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FOREWORD



The profession of military encounters multitude of challenges that are demanding in the contemporary security landscape. These range from nation building responsibilities to meeting rigorous training standards in the field to countering a variety of non-traditional security threats, whilst performing a host of other military functions. However, there must be a premium on self-education and development of mind, especially for the Officer cadre to successfully face these challenges.

The process of building intellect takes its roots at home. However, its formal and universal application to the future Officers commences with their basic training. This is further consolidated through the continued education the tri-service Officers receive at the Defence Services Command and Staff College (DSCSC). The curriculum emphasises on improving the analytical skills of the officers and deepening their engagement in scholarly conversation and debate. DSCSC encourages intellectual rigour in providing strategically-driven solutions to the ever-changing security landscape. Therefore, it is my utmost pleasure to present the *Defence and Security Journal* of the Defence Services Command and Staff College, Sri Lanka published for the sixth consecutive year. The prime objective of the journal was to inspire young military leaders who were groomed at the DSCSC to publish their research on defence and security, projecting fame on the national security of Sri Lanka. The articles in this journal are primarily of the defence and security domains, which represent contemporary security dynamics and projections for the future of the armed forces and the college.

Whilst welcoming the latest issue of the journal, I wish to extend my sincere gratitude to Dr. Bhagya Senaratne, Ms. Apsara Karunaratne and the Peer Reviewers for their untiring commitment and dedication for bringing out this high-quality publication.

I end with the hope that Volume six of the *Defence and Security Journal* will stimulate the minds of our valued readers and inspire future military leaders to pick up the pen to offer their own views to enrich future defence and security concerns.

HIMANN Herath RSP USP psc

Major General

Commandant

Defence Services Command and Staff College, Sri Lanka

EXPLORING THE PRESENT STATUS AND FUTURE POTENTIALS OF ADOPTING MISSION COMMAND FOR SRI LANKA ARMY

Lieutenant Colonel Mohammad Zahid Hossain

ABSTRACT

Mission Command is a command philosophy which the armies around the globe, whether modern and already developed, or developing, currently use. Experts consider it to be one of the most suitable methods for future battlefields, especially, if someone is adopting the Manoeuvrist Approach to warfare. Moreover, following the principles of Mission Command in peacetime is essential in ensuring that it can be followed during wartime or crisis. The Sri Lanka Army also prescribes to the ideas of Manoeuvrist Approach and Mission Command. This research was conducted to identify up to what extent Mission Command is followed in the Sri Lanka Army and to suggest measures to improve the present state. The research was conducted following a mix method. The research concluded that Mission Command is partially present in the culture of the Sri Lanka Army and the Sri Lanka Army is on the right path when it comes to adopting Mission Command. However, some organisational and cultural/institutional hindrances were identified. The paper recommends broad suggestions to improve these organisational and culture difficulties.

Keywords: Manoeuvrist Approach, Micromanagement, Mission Command, Resource-Constraint, Zero-Error Syndrome

INTRODUCTION

Mission Command is a command philosophy or approach. It is based upon the exercise of local initiative but bound within the framework of the higher commanders' intent (Lyanage, 2015). According to the US Field Manual on Mission Command, it is the "Army's approach to command and control that empowers subordinate decision making and decentralised execution appropriate to the situation" (Department of the Army, 2019, pp.1-3). If Mission Command needs to be successful, leaders at all echelons must exercise disciplined initiative within their commander's intent. It requires an environment of mutual trust (United States Department of the Army, 2003). British Army Field Manual (British Ministry of Defence, pp.6-11) states that "Mission Command is a philosophy of command, with centralised intent and decentralised execution." This type of command is suitable for complex and dynamic situations and best serves the Manoeuvrist

Approach doctrine (British Ministry of Defence, 2010). Bryan Watters¹ (as cited in Chowdhury, 2015) opined that the appropriate delegation of authority is the driving key that allows junior leaders to plan and conduct various responsibilities by conceiving the intent and purpose of higher command. Mission Command enables subordinate commanders to conduct military tasks and operations through decentralisation, but being bound by rules and doctrine. According to the Bangladesh Army Training Pamphlet, the German Army is widely believed to be the most consistently successful modern army at using Mission Command, which is referred to as 'Auftragstaktik' (Chief of General Staff's Office, Bangladesh, 2006). As Sri Lanka Army follows the Manoeuvrist Approach Doctrine, the concept of Mission Command is common in the Sri Lanka Army too (Chief of General Staff's Office, Sri Lanka, 1995). Defence Services Command and Staff College (DSCSC), Sapugaskanda also considers Mission Command as one of its core values (Defence Services Command and Staff College, 2020). However, it is perceived that there is a gap between theory and practice in this case.

ORIGIN OF MISSION COMMAND

The concept of Mission Command was first introduced by the Prussians. Sharp and Crevision (2013) observe that following the Prussian defeat at the battles of Jena and Auerstedt, in 1806, the Prussians began an in-depth review of their doctrine. Accordingly, by 1837, the Prussian field service regulation was updated. The exercise of initiative by junior officers was encouraged as per the new doctrine. 'Auftragstaktik' (Mission Command) was a product of German social and cultural tradition, and it was adopted by the German Army for its purposes (Silva, 1989). Modern technologies and tactics of that time brought dramatic changes in the operational environment, which was dominated by chaos, confusion, and unpredictability in the battlefield. The more dynamic, flexible, and pragmatic approach to command and control issue was a dire need of time. Field Marshal Helmuth von Moltke, as Rossells (2012) observed, Mission Command was successfully adopted in his campaigns against Austria in 1866 and France in 1870-71. Moltke promoted the core concepts of Mission Command. One of his main concerns was to foster independent thinking and acting among his subordinates. By World War I, Germans trained up to their platoon leaders on the broad concept of Mission Command. In the Second World War, German's *blitzkrieg* combined with Mission Command caused rapid success in Poland and France. Great military leaders like Heinz Guderian and Rommel displayed their archetype leadership of conducting operations within broader guidance and concept of Mission Command. Consequently, the German command and control model became a model for most western armies.

¹ During Chowdhury's (2015) interview, Dr. Bryan Watters OBE (Officer of the Most Excellent Order) was a Senior Lecturer at Cranfield University's School of Defence and Security where he lectured and researched on leadership, strategic management, leadership of Jungs, and research methodology.

