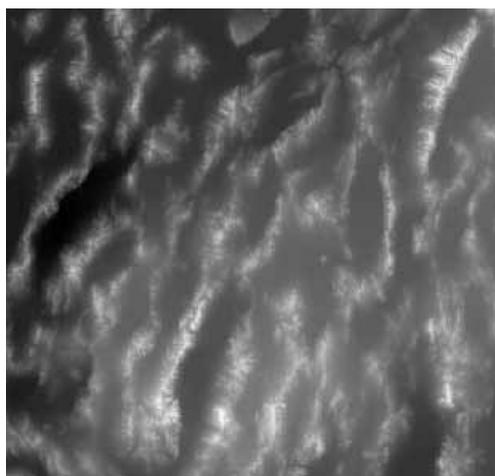
The update step replaces the even elements with an average. This results in a smoother output  $c[n]$  that represents a coarse approximation to the signal  $x[n]$ . The update operator  $U$  is applied to the wavelet coefficients (Equation (3)), and is added to  $x_e[n]$  (Equation (4)).

$$U(d[n]) = \frac{1}{4}(d[n-1] + d[n+1]) \quad (3)$$

$$c[n] = x_e[n] + U(d[n]) \quad (4)$$

The lifting scheme scans 2D images row-by-row. Using a DEM as the input, an iteration of the lifting stage generates the complete set of multiscale DEMs  $c_s[n]$  and the elevation loss caused by the change of scale  $d_s[n]$ . At iteration,  $c_s[n]$  only contains half of the points of the input for the iteration, and hence, the resolution of the generated multiscale DEM is reduced by half.

The DEM in Figure 1 shows the area of Great Basin, Nevada, USA. The area is bounded by latitude  $38^\circ 15'$  to  $42^\circ$  N and longitude  $118^\circ 30'$  to  $115^\circ 30'$  W. The DEM was rectified and resampled to 925 m in both  $x$  and  $y$  directions. The DEM is a Global Digital Elevation Model (GTOPO30) that was downloaded from the USGS GTOPO30 website [54]. GTOPO30 DEMs are available at a global scale, providing a digital representation of the Earth's surface at a 30 arc-seconds sampling interval. The land data used to derive GTOPO30 DEMs are obtained from digital terrain elevation data (DTED), the 1-degree DEM for USA and the digital chart of the world (DCW). The accuracy of GTOPO30 DEMs varies by location according to the source data. The DTED and the 1-degree dataset have a vertical accuracy of  $\pm 30$  m while the absolute accuracy of the DCW vector dataset is  $\pm 2000$  m horizontal error and  $\pm 650$  m vertical error [55]. Tensional forces on the terrain's crust and thins by normal faulting cause the formation an array of tipped mountain blocks that are separated from broad plain basins, producing a basin-and-range physiography [56-60].



**Figure 1: The GTOPO30 DEM of Great Basin. The elevation values of the terrain (minimum 1,005 m and maximum 3,651 m) are rescaled to the interval of 0 to 255 (the brightest cell has the highest elevation). The scale is approximately 1:3,900,000.**

Multiscale DEMs of the Great Basin region are generated by implementing the lifting scheme on the DEM of Great Basin using scales  $r$  of 1 to 20. As shown in Figure 2, as the scale increases, the merging of small regions into the surrounding grey level regions increases, causing removal of fine detail in the DEM. As a result, the generated multiscale DEMs possess lower resolutions at higher degrees of scaling.