MISSION COMMAND IN OTHER ARMIES

US Army: The US Army published its first decentralised command doctrine in the 1941 version of FM 100-5 (Operations). The debacle in the Vietnam War led the US Army to initiate significant changes in their war fighting strategy, especially, in their command control approach. Adoption of Mission Command by the American Army was conducted as part of the reforms of the 1970s and 1980s (Shamir, 2010). However, Orm and Mundell (2019) opine that there is a long way to go to fully embrace Mission Command. Leaders being risk averse and their lack of trust in their subordinates are some of the underlying reasons of not following Mission Command in the US Army. According to them, Mission Command must be a 24-hour 365-day mind-set in the Army. Every leader must commit to executing Mission Command in their day to day life, in the field, while conducting training and even in routine garrison life.

British Armed Forces: The British Army incorporated Mission Command officially in 1987, five years after the Falkland War with Argentina (Russeels, 2012). The British Armed forces learned many tactical lessons from the Vietnam War of US and reviewed their doctrine accordingly. Russeels (2012) commented, "The British acknowledge that they created a compromise between the Prussian general staff system and British culture to fit Mission Command into their army."

Israel Army: Israel Army faces the same geopolitical realities that led the Prussians to adopt Mission Command. The desperate battles that Israel faced in multiple fronts could only be won by maximum decentralisation of command. Israel Army puts special emphasis on professionalism and educational levels of its officer corps. In Israel, the philosophy of Mission Command was studied over an extended period. It was finally formally adopted in 2006 through publication of their Basic Doctrinal Publication on "Command and Control". According to the Israeli Defence Forces' doctrine, during an operation the commander must choose between the two extremes of Mission Command and Detailed Command (Bejehineletit). They also have the liberty to use combinations of the two alternatives. The commander's assessment of elements such as the troops' level of training, time considerations, etc. determines which one to choose (Ben-Shalom and Shamir, 2011).

Mission Command in Neighbouring Armies: Since the culture of armies in the region has a common heritage, studying the state of the regional armies gave some insight. The state of command of neighbouring countries like Bangladesh, India and Pakistan reveals that the Mission Command Philosophy is not widely followed in any of these armies (Dalal, 2020; Khan, 2020).

SIGNIFICANCE AND FUTURE OF MISSION COMMAND

Out of the two styles of warfare, namely, Attrition Style and Manoeuvre Style, Attrition Style War is fought to destroy the opponent's ability to fight while Manoeuvre Style War is fought to destroy the opponent's will to fight (Military Science Fiction, 2015). The Sri Lanka Army has chosen the latter style (Herath, 2020). This style of warfare relies on speed, surprise, and exploitation of opportunity (British Ministry of Defence, 2010). The future battlefield is going to be chaotic and preclude communication between different echelons of leadership. In many cases there might not be any communication, passing orders and sharing of information between the various levels of command. Therefore, Mission Command is suitable for this type of situations.

On the contrary, Antúñez (2021) opines that understanding the social and cultural aspects of an operational environment and its contours would be paramount for success of military operations while chances of misunderstanding or misjudging it, especially by junior leadership, may prove detrimental. Therefore, 'Human Terrain' might have an adverse effect in the concept of Mission Command practice.

But what if the future battlefield environment becomes even more complex and diverse? As claimed by Leonard et al., (2010), there will be 'Interaction of Opposites'. This means that the battlefield or environment of operation will sometimes have conventional and sometimes unconventional settings. Again, organisations would need to follow hierarchy at times, while anarchy at others. Control, therefore, must be sometimes centralised and sometimes decentralised. Commanders may have to concentrate or distribute combat power, based on the situation. The general belief among the military professionals on Mission Command and Detailed Command is that seizing, retaining and exploiting of the initiative without following the concept of Detailed Command is impossible. There are numerous examples from military history. Therefore, operations perhaps require Detailed Command styles in achieving dominance over the adversary to fulfil the Commander's desired end state. Thus, there are arguments favouring both Mission Command and Detailed Command.

Shamir (2010) opined that the concept of Mission Command is a complex, elusive, and a multifaceted phenomenon. It cannot be easily quantified, measured, or institutionalised. Shamir (2011) further compared the state of Mission Command in three leading armies of the world, i.e., the U.S Army, British Army, and Israel Army. He concludes that all these three military establishments were yet to institutionalise Mission Command at the time of his research. All armies, both developed and developing, are studying, and analysing how to adopt and follow the Mission Command 'Command and Control' system. The Sri Lanka Army also subscribes to the idea of Mission Command. The case in the Sri Lanka Army is also likely to be the same, i.e., Mission Command is not fully institutionalised as in the US Army.

the British Army and the Israeli Army. Amarakoon (2009) examined whether the principles of Mission Command were followed by Sri Lanka Army during Eelam War IV. He found that all the principles of Mission Command were indeed followed though most did not have much idea about the concept itself. He recommended that Mission Command should be introduced in Sri Lanka Army. Hasan (2015) conducted an elaborate study and suggested that the Sri Lanka Army should follow the Mission Command. By conducting a comparison of the two types, Command-and-Control System, and a Cost-Benefit Analysis, his study sought to explore which style the Sri Lanka Army should follow. This research also furthered the quest and explored the present state of adherence to Mission Command principles in the Sri Lanka Army.

PRINCIPLES

According to the old US manual, there were five principles of Mission Command, while the latest update of 2019 has increased it to seven (Department of the Army, 2003). The British manual on Land Operation (British Ministry of Defence, 2017) promotes six principles. The Army Doctrine Publication Volume Two on Command of the Sri Lanka Army i.e. ADP Vol 2, 1995 (Chief of General Staff's Office, Sri Lanka, 1995) suggests five. The Principles are listed in the following table:

Table 1: Comparison of Principles of Mission Command

Ser	US Army	UK Army	Sri Lanka Army
(a)	(b)	(c)	(d)
1.	Competence	The Absolute Responsibility to Act to Achieve The Superior Commander's Intent (The fundamental guiding principle of Mission Command according to British Doctrine)	Unity of Effort
2.	Mutual Trust	Trust	Decentralisation
3.	Shared Understanding	Mutual Understanding	Trust
4.	Commander's Intent	Freedom of Action	Mutual Understanding
5.	Mission Orders	Timely and Effective Decision-Making	Timely and Effective Decision-Making
6.	Disciplined Initiative	Unity of Effort	
7.	Risk Acceptance		

Source: USFM 6-0, 2019, UK Land Operations 2017 and ADP Volume 2

Though all the principles are important, the research limited itself to those that are deemed easier to identify in an organisation during peacetime. These are Mutual Trust, Freedom of Action and Decentralisation, Initiative, and Competence.