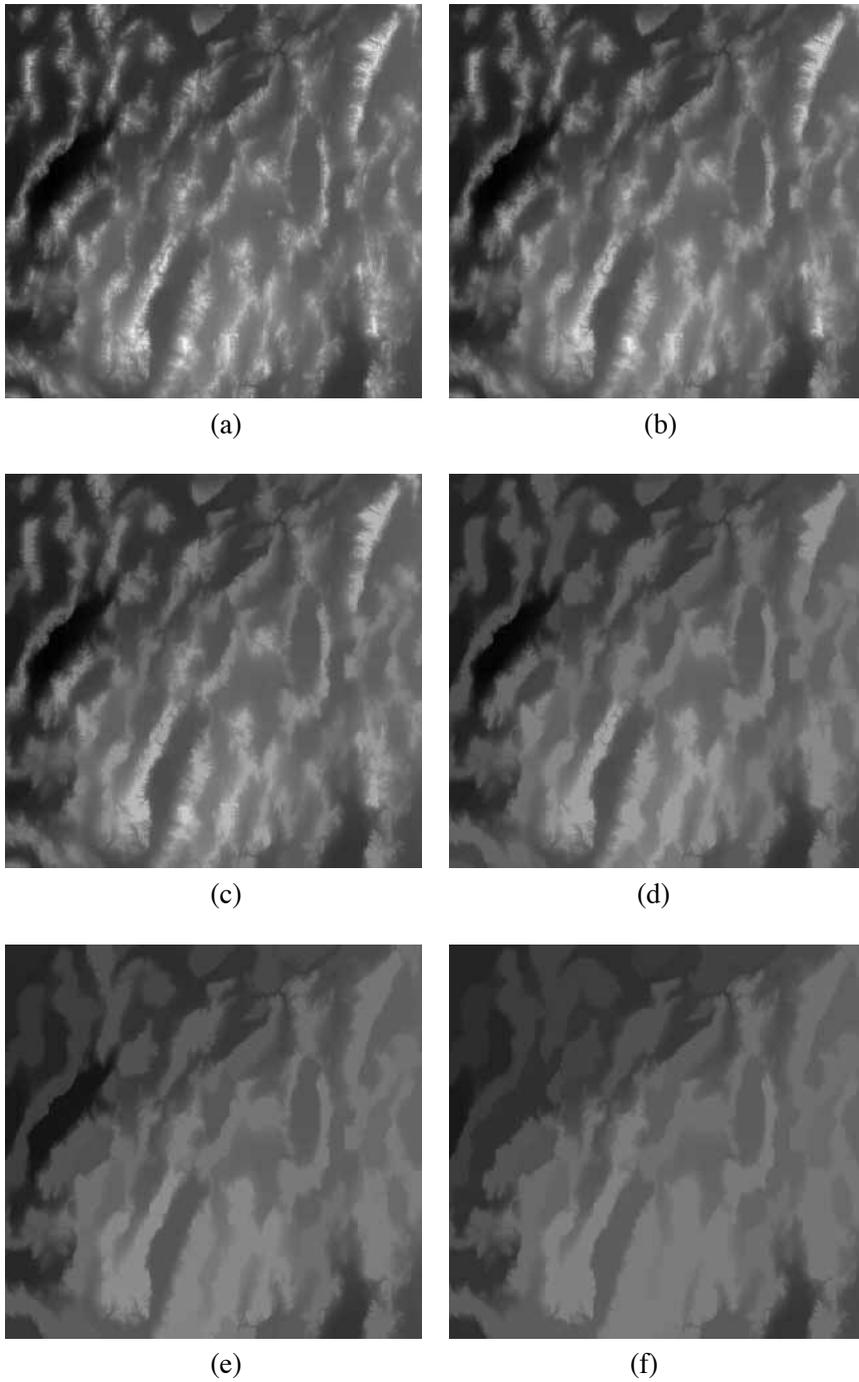
### **Mountain Extraction**

The mountains of the generated multiscale DEMs are extracted using the mathematical morphological based algorithm proposed in Dinesh [61]. First, ultimate erosion is performed on the DEM to extract the peaks of the DEM. Conditional dilation is performed on the extracted peaks to obtain the mountains of the DEM. As shown in Figure 3, the merge of small regions into the surrounding grey level regions and removal of fine detail in the generated multiscale DEMs cause a reduction in the area of extracted mountains.

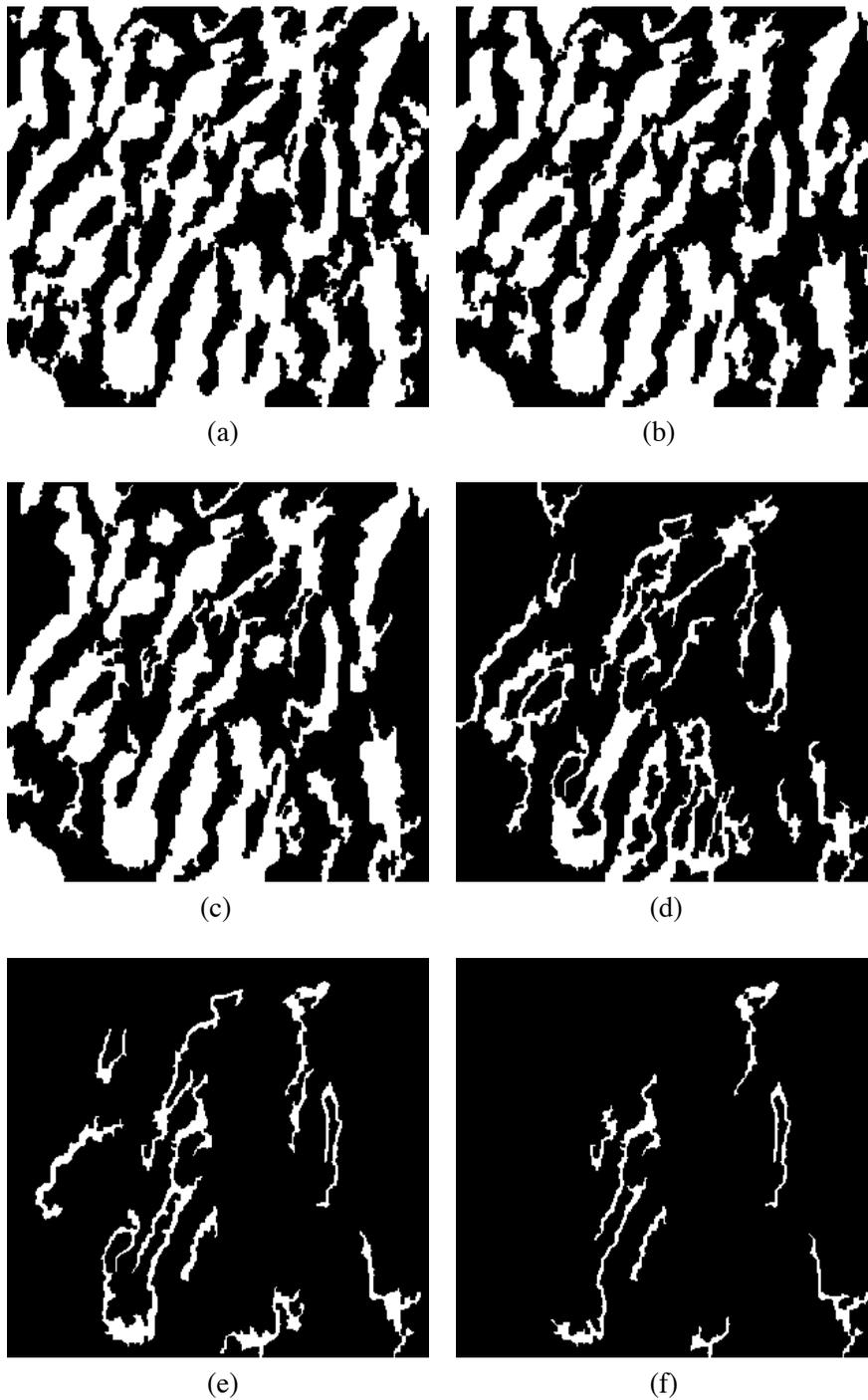
### **Generation of the Influence Zones of the Extracted Mountains**

Connected component labelling [62] is implemented on the extracted mountains in order to identify the individual mountains. In the resulting greyscale images, each individual mountain object is assigned with a unique grey level. The influence zones of the extracted mountains (Figure 4) are computed applying the immersion simulation algorithm proposed in Vincent and Soille [63] on the greyscale images generated using connected component labelling. This algorithm is based on a progressive flooding of an image, is applicable to  $n$ -dimensional images. The cells are first sorted in increasing order of their grey levels. The successive grey levels are processed in order to simulate