METHODOLOGY

The research was conducted following a mix of qualitative and quantitative methods. A focus group discussion (FGD), interview of a resource personnel and interview of a commanding officer were conducted to gain insight into the state of the Mission Command in the Sri Lanka Army. However, due to the unexpected constraints caused by the COVID-19 pandemic, the researcher faced difficulties to interact with a suitable sample in the form of interviews. Other than the interviews and FGD, a survey among a sample of mid-ranking officers was conducted to gather their perception regarding the state of Mission Command, its present challenges, and the way forward to implement it in the Sri Lanka Army. For the survey, officers from all regiments were selected randomly. The insight from personal communications and the survey was fused by allowing different weightage according to the merit of the source and honest judgment of the researcher to arrive to a conclusion. The resource personnel's opinion was given the highest weightage followed by the view of the Commanding Officer of the Sri Lanka Light Infantry. The FGD received the third highest weightage. The data collected from the survey was given the least weightage.

PERCEPTION ABOUT COMMAND-AND-CONTROL SYSTEM PREVAILING IN THE SRI LANKA ARMY

The survey question regarding what type of 'Command and Control (C2) System' the Sri Lanka Army follows had three answers: Mission Oriented C2 System, Mixed/ Other and Detailed or Direct C2 System. After conducting the weighted average, it was found that a detailed style of command is prevalent in the Sri Lanka Army. The author would like to recall that the analysis was based only on the perceptions of the respondents and the interviewees. However, the tests involving some important principles of Mission Command provided more reliable indications.

MUTUAL TRUST

Mutual Trust is one of the most important principles of Mission Command. It must flow in both upwards and downwards through the chain of command. Subordinates can exercise initiative only when they have firm belief or faith that their commander trusts them. They will also be more willing to exercise initiative if they have the confidence that their commander will not only accept but also support the outcome of their decisions, even if it is wrong to some extent. This is one direction of the stream of trust. The other direction, i.e. downward trust, is also necessary. Commander's delegate greater authority to subordinates who have demonstrated competency and whose judgement they trust (U.S. Department of the Army, 2019). After analysing the data corresponding to the questions related to state of Mutual Trust, the research concluded that the state of Mutual Trust

prevailing in the Sri Lanka Army is 'satisfactory' as the majority (total 57.2%) of the respondent were neutral or agreed that it is so. Table 2 illustrates the results.

Table 2: Analysis of Data from Survey, FGD and Interviews Regarding Perception on the State of Mutual Trust in the Sri Lanka Army

Type	Response	Vote	Weight	Weighted Average	%	Result (%)				
						Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Survey (51 respondents)	Strongly Agree	0.04	1	0.01	0.40	0.40	2.30	54.50	42.80	0.0
	Agree	0.23	1	0.06	2.30					
	Neutral	0.45	1	0.11	4.50					
	Disagree	0.28	1	0.07	2.80					
	Strongly Disagree	0	1	0.00	0					
FGD	Neutral	1	2	0.50	20					
Interview 1	Neutral	1	3	0.75	30					
Interview 2	Disagree	1	4	1.00	40					
Total	4	14	2.50	100	100					

Source: Analysis of Survey Data by the author

FREEDOM OF ACTION AND DECENTRALISATION

Freedom of Action: The Manoeuvrist Approach accepts that operations are supposed to be chaotic, and outcomes would invariably be unpredictable. It, therefore, favours Freedom of Action at all levels (British Ministry of Defence, 2010). In contested and congested environments, as well as being able to counter modern agile technologically driven assets demands the simultaneous existence of shared understanding and trust. Establishing with a significant freedom of action in operational requirements enable subordinate commanders to assume responsibility for conducting missions in line with the commander's intent and rely on subordinates capabilities.

Decentralisation. Decentralisation applies to all levels and is an important facet of Mission Command. It allows subordinates to use their initiative within their delegated freedom of action and provides them with a greater sense of involvement and commitment. Decision levels should be set as low as possible (British Ministry of Defence, 2010). Freedom of Action and Decentralisation are interlinked.

Since these two principles are interconnected, the state of adherence to them was gauged by a single question. Table 3 shows the result that indicates that the junior leaders of the Sri Lanka Army do not enjoy Freedom of Action. It also signals that decentralisation is not practised in the Sri Lanka Army. It is therefore safe to comment that these two principles are absent in the Sri Lanka Army.

Table 3: Analysis of Data from Survey, FGD and Interviews Regarding Perception on State of Freedom of Action and Decentralisation in the Sri Lanka Army

Do you think in the Sri Lanka Army the junior leaders are well-guided by superiors and Headquarters for completing their assignments?										
Ser	Type	Response	Vote	Weight	Weighted Average	%	Result (%)			
							Always	Most of the Times	Sometimes	Never
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
1	Survey (51 respondents)	Always	0.09	1	0.36	4.32	16.32	52.80	30.8	0
2		Most of the Times	0.6	1	2.40	28.80				
3		Sometimes	0.31	1	1.24	14.88				
4		Never	0	1	0.00	0				
5	FGD	Most of the Times	1	2	2.00	24	16.32	52.80	30.8	0
6	Interview 1	Sometimes	1	3	1.33	36				
7	Interview 2	Always	1	4	1.00	12				
8	Total		4	13	8.33	100	100			

Source: Analysis of Survey Data

INITIATIVE

To make the Mission Command philosophy successful, both leaders and subordinates need to exercise disciplined initiative. Those who exercise disciplined initiative create opportunity by taking action to develop a situation without waiting for any guidance. In battlefields, the situation changes rapidly. The plan devised for a particular situation also becomes obsolete at the same pace. Commanders rely on subordinates to act to meet their intent, not simply to adhere to a plan that is no longer valid. A subordinate's initiative may be the starting point for seizing, retaining, and exploiting the operational initiative by forcing an enemy to respond to friendly action (US Department of the Army 2019).

As per the findings, 93% of the respondents (40% Strongly Agree and 53% Agree that they promote initiative) of the surveyed 31 officers perceived that they allow their subordinates to take initiative. However, 17% strongly perceive and 42% agree (total 59%) that their superiors do not promote initiative. Analysis of this data set hints that Mission Command is partially followed in the Sri Lanka Army. The onus of allowing juniors to take initiative lies with the seniors. As the respondents were mid-ranking officers, allowing them to take more initiative by their superior authorities would further improve the state of Mission Command in the Sri Lanka Army. The finding of this data set is portrayed in Figure 1.