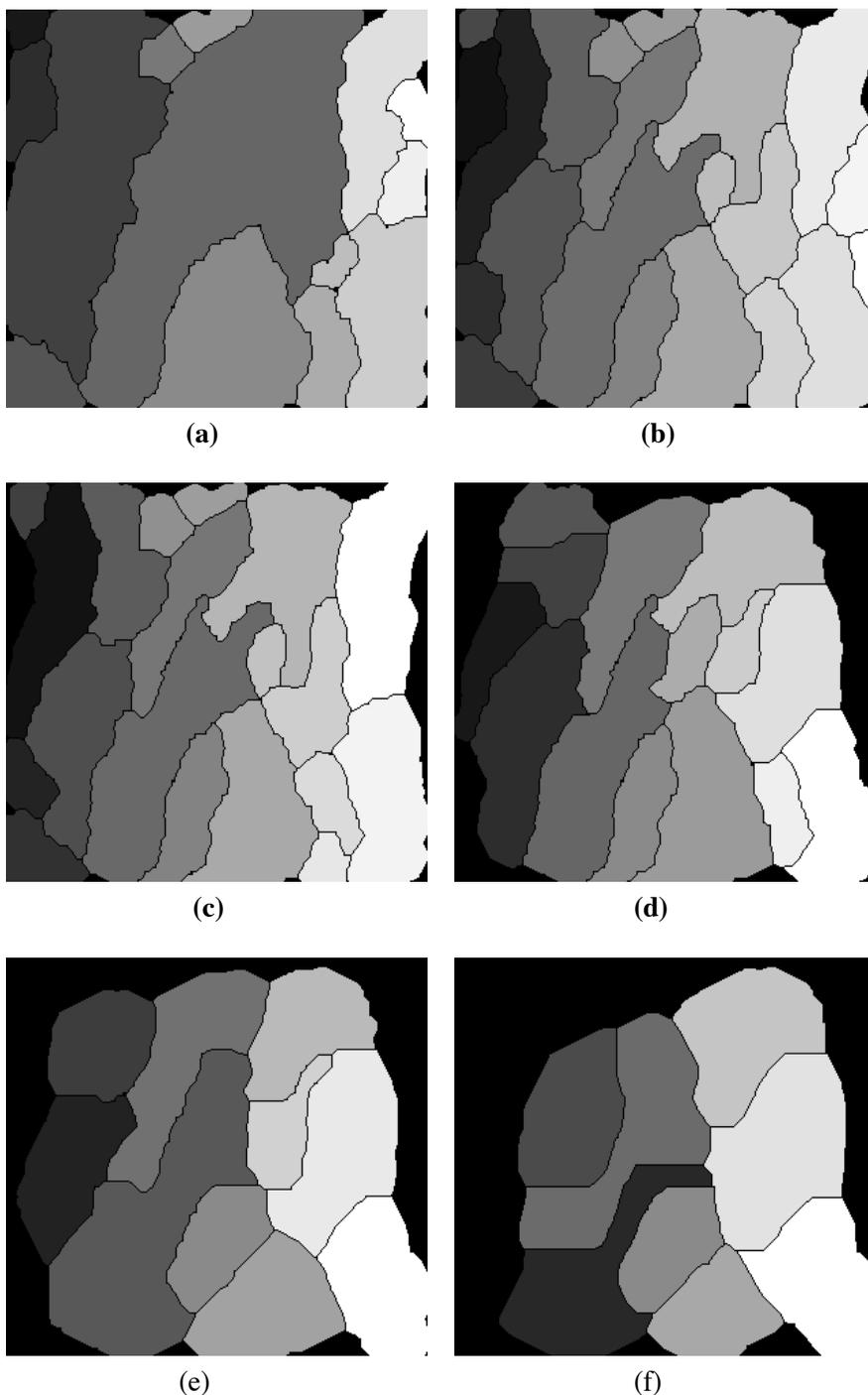
the flooding propagation. A distributive sorting technique combined with breadth-first scanings of each grey level allow for fast computation of influence zones.



**Figure 2: Multiscale DEMs generated using scales of: (a) 1 (b) 3 (c) 5 (d) 10 (e) 15 (f) 20.**



**Figure 3: Mountains (the cells in white) extracted from the corresponding multiscale DEMs in Figure 2.**



**Figure 4: Influence zones of mountains extracted from the corresponding multiscale DEMs in Figure 2.**

## Results and Discussions

For each scale, the total area of influence zones  $I$  and number  $N$  of the extracted mountains are computed (Table 1). The average area of influence zones  $AI$  is computed using Equation (5). Based on this equation,  $AI$  increases when  $I$  increases and / or  $N$  decreases, and vice versa.

$$AI = I / N \quad (5)$$

Table 1: Basic measures of influence zones of mountains extracted from the generated multiscale DEMs.

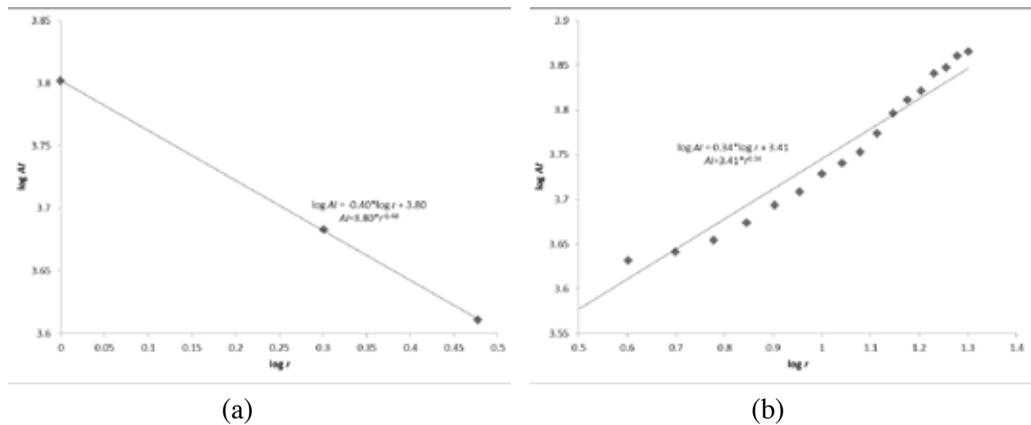
Scale $r$	Number of Extracted Mountains $N$	Total Area of Influence Zones $I$ (cells)	Average Area of Influence Zones $AI$ (cells)
1	14	88740	6338.57
2	20	96405	4820.25
3	21	85674	4079.71
4	19	81291	4278.47
5	19	83092	4373.26
6	18	81194	4510.77
7	18	84871	4715.05
8	18	88832	4935.11
9	16	81723	5107.68
10	14	74920	5351.42
11	14	77049	5503.50
12	13	73540	5656.92
13	12	71278	5939.83
14	11	68800	6254.54
15	10	64770	6477
16	10	66222	6622.22
17	9	62425	6936.11
18	8	56298	7037.25
19	8	58000	7250.00
20	8	58694	7336.75

It is observed that as the scale increases from 1 to 3, the average area of influence zones of the extracted mountains reduces. This occurs as when the scale is increased, the sizes of the extracted mountains reduce, resulting in a decrease in the total area of influence zones. Furthermore, increase in scale also causes the division of mountains into smaller mountains, resulting in an increase in number of extracted mountains.