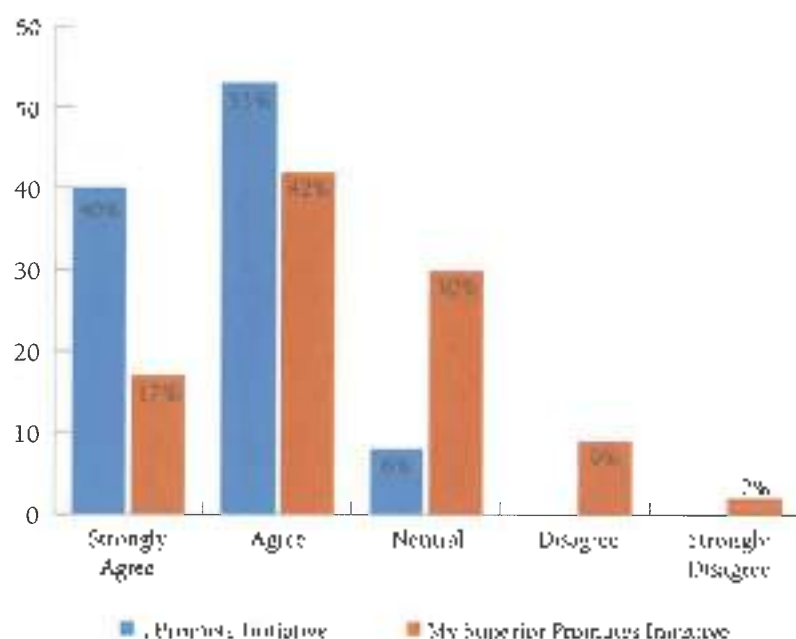


Figure 1: Comparison - Initiative Given to Subordinates vs. Freedom of Action Received from Superiors

Source: Survey Data

COMPETENCE

Competence is considered as the most important principle of Mission Command according to Balasooriya² (2020). Competent commanders, subordinates, and teams are the basis of effective Mission Command. An organization's ability to operate using Mission Command relies directly to the competence of its soldiers.

² During the interview, Brigadier (then Colonel) SPGR Balasooriya RSP (he was serving in the Office of the Chief of Defence Staff as Colonel Operations and security. He has commanded the 1st Mechanised Infantry Regiment for three years and was second in command of 1st Mechanised Infantry for two years. He has approximately a decade of service as company commander and platoon commander. He had taken part in playing all the operations conducted during the period 1997 to 2009. He had been the Commanding Officer of a Mechanised Battalion during the final battle.

Commanders and subordinates achieve the level of competence to perform assigned tasks up to the standard that is desired through training, education, experience, and professional development (US Department of the Army, 2019)

46% of respondents of the survey opined that the standard of the level of competence of the junior leader is either good or particularly good while 43% considered it to be moderate, 9% poor and 2% very poor. But the outcome of the FGD and interview with Colonel Balasooriya (2020) reveals that the standard of competence would be leaning towards moderate to poor. Even modern and developed armies with junior leaders with better competence are still facing problem to implement Mission Command properly. So even if 46% feel the standard is within 'very good' and 'good', it is likely to be insufficient when it comes to truly following the principles of Mission Command. The present state of competence of the junior leaders was considered one of the weakest principles of the Sri Lanka Army. Among the weaker competences or related traits, a ranking has been made using weighted average formula. The ranking is indicated in Table 4.

Table 4: Ranking of Competences and Related Traits as per Weakness

Ser	Competence/Trait	Weighted Average Score	Remarks
(a)	(b)	(c)	(d)
1.	Sense of Judgment	1.57692	Since the weakest traits were intended to be brought out, the Very Good and Good votes were discounted. Hence, Very Good = 6, Good=0, Moderate=3, Poor = 4 and Very Poor = 5 was considered for calculating the weighted average.
2.	Reflex to Changing Situation	1.34613	
3.	Sense of Responsibility	1.30769	
4.	Uprightness	1.29412	
5.	Confidence	1.19231	
6.	Initiative	1.09434	

Source: Analysis of Survey Data

SUMMARY

Sri Lanka Army is well-versed with the philosophy and concept of Mission Command and trace of Mission Command was found in the Sri Lanka Army. However, there is scope to improve it further. The summary of the findings from the preceding paragraphs is presented in table 5 for better visualisation.

Table 5: Summary on Finding on Primary Research Question

Ser	Item	Supports Mission Command		Remarks
		Yes/ Partial	No	
(a)	(b)	(c)	(d)	(e)
1.	Perception		✓	By analysing the interview of Resource Personnel, Interview of the Commanding Officer, FGD and responses of the Survey Respondents
2.	Mutual Trust	✓		From Table 2
3.	Freedom of Action		✓	From Table 3
4.	Decentralisation		✓	
5.	Initiative	✓		93% of the respondents of the surveyed 51 officers perceived they allow their subordinates to take initiative
6.	Competence		✓	By analysing the interview of Resource Personnel, Interview of the Commanding Officer, FGD and responses of the Survey Respondents

Source: Researchers Analysis

CHALLENGES FACED TO FOLLOW MISSION COMMAND IN THE SRI LANKA ARMY

The Sri Lanka Army faces challenges stemming from existing command climate/ cultural or institutional point of view and preparedness of the organisation to follow the philosophy of Mission Command. The ranking of the challenges, as per the perception of the respondents of the survey, are displayed in Table 6.

Table 6: Ranking of Challenges Perceived by the Respondents

Ser	Challenges	Type	Weighted Average Score	Remarks
(a)	(b)	(c)	(d)	(e)
1.	Lack of Understanding of the Subject Matter	Institutional/ Cultural	4.17	Since the challenges which the respondent felt more important were intended to be brought out, Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2 and Strongly Disagree = 1 was considered for calculating the weighted average.
2.	Risk of Career Progression	Institutional/ Cultural	4.06	
3.	Lack of Institutional Training	Organisational	3.90	
4.	Inadequate Resources	Organisational	3.86	
5.	Sense of Insecurity among the Subordinates	Institutional/ Cultural	3.77	
6.	Lack of Positive Mind-Set of the Senior Officers/ Zero Error Syndrome	Institutional/ Cultural	3.73	
7.	Inadequate Competence of Junior Leaders	Organisational	3.73	
8.	Safe Play Tendency	Institutional/ Cultural	3.73	

Source: Analysis of Survey Response

FINDINGS

Discussions with Balasooriya (2020) and Basnayaka³ (2020), the PGID, and the result of the survey as illustrated in Table 6 was fused to summarise the findings. 'Zero Error Syndrome' hinders the application of Mission Command. Result of the survey and interaction with the interviewees shows that most opines that the Evaluating System of career progression of officers compel to undermine taking risks. For the same reason, the officers get involved in micromanaging, which hinders development of the subordinate. Freedom of action is therefore lost as a culture. A sense of insecurity arises among the subordinates. Playing safe tendency is not conducive to foster Mission Command.

³ Lieutenant Colonel HRA Basnayaka RWP RSP of the Sri Lanka Army has served for 25 years. He had been commanding the 24 SLLI for the last two years during the research. Before taking over the command of the unit he also served as a second in command for one year. He also commanded platoons and companies of various units.