As the scale increases from 3 to 20, the average area of influence zones of the extracted mountains increases. This occurs as when the scale is increased, a number of small mountains are removed, resulting in a decrease in the number of mountains, and hence, an increase in the average area of influence zones.

A similar observation was made in Dinesh [18] regarding the influence zones of simulated droughts of water bodies. Initial increases in droughting level result in decrease of average area of influence zones due to decrease of total area of water bodies and the division of water bodies into smaller water bodies. Further increases in droughting level cause increase of average area of influence zones due to removal of smaller water bodies. Two log-log plots of the average area of influence zones of the extracted mountains  $AI$  against the level of droughting  $r$  are drawn, one for scales of 1 to 3 (Figure 5(a)), and one for scales of 3 to 20 (Figure 5(b)). Power law relationships are observed in both plots. These power laws take the following form:

$$AI = c \cdot r^D \tag{6}$$



**Figure 5: Log-log plots of average area of influence zones the extracted mountains  $AI$  against scale  $r$ . (a) For scales of 1 to 3. (b) For scales of 3 to 20.**

These power law relationships arise as a consequence of the fractal properties of influence zones of mountains extracted from multiscale DEMs. The term ‘fractal’ implies that an object or pattern has self-similar or self-affine properties. Self-similar means that parts of an object are identical to the whole, and self-affine means that parts of an object resemble systematically squashed or stretched versions of the wholes. Ideal fractals display similarity across an infinite range of scales, which is rarely seen in

nature. Consequently, the ranges of fractality can be used to decipher characteristic scales and thresholds at which physical processes operate. Fractal geometry was introduced and popularized by Mandelbrot [64-66] to describe highly complex forms that are characteristic of natural phenomena such as coastlines and landscapes. In Equation (6),  $c$  is a constant of proportionality, while  $D$  is the fractal dimension of the average area of influence zones of mountains extracted from multiscale DEMs, which indicates the rate of change of average areas of influence zones over varying scales.  $D$  has a positive value for increasing average area of influence zones, and a negative value for decreasing average area of influence zones.

## **CONCLUSION**

In this paper, the characterisation of the influence zones of mountains extracted from multiscale DEMs was performed. It was observed that as the scale increases from 1 to 3, the average area of influence zones reduces due to the reduction in sizes of the extracted mountains and increase in number of mountains because of the division of mountains into smaller mountains. As the scale increases from 3 to 20, the average area of influence zones increases due the removal of small mountains. A power law relationship was observed between the average area of influence zones of the extracted mountains and scale. The scaling exponent of this power law, which was named as a fractal dimension, indicates the rate of change of average area of influence zones of mountains extracted over varying scales.

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## COMPUTATION OF REATTACHMENT LENGTH OF THE MAIN RECIRCULATION REGION OF A BACKWARD-FACING STEP: A REVIEW

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### ABSTRACT

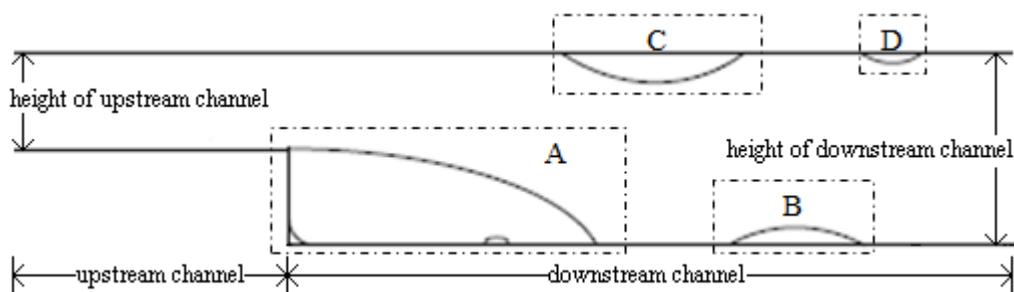
*In flow dynamics, the separation and reattachment of flow in a backward-facing step (BFS) is important because it establishes a relationship between some of the physical characteristics of flow recirculation regions such as the reattachment length of the main recirculation region (MRR), and detachment and reattachment lengths of the subsequent recirculation regions. Among the parameter that influence the formation of separation and reattachment regions are expansion ratio ER and Reynolds number Re. Various studies have been conducted on BFS using various values of Re and ER to identify the separation and reattachment regions. These studies were performed experimentally, computationally, or using a combination of these two approaches. This paper is aimed at reviewing these studies in terms of experimental techniques employed, and comparison of experimental results and numerical predictions of the reattachment lengths.*

*Keywords: backward-facing step (BFS); reattachment length; main recirculation region (MRR); expansion ratio ER; Reynolds number Re.*

### INTRODUCTION

The flow of air in gas turbine engine components can be studied using a backward-facing step (BFS) configuration to represent the scenario that could take place when the flow from higher velocity or small channel enters an area with lower velocity or larger channel. BFS is one of the simplest flow configurations, which has higher tendency to create flow with separation and reattachment flow regions. In aerospace engineering, this kind of flow configuration can be seen in the formation of cooling layers on the surface of gas turbine components, in which the layer is needed to cool down the components and prevent material melt down due to high temperature operation of the engine [1,2].