From the point of view of organizational preparedness of the Sri Lanka Army competency and lack of resources were found to be two of the major challenges. Though the survey respondents claimed that they received training and education, the standard needs to be improved as gathered from the personal interactions with the interviewees and FGD. Necessary publications to support the training and education is required. At present, the Sri Lanka Army does not have any publication on Mission Command the way other armies that promote Mission Command have. For example, the US Army have Publications like Field Manuals (FM) on Mission Command which they continuously update. Core issues of Mission Command should be incorporated in the training doctrine. The junior leaders are yet to be prudent enough to cope with two levels up responsibilities. Training and education of officers and Junior/Non-Commissioned Officers need to be improved to foster Mission Command.

SUITABILITY OF MISSION COMMAND IN FUTURE AND WAYS FORWARD TO IMPLEMENT IT IN THE SRI LANKA ARMY

The literature review suggests that in the future, the battlefields will be overly complex. The literature review, survey, and discussion during interviews and FGD also found that in the future preferring Mission Command over Detailed Command would give more dividend. The success rate of the operations behind enemy line by independent small teams of highly trained soldiers of the Sri Lanka Army substantiates the suitability of the philosophy of Mission Command. It should continue in the future also. However, it would be even better if a mix system would be followed with emphasis on Mission Command, the way Israeli Army follows. Hasan (2015) indicated that the then Commander of the Sri Lanka Army General Chinthantha de Silva⁴ too preferred a mix.

According to the survey, some 'Institutional/Cultural and Organisational' changes were identified which can help foster future potential to improve Mission Command in the Sri Lanka Army. The raising of way forward as found from the survey is in Table 7.

⁴ General Chinthantha de Silva, the 20th Commander of the Sri Lanka Army

Table 7: Way Forwards According to the Respondents

Ser	Way Forward	Type	Weighted Average Score	Remarks
(a)	(b)	(c)	(d)	(e)
1.	Practical and Situational Training for Officers	Organisational	4.71	Since the challenges which the respondent felt were important were intended to be brought out, Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2 and Strongly Disagree = 1 was considered for calculating the weighted average
2.	Practical and Situational Training for JCO/ORs	Organisational	4.56	
3.	Develop Competence of Junior Commanders	Organisational	4.56	
4.	Allocate Adequate Resources	Organisational	4.47	
5.	Decentralisation of Command Culture	Institutional/ Cultural	4.29	
6.	Foster Supportive Organizational Culture	Institutional/ Cultural	4.28	
7.	Eradicate Zero Error Syndrome	Institutional/ Cultural	4.18	

Source: Analysis of Survey Response

The competence of junior leaders was found to be a major issue. Change and revision in training doctrines to promote methods focusing inculcating junior leadership from the Mission Command perspective is necessary to address this requirement. Required pamphlet and training manuals may be published. It was also identified that lack of resources like money, materials, staff, and other equipment/assets tends to curb the initiative of the commanders on ground to resort to Mission Command in peace time.

From the Institutional/Cultural point of view, it is clear that some changes are necessary in the mind-set of the driving force of the Sri Lanka Army, i.e. the Officers' Corps. Eradicating 'Zero-Error Syndrome', avoiding micromanaging is the need of time. Both the organisational structure and organisational culture should allow 'Decentralisation and Freedom of Action'. According to Balasooniya (2020), an Officer needs to spend more time in the unit with troops to develop Mutual Trust.

At present, the Sri Lanka Army is following the British Doctrine. British Doctrine is more focused on operating in foreign soil. The suitability of following British Doctrine may also be revised. Instead, suitability of following Israeli Doctrine, that is mix of Mission and Detailed Command may be explored.

CONCLUSION

Future battlefields are likely to be more chaotic and fluid. Changing nature or the character of the warfare demands more dynamic and pragmatic approaches to command and control. Though 'Detailed Command' might be suitable for some tactical situations, it is Mission Command, which is the pragmatic approach suitable to face future battlefield's challenges.

The Sri Lanka Army understands the value of Mission Command and wants to incorporate it in its military culture. However, it takes time to build a culture. If Mission Command is not practised during peacetime, it is unlikely that it will be possible to follow it during crisis. The research traced the level of adherence of Mission Command in the Sri Lanka Army during peacetime. The state of some important principles were measured to do so.

By using and relying on subjective analysis with the help of qualitative tools, the research concludes that the Sri Lanka Army is in the right path when it comes to adopting Mission Command in their culture. Anurakoon (2009) in his research found traces of Mission Command in the Sri Lanka Army though it was not present in theory or doctrine according to him. Later, Hasan (2015) observed it in theory but according to his research, Mission Command was not widely practised. This research found it in theory and in practise to some extent. However, there is some room for improvement. The level of mutual trust prevailing in the Sri Lanka Army was found to be satisfactory. However, this was not the case for flexibility and decentralisation. The state of competence also needs improvement. Allowing subordinates to take initiative is one of the most important principles and acts as a strong indicator of presence of Mission Command. The mid ranking officers of the Sri Lanka Army promotes initiative which is a tall sign that the Sri Lanka Army is in the right path.

RECOMMENDATIONS

As the Sri Lanka Army faces challenges from both preparedness of the organisation, and existing command climate or institutional point of view, the research made some broad recommendations on these two aspects which might increase the potential to follow Mission Command in the Sri Lanka Army in future.

For organisational preparedness of the Sri Lanka Army, competency and lack of resources were found to be two of the major challenges. However, as resource constraints of the Sri Lanka Army is a vast subject all by itself, the research recommended it deemed a separate study. To improve the competence of the junior leaders, the focus should be on training. Revision of training manuals and methodologies focusing on inculcating the junior leadership in Mission Command perspective is necessary. Separate leadership packages promoting scenario-based training may be introduced in the training curriculum.

Institutionalising Mission Command concept involves cultural changes which takes time. It will also need the acknowledgement that there are some room to improve. A cultural change is always a top-down approach and therefore institutionalising Mission Command is obviously a command responsibility. To do so, Formation/Unit/sub-unit commanders should eradicate 'Zero Error Syndrome' and accept some degree of risk. They may restrain from guiding subordinates too much. Maximum decentralization in day-to-day professional and training activities allowing more freedom of action and initiative is necessary to instil Mission Command in the culture of the Sri Lanka Army.