Figure 1 shows a BFS model which is basically a rectangular duct consisting of two channels, upstream and downstream. The model is designed in such a way so that the both channels have different heights, with the expansion ratio  $ER$  can be defined as the ratio between heights of the downstream and upstream channels.  $ER$  is one of the factors that affect the formation of flow separation and reattachment regions. Based on this figure, there are four regions which are formed, two each on the bottom and upper surfaces respectively. Region A is the main reattachment region (MRR), while region B is first detachment and reattachment region of bottom surface. Regions C and D are the first and second detachment and reattachment regions of bottom surface respectively. In practice, the number of regions formed is not limited to these four regions only; it could be more than that depending on the Reynolds number  $Re$  used [3, 4].



**Figure 1: Schematic illustration of a BFS model.**  
(Adapted from Armaly et al. [3] and Erturk [4])

Various studies have been conducted on BFS using various values of  $Re$  and  $ER$  to identify the separation and reattachment regions [3,4, 5-8]. These studies were performed experimentally, computationally, or using a combination of these two approaches. This paper is aimed at reviewing these studies in terms of experimental techniques employed, and comparison of experimental results and numerical predictions of the reattachment lengths.

## Experimental Techniques

Armaly *et al.* [3] performed the measurement of reattachment length and velocity distribution of BFS flow by a laser-Doppler anemometer (LDA). The reason for them to employ this equipment because of its capability to define quantitatively the variation of separation length with different values of  $Re$  and to obtain detailed information on the velocity profiles downstream of the step. The schematic diagram showing the set-up of this experimental technique is shown in Figure 2. The channel test section used in this work was 0.52 cm in height, and 20 and 50 cm in length for the upstream and downstream channels respectively. The purpose of using these dimensions is to ensure a fully developed 2D flow at the cross section at the location of the step for the entire measurements conducted, which covered a range of  $70 < Re < 3,000$ . The arrangement of this open air-driven flow provides an  $ER = 1.94$ .

Lee and Mateescu [5] introduced a technique called multi-element hot-film sensor (MHFS). This technique measures nonintrusively the locations of the reattachment and separation points for fully developed laminar and transitional channel flows over a 2D BFS using closely spaced sensor arrays, in conjunction with a bank of constant-temperature anemometers (Figure 3). The rectangular test section was constructed from plexiglass. The upstream channel length of the test section was 1.2 m with height and width 1.5 and 60 cm respectively. These dimensions were used to ensure a fully developed laminar flow upstream of the step up to  $Re = 1,150$ . In addition, the transitional flow regime for  $Re$  between 1,150 and 3,000 was investigated. Besides that, hot-wire velocity measurements were also made to supplement the MHFS measurements. In this study, two values of  $ER$  were used, which are 1.17 and 2.

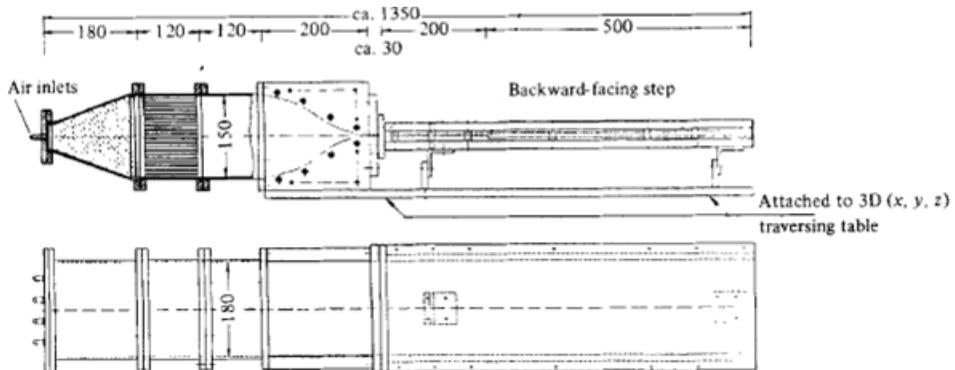


Figure 2: Schematic of air tunnel and test section used in Armaly et al. [3] (dimensions in mm).

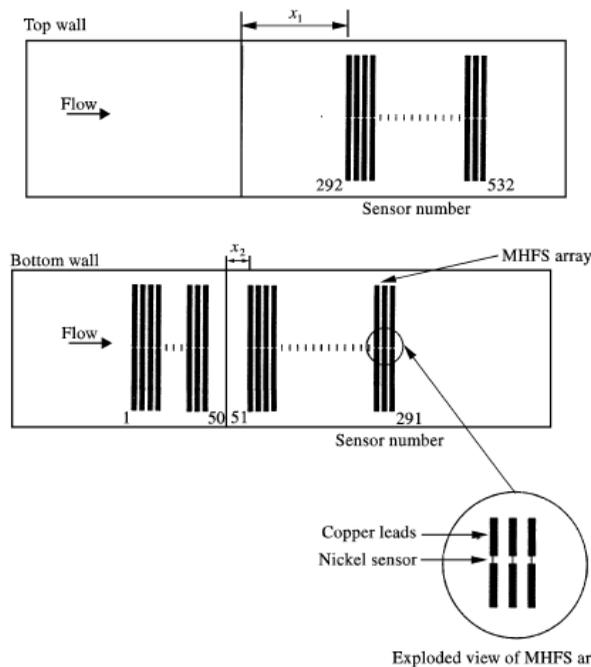
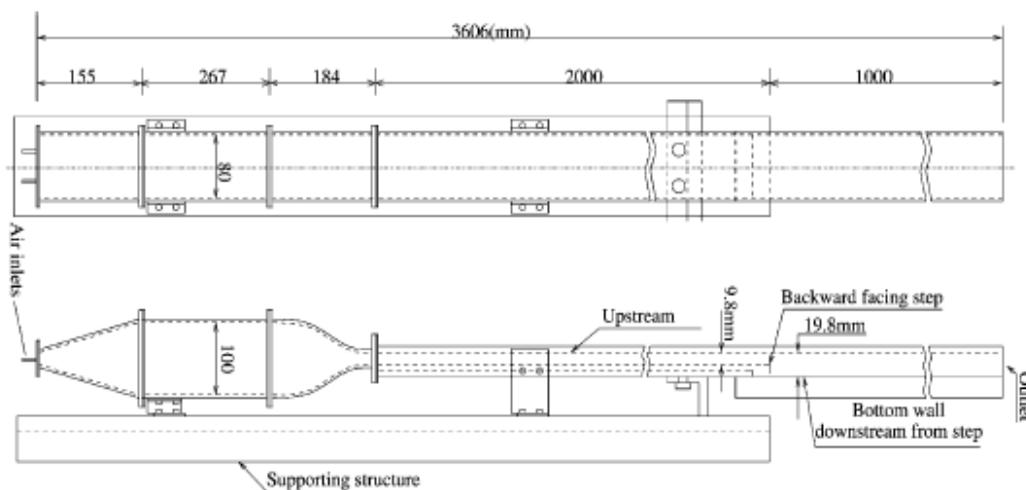


Figure 3: Schematic of the MHFS array used in Lee and Mateescu [5] ( $x_1 = 92$  mm and  $x_2 = 13.5$  mm).

Nie and Armaly [6] studied the separation and reattachment flows due to sudden changes in geometry by using a laser Doppler velocimeter (LDV). This equipment is capable of measuring nonintrusively the local velocities of 3D flow adjacent to the boundary walls of the BFS flow are performed for the purpose of mapping the boundaries of the reverse flow regions that develop in this geometry, which is adjacent to the sidewalls, wall and stepped wall, as a function of  $Re$  between 100 and 8,000, thus covering the laminar, transitional and turbulent flow regimes. Figure 4 shows the schematic diagram of the experimental geometry. It consists of a BFS in a duct where the step height is 1 cm and the width is 8 cm. The coordinate system is defined as shown schematically in this figure, where the  $x$ -,  $y$ -, and  $z$ -axes denote the streamwise, transverse and spanwise directions respectively. The upstream channel is 0.98 and 8 cm in height and width respectively. The open-air tunnel is constructed from plexiglass sheets of 0.95 cm thick that are machined and assembled to form the desired geometry. The two sidewalls of the test section are made of 0.6 cm thick optical glass, thus facilitating the use of the LDV. The upstream and downstream channels of the air tunnel have the same cross-sectional area as the upstream channel of the experimental geometry and are 200 and 100 cm long respectively. These lengths are sufficient to ensure fully developed airflows at the step and exit section of the air tunnel. This geometry provides a BFS with  $ER$  of 2.02.



**Figure 4: Schematic of the air tunnel and test section used in Nie & Armaly [6].**

Elizarova *et al.* [7] investigated on turbulent flow over a BFS in a channel using a particle image velocimetry (PIV) in an open air-driven wind-tunnel. The set-up of this experimental investigation is shown in Figure 5. The existing square section (300 x 300 mm) has been adapted to provide a 2D BFS with adjustable step height. The width and length (800 mm) of the test section were not changed. An electrically powered fan was used to obtain velocities of about 1 to 80 m/s in the non-adapted test section without any obstacles.

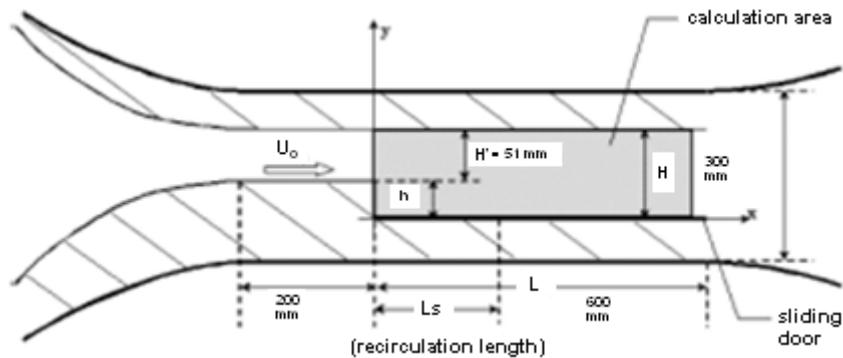


Figure 5: Wind tunnel section and notations used in Elizarova *et al.* [7].

This work is actually based on Armaly *et al.* [3], who pointed out that the reattachment length of the flow behind the step varies with the  $Re$  and the height of the step, where the reattachment length can be twenty times larger than the height of the step. Therefore, to be able to visualise the whole flowfield (and especially the reattachment area), the test section height upstream of the step was fixed to 51 mm, and they have considered different step heights between 12 mm and 50 mm. The length of the test section before the step was 200 mm, which allowed the flow to be fully developed. The mean velocity obtained is approximately 1.4 m/s (as checked with a two-component hot-wire anemometer). The mean turbulent ratio measured was less than 0.85 % ahead of the step.

Mouza *et al.* [6] introduced a technique using the electro-diffusion principle to measure the instantaneous wall shear rate along the channel centreline of a flow over a BFS in a horizontal rectangular channel. This work covers a range of  $Re$  covering laminar and transitional regimes, and the beginning of the turbulent regime, with the intention being to investigate the effect of operating conditions on the reattachment length. This technique was performed in a rectangular plexiglass channel (0.25, 0.02 and 2 m in width, height and length). Based on Figure 6, we can see that the step is formed by inserting a movable plexiglass block having thickness 0.01 m. This arrangement provides  $ER$  of 2.

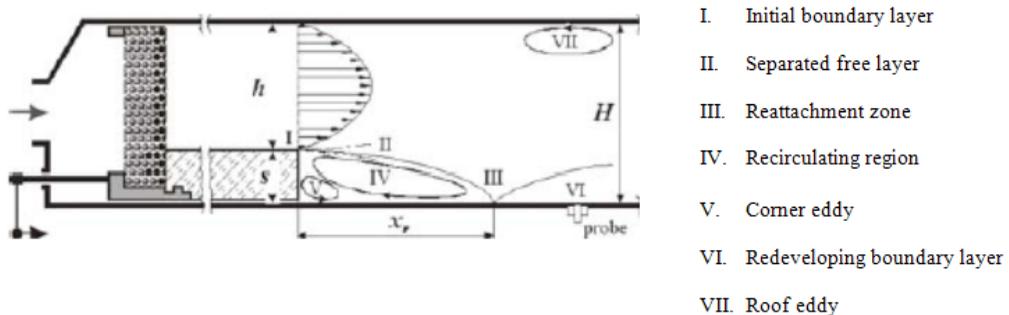


Figure 6: The BFS apparatus employed in Mouza *et al.* [8].