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SECURITY CHALLENGES OF INTRODUCING NUCLEAR POWER TO SRI LANKA'S FUTURE ENERGY MIX

Lieutenant Commander (L) Rangana Ramunusighe

ABSTRACT

Nuclear power is considered one of the best alternative sources to obtain reliable clean electricity. By early 2020, more than 440 nuclear power plants operated, providing 10% of the world's electricity demand. Nuclear Power Plants (NPP) have been identified as a possible source of electricity for Sri Lanka beyond the year 2030. However, nuclear security and safety issues are identified as the major bottlenecks to promote nuclear energy. Hence, this research is concerned with nuclear safety, security, and safeguard measures together with emergency preparedness, environmental concerns, energy and the national security nexus. The present nuclear scenario in the country and essential developments to be done in the future too were included in the research. Further, the necessity to consider more on the subject matter due to nuclear neighbours, transshipment of nuclear-related materials through Sri Lankan ports, and the rapid increase of radioactive materials for peaceful industries too is deliberated. Finally, recommendations were made to enhance training, education, and awareness while promoting the nuclear security culture in Sri Lanka.

Keywords: Emergency Preparedness, Nuclear Security, National Security, Safeguards

INTRODUCTION

Energy security is of utmost importance to ensure economic growth and the national security of a country. Being a clean and sustainable energy source, nuclear energy caters to 10 percent of the world's electricity demand. All sources of electricity have their pros and cons. Higher capital costs, complex technology, and safety issues are the main bottlenecks to promote Nuclear Power Plants (NPPs) as an alternative electricity source. Among the cons, security, and safety aspects related to this technology would be the most influential factor.

The Ceylon Electricity Board (CEB) has expressed their intention to introduce NPPs to the national grid of Sri Lanka beyond the year 2030, in the Long-Term Generation and Expansion Plan (LTGEP) published in the years 2015, 2018, and 2020. Further, the Sri Lanka Atomic Energy Board (SLAEB), the Public Utilities

Commission of Sri Lanka (PUCSL), the CEB and many other stakeholders are in the process of developing a road map to introduce NPP to Sri Lanka as per the LTCIEP (SLAEB, 2018). The author's objectives were to study safety and security necessities related to introducing NPP and their level of existence in Sri Lanka to derive solutions to improve the nuclear security culture in Sri Lanka. Accordingly, the evolution of nuclear energy, risk and accidents, security and safety dimensions adopted by responsible authorities in the world, region, and Sri Lankan initiatives are discussed in this paper.

The author accepts the concepts on political and diplomatic concerns associated with NPP to a particular nation. However, this paper covers only the nuclear safety, security, and safeguard capabilities together with the emergency preparedness-related to introduce NPP as an alternative electricity source to Sri Lanka.

ELECTRICITY CONTRIBUTION

The necessity and scarcity of energy have created inescapable competition among human beings. The assurance of energy security to maintain healthy energy diplomacy are the responsibility of any government. The sun produces energy as heat and radiant due to the nuclear fusion reaction of hydrogen atoms. Scientists have divided all forms of energy into two basic categories as potential energy and kinetic energy. Despite all forms of energy, the nuclear energy produced in the sun can be considered as the driving force of all forms of life. Moreover, similar technology has been used to produce a nuclear bomb, and subsequently, the heat generated by the nuclear reaction has been used to heat water and produce steam to generate electricity by rotating turbines.

The annual growth rate of electricity generation in the world reduced significantly in the year 2019 due to many reasons including lower economic growth rate and natural disturbances (IEA, 2019; Global Energy Statistical Yearbook, 2020). Many renewable and non-renewable sources of energy contribute to electricity generation with the majority generated from coal. The contribution from each source to the total electricity production is as follows.

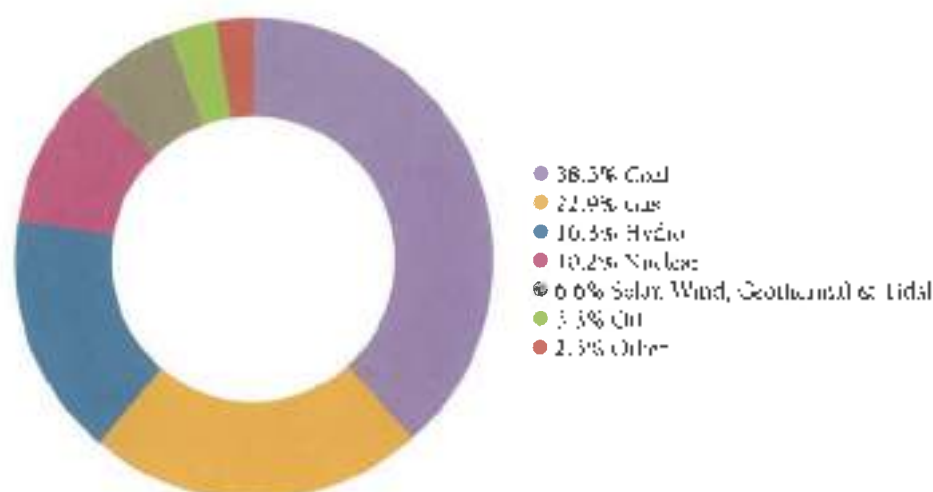


Figure 1: World Electricity Generation Mix
 Source: International Energy Agency Electricity Information, 2019

WORLD NUCLEAR SCENARIO

During World War II, most of the Allied and Axis powers eagerly worked on nuclear technology to gain a strategic advantage over others. The first nuclear research reactor, Chicago Pile-1 was built in 1942. The legacy of the first nuclear chain reaction and how the atomic age began in December 1942 in the USA is discussed by Steve Koppes and Alex Wellerstein (Koppes, n.d., Wellerstein, 2017). The first-ever nuclear technology turned to light has been reported in 1951 by illuminating four (04) bulbs in Idaho, USA. In the year 1954, the Soviet Union, and two years later the UK added NPP to their national grid (US Department of Energy, 2020). Since then, NPPs have been built in many countries all over the world.

The notable observation found in the literature reviewed was the off-the-beam roaming of the anticipation of researchers on the increment of the contribution of nuclear power to the world's total electricity supply. These miscalculations occurred due to three major accidents at Three Mile Island, USA, Chernobyl, USSR and Fukushima, Japan (Krymm, *et al.*, 1977; Bennett and Skjoldenbrand, 1986).

Nuclear power has produced a total 2,563 TWh of electricity, which was 10 percent of the world's total electricity production and the second largest low-carbon power after hydroelectricity in 2018. The total installed nuclear power capacity in the world as of 31st December 2019 was 395 GW from 443 reactors (PRIS, 2019). As per the IEA data, the contribution of fossil fuel has been decreased by 3.5 percent while nuclear production has been increased by 3.6 percent in the year 2019 (IEA, 2019). In 2016, it was predicted that nuclear energy together with other forms of renewable energy will be the world's fastest-growing sources of electricity by 2040 (IEO, 2016).