## NUMERICAL PREDICTIONS OF REATTACHMENT LENGTH

### Armaly *et al.* [3]

The solution procedure in Armaly *et al.* starts by supplying initial guesses of the velocity and pressure variables and then, computing a converged solution by iteration. The solution was considered converged and satisfactory when the normalised residuals of each partial differential equation summed over the whole calculation domain were smaller than  $10^{-4}$ . The grid distribution in the calculation domain was non-uniform in both the longitudinal and cross-flow directions. A large number of grid points were placed in the areas where steep variations in velocities were expected. This information was deduced from experiments and preliminary calculations using equally spaced numerical grids.

It was found that a grid density of  $45 \times 45 = 2,025$  is sufficient to provide a primary reattachment length that is independent of the grid density for  $Re$  of up to 400. It was also found that for  $Re$  of 100, a solution utilising a grid density of 2,025 only requires number of iterations (NITER) of 400 for convergence. In this work, the NITER was increased in accordance with  $Re$  up to values where the additional recirculation regions formed. Using the same grid density, it was found that for  $Re$  of 450, the required NITER was 1,200.

### Lee and Mateescu [5]

Besides experimental work, Lee & Mateescu also performed a computational study for  $Re$  of 800 for a fully developed velocity profile, with grid density of  $500 \times 50 = 25,000$ . The computational domain used in this work had a non-dimensional length of 30 (based on the downstream height of the channel,  $H_d$ ) in the  $x$ - and  $y$ - directions respectively. The mesh spacing in the  $x$ -direction was  $\Delta x_{min} = 0.08$ , and maximum at the outlet was  $\Delta x_{max} = 0.21$ , while in the  $y$ -direction, the minimum mesh spacing was at the walls,  $\Delta y_{min} = 0.015$ .

### Erturk [4]

Figure 7 shows the schematic of the BFS flow used by Erturk with the inlet channel and step height illustrated as  $h_i$  and  $h$  respectively. They imposed that the flow is a fully developed plane Poiseuille flow between parallel plates such that the inlet velocity profile is parabolic at the inlet boundary.

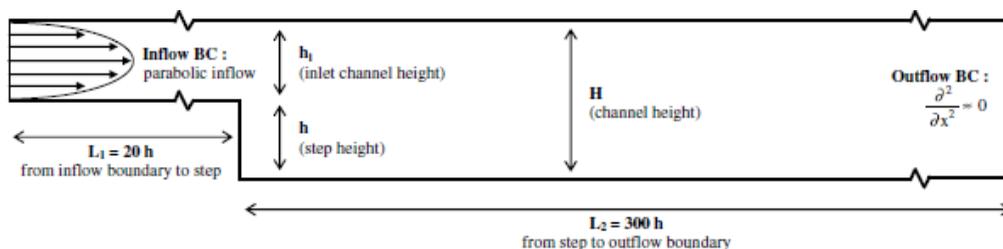


Figure 7: The dimensions of the BFS domain used in Erturk [4].

The inlet boundary  $L_1$  is located 20 step heights upstream of the step. As shown in Figure 8, in the inlet channel, 500 uniform grids were used, and 101 uniform grids were used between bottom and upper plates. The exit boundary  $L_2$  is chosen as 300 step heights away from the step. In order to have high accuracy in the vicinity of the step, in  $x$ -direction from the step to a distance of 100 step heights, shown as  $L_3$ , 2,500 uniform fine grids were used. From 200 step heights distance to the exit boundary, shown as  $L_4$ , 1,250 stretched grid points were used in order to be able to have the location of the exit boundary far from the step. The BFS model with a fully developed plane Poiseuille flow is as shown in Figure 9.

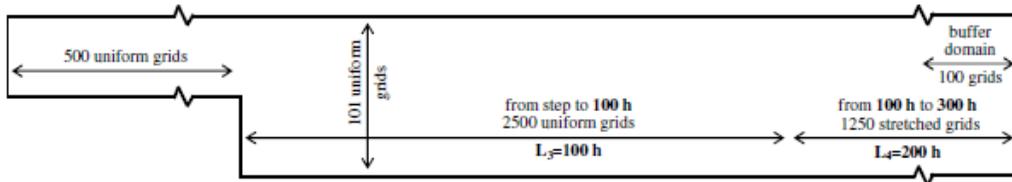


Figure 8: The grid details of BFS domain used in Erturk [4].

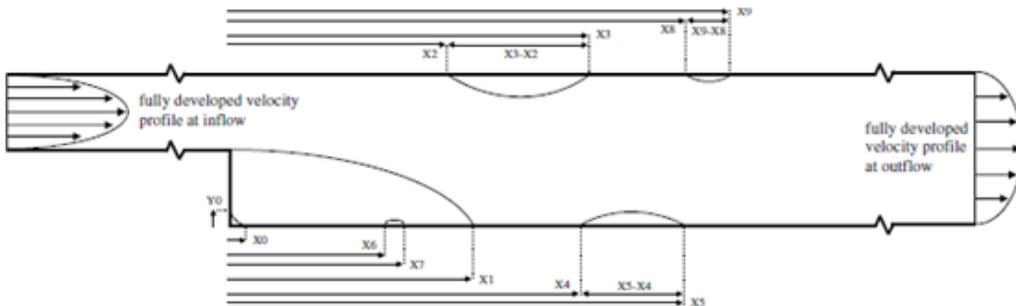


Figure 9: The BFS model used in Erturk [4] with fully developed plane Poiseuille flow.

## DISCUSSION

Table 1 summarises the  $ER$  values for BFS models used in various studies. The lowest value found is our review is 1.17, used by Lee & Mateescu [5], while the highest value is 2.02, used by Nie & Armaly [6]. Most of the studies employed  $ER$  of either 1.94 [3, 4] or 2 [5, 8].

Table 1: A summary of  $ER$  values for BFS models used in various studies.