The sustainability of the energy sector is an essential element for a developing country (Ahuja and Tatarani, 2009). To achieve energy sustainability, neighboring countries such as India and Pakistan too have added NPPs to their national grid despite their uncertain security situations. Bangladesh has constructed a research reactor with the newly-constructed Rooppur Unit 1 NPP and Rooppur Unit 2 which will be commissioned by 2023 and 2024, respectively (International Atomic Energy Agency, 2020).

NUCLEAR SAFETY AND SECURITY CONCERNS

There are three main risk phenomena involved with nuclear reactors as follows:

- a. Intensely radioactive materials.
- b. Fission production produces radioactive substances caused to generate decay heat.
- c. Rapid increase of the reactor power due to uncontrollable chain reaction

According to Markandya and Wilkinsin (2007), nuclear power has reported the lowest fatality per unit compared to many sources of electricity including coal, petroleum, natural gas, oil, and even hydroelectricity. It has prevented 1.84 million deaths due to air pollution by reducing 64 billion tons of CO₂ equivalent that could be released from burned fossil fuels (Markandya and Wilkinson, 2007). However, the three major accidents indicated above have diminished the favor towards nuclear power.

Public fear is a major barrier to introduce NPP. Safety and security during transportation, storage of fuel, and managing nuclear waste are the main concerns of nuclear security. A prompt solution taken to ensure nuclear security and safety will ease several other issues such as the national position, legal and regulatory frameworks, emergency planning, and safeguard while positively impacting stakeholders and industries involved with the nuclear industry. However, the security issue has to be sorted out by the country itself with the assistance of local and foreign professionals and institutions.

NUCLEAR SCENARIO IN SRI LANKA

The regulation processes of nuclear-related aspects commenced in Sri Lanka in the year 1959 with the establishment of the Sri Lanka Atomic Energy Authority (SLAEA). SLAEA was further systemized in 2014 with the Sri Lanka Atomic Energy Regulating Council (SLAERC) and Sri Lanka Atomic Energy Board (SLAEB).

Sri Lanka is a founding member of the IAEA since 1957 (IAEA, 2020). Suggestions on a technical working group of atomic energy were included in the 10 years'

national development plan of former Prime Minister SWRD Bandaranaike (Sri Lanka Atomic Energy Board, 2021). Other notable initiatives in the Sri Lankan context are as follows:

- a. Pre-feasibility study in 1974 (Sri Lanka Atomic Energy Board, 1974).
- b. Pre-feasibility study in 2010 and a policy decision has been taken by GoSL to use nuclear power for electricity generation by the year 2030 (Ministry of Power and Energy, 2010).
- c. Preparation of a road map to introduce NPP to Sri Lanka from 2016 (International Atomic Energy Agency, 2020).

NUCLEAR SECURITY CONCERNS – A SRI LANKAN PERSPECTIVE

Despite the unavailability of in-house NPP, neighboring countries have already acquired nuclear technology. Hence, Sri Lanka is in the sphere of threat in case of nuclear accidents. The Kudankulam NPP situated in Tamil Nadu approximately 225 km away from the west coast of Sri Lanka and 276 km from Colombo has emphasized the need to be concerned about nuclear security and safety in Sri Lanka. As a remedial action, the GoSL signed an agreement with India on the cooperation of civil nuclear energy in February 2015 (World Nuclear News, 2015). The security and safety of the nuclear industry in Asia, such as in Bangladesh and Pakistan, too will impact Sri Lanka (Haegeland, *et al.*, 2019). The above reasons highlight the need for prompt concern over nuclear safety and security.

Moreover, the absorption of peaceful nuclear technology for industries are increasing daily in Sri Lanka. Hence, it is essential to identify the nuclear safety and security aspects required to be concerned by a country while examining the existing situation in Sri Lanka to ascertain their adequacy to introduce NPPs. The recommendations were derived on additional measures to be taken considering the acquisition of NPPs as well as other nuclear-related industries.

Several conventions are directly relevant to nuclear safety and security aspects and have been adopted by Sri Lanka including the following:

- a. Convention on Early Notification of a Nuclear Accident, since 1991.
- b. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency since 1991.
- c. Convention on Nuclear Safety since 1999 (SLAEB, 2018).

The contribution of eminent Sri Lankans to draft such conventions, research and pre-feasibility studies conducted by researchers on the introduction of NPP to Sri Lanka were scrutinized (Danapala, 1991). Many of them have identified the concern on a high degree of safety and security aspects and their impact on other

issues as one of the major bottlenecks to introduce NPPs to Sri Lanka (Jayakodi, et al., 2018; Bazunusinghe, 2018; Priyadarshana, 2010). The positive public opinion on introducing NPP is uncertain due to security concerns (Jayakodi, et al., 2018; Priyadarshana, 2010) and initiatives taken by SI AFB and SLAERC to address the NPP related security issues (SLAEB, 2018) are also notable in this aspect.

CONCEPTUAL FRAMEWORK AND RESEARCH DESIGN

Security concerns related to the introduction of NPP to Sri Lanka were filtered by a comprehensive study on related subject areas emphasizing on Sri Lanka's nuclear understanding. Accordingly, the conceptualization of the research is shown in figure 2:

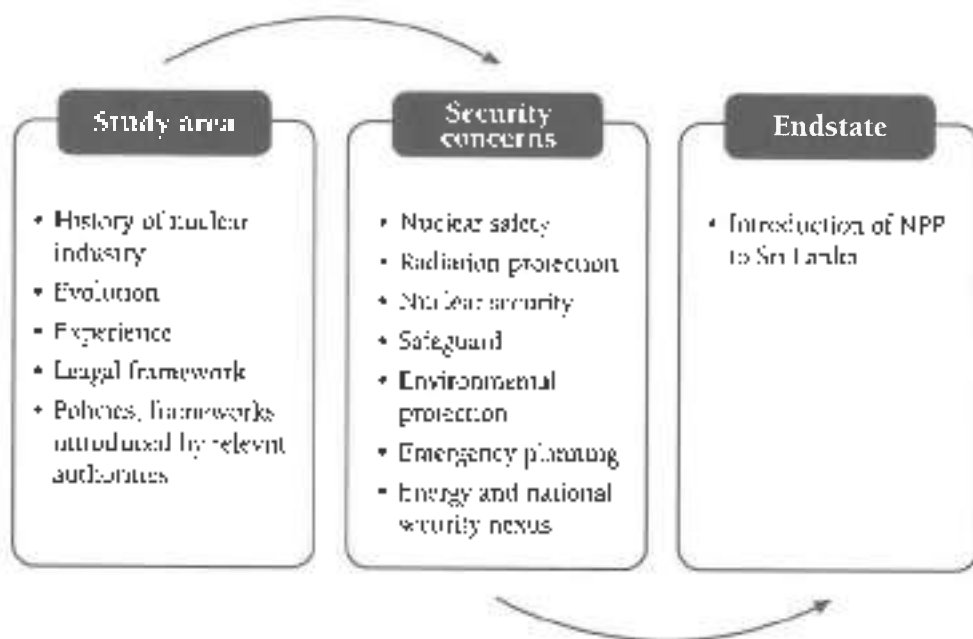


Figure 2: Conceptualization of Research

Source: Designed by the Author

The sample was not predetermined during the initial stage, as the sample size and sampling strategy are not significant in qualitative research (Kumar, 2011). The data was collected until it saturated and the researcher was satisfied with the information received through the purposive sampling method. Primary data was collected from in-depth interviews, focus group discussions, field notes, transcripts, audio and video recordings.