Study	Exp*	Comp**	Exp	Comp	Exp	Comp	Exp	Comp
	$ER = 1.17$		$ER = 1.94$		$ER = 2.0$		$ER = 2.02$	
Armaly <i>et al.</i> [3]			X					
Lee & Mateescu [5]	X				X			
Nie & Armaly [6]							X	
Mouza <i>et al.</i> [8]					X			
Erturk [4]				X		X		

\*Experimental \*\*Computational

Figure 10 shows the reattachment lengths computed by Erturk [4] using  $ER$  of 1.94 and 2, for  $Re$  up to 1,500. It is found that the trend line can be divided into two straight lines, for  $Re$  between 100 and 500, and 600 and 1,500 respectively. By looking at the angle of slope of both straight lines, it is found that the first straight line has larger gradient as compared with the second straight line. This comparison shows that the reattachment lengths increase at reducing rate once the  $Re$  exceeds 500. This could be because of the formation of subsequent recirculation regions, especially on the upper surface of the rectangular channel which need to be identified as well.

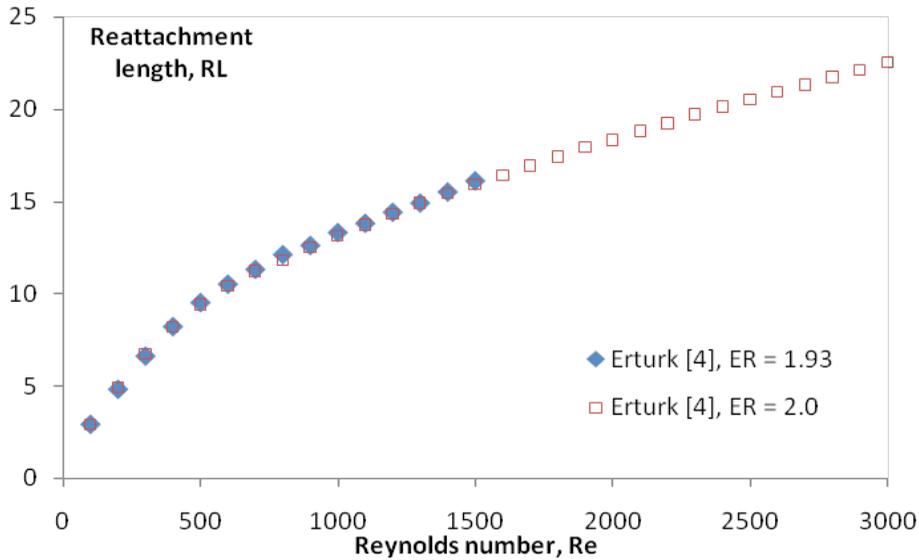


Figure 10: Reattachment lengths computed by Erturk [4] using  $ER$  of 1.94 and 2.

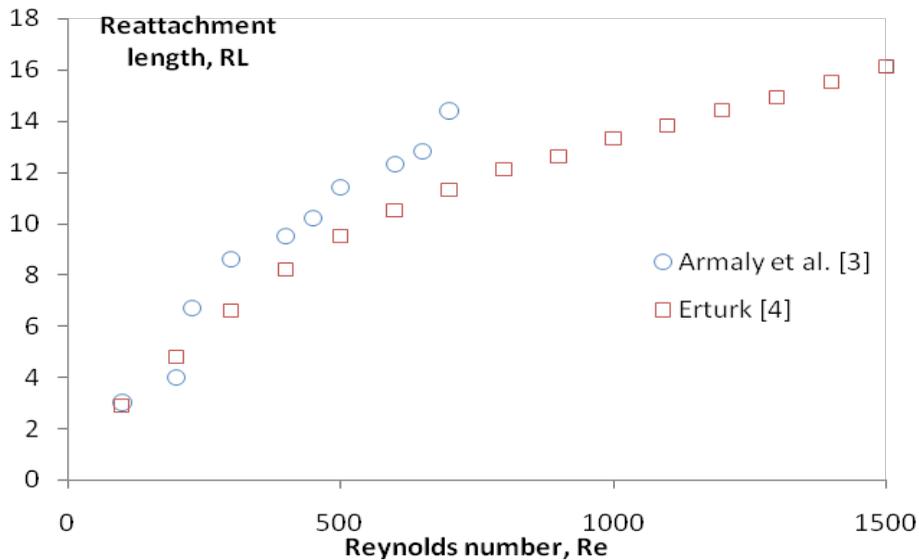


Figure 11: Reattachment lengths computed by Armaly *et al.* [3] and Erturk [4] using  $ER$  of 1.94.

Figure 11 shows the reattachment lengths computed by Armaly *et al.* [3] and Erturk [4] using  $ER$  of 1.94, using  $Re$  of up to 800 and 1,500 respectively. It is found that at the lower range of  $Re$ , between 100 and 400, especially at  $Re = 300$  and 400, the differences of reattachment length between both of these data are fluctuating at low margin, can be considered as medium level satisfactory between these results. However, when  $Re$  increased to higher values, we found that the difference between both sets of data started to increase, and this could be found at  $Re$  of 500, 600, 700 and 800.

Armaly *et al.* started their experimental work at  $Re = 125$  and the length obtained by them is 3, while Erturk started his simulation at  $Re = 100$  and obtained length of 2.9. Armaly *et al.* then performed their work at  $Re = 229$ , while Erturk performed his simulation at  $Re = 200$ , and they obtained lengths of 4 and 4.8 respectively. This shows that the reattachment length obtained by Erturk started to increase at higher rate as compared to Armaly *et al.* However, at  $Re = 300$ , the results are vice versa whereby the length obtained by Armaly *et al.* increased to 6.7, compared with 6.6 obtained by Erturk [4]. Then, at  $Re = 400$ , Armaly *et al.* obtained 8.7, which is higher compared with 8.2 which obtained by Erturk. This trend continued at  $Re = 700$  and 800, where Armaly *et al.* and Erturk obtained (12.8, 11.3) and (14.4, 12.1) respectively. This shows that the reattachment lengths obtained by Armaly *et al.* are increasing at larger rate as compared with Erturk when  $Re$  is increased.

## CONCLUSION

Based on this review, it can be concluded that both Armaly *et al.* [3] and Erturk [4] obtained results that agree well each other, especially at lower range of  $Re$ . When the  $Re$  is increased from 500, the comparison between both of sets of data shows that the relationship between reattachment length and  $Re$  is still in linear mode, but the gradient of their increase starts to drop due to the formation of subsequent recirculation regions on the bottom and upper plates inside the rectangular channel.

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