A loose list of issues was used as an interview guide, while a semi-structured questionnaire with open-ended questions was used to obtain data. The questions differed from person-to-person as per their expertise. Considering the feedback and the level of interaction, the researcher entertained the freedom to alter the questions to gather information as appropriate. Primary data were collected from sources including government and semi-government publications, while secondary data were obtained from earlier research reports, and mass media.

RESEARCH METHODOLOGY

The research was based on perception, prejudgment, assumptions, presuppositions, and the experience of experts in the field. Hence, the thematic analysis in qualitative methodology was used to analyze primary and secondary data. Nine (09) interviews and two focus group discussions were conducted to gather information. Re-interviews were done for data reviewing and validation. Details of the interviewees are shown in Table 1.

Table 1. Summary of Respondents

Ser	Participant	Organization	Level/Position	No. of Participants
(a)	(b)	(c)	(d)	(e)
1.	R1	SLACB	Director	1
2.	R2	SLAEB	Scientific Officer	1
3.	R3	SLAEB	Scientific Officer	1
4.	R4	YNSSL, SLACB	Scientific Officer	1
5.	R5	UCOM, KDU	Professor	1
6.	R6	UCOM, KDU	Senior Lecturer	1
7.	R7	CER, KDU	DGM (Retired) Senior Lecturer	1
8.	R8	CER	Chief Engineer	1
9.	R9	SLAF	Squadron Leader	1
10.	FG1	SLA, SLN, SLAF, STF	Major, Commander, Wing Commander, Inspector (SIT)	5
11.	FG2	SLAEB, CER, PUOSL	Scientific Officers, Chief Engineer	4
12.	Total			18

Source: Developed by the Author

The content of the interviews was analyzed to extract the essence and generate codes. Thereafter, the main themes were derived based on the research questions. Accordingly, five main themes were identified. As per the themes, the substantive verbatim responses were classified, recorded, and further analyzed descriptively.

under the main themes. All the identified themes were reviewed and data re-collection and re-analysis were carried out to derive better conclusions and recommendations. The data was validated based on their credibility, transferability, dependability, and confirmability. The data analysis process of this research is shown in Figure 3.

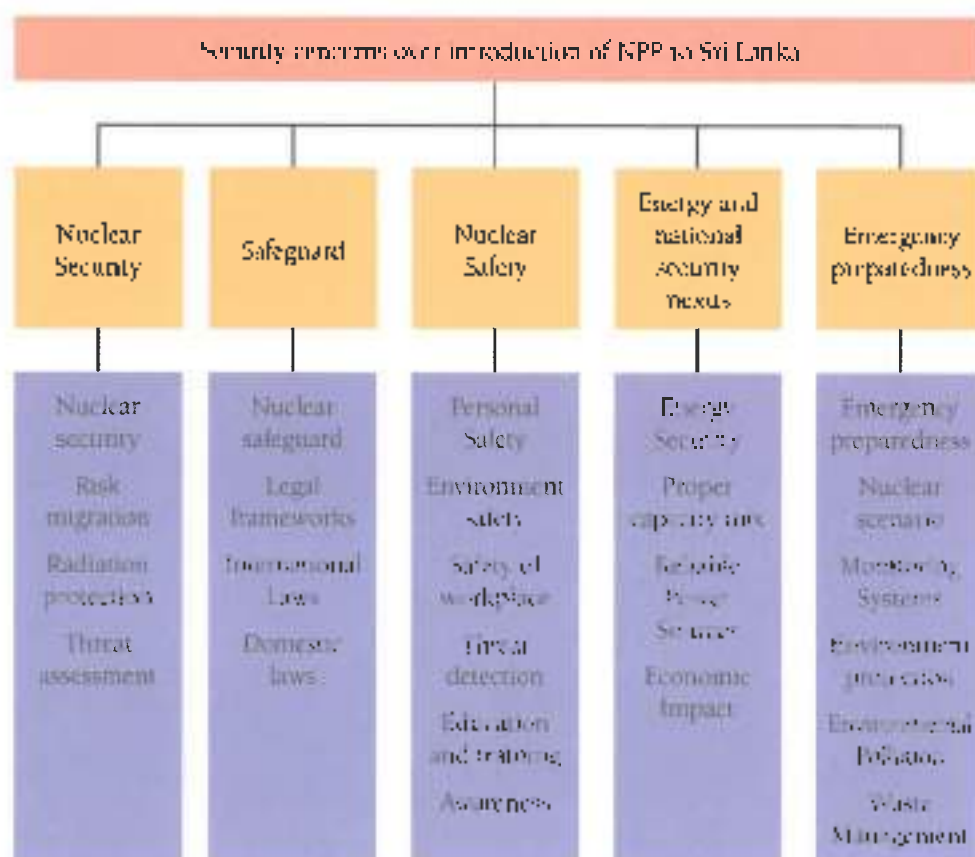


Figure 3: Data Analysis Framework

Source: Developed by the Author

NUCLEAR SECURITY

The IAEA has explained 19 infrastructure issues and milestones to introduce NPP to a country. Some of the respondents also highlighted that nuclear security is the most prominent and complex aspect in the process of introducing NPP. Before selecting a suitable site, it is essential to consider security aspects and the assurance of mitigating any external or internal security threats and third-party asymmetric threats to physical infrastructure, transportation, and storage of fuel and waste management.

The IAEA has published a comprehensive set of publications on nuclear security fundamentals, recommendations, implementation and technical guidelines. Further, they have suggested developing a national framework containing a set of principles and agreements on nuclear-related events including the use of radioactive substances other than NPP. Further, an integrated command and control structure is mandatory for this process.

At present, SLAEB together with other institutions such as the tri forces, Sri Lanka Port Authority (SLPA), and Sri Lanka Police are conducting regular inspections on radioactive material in important locations such as ports and air terminals. They are equipped with handheld detectors and fixed detectors. These military personnel, policemen, customs officers are given basic training to use radiation detection equipment and to take preventive action in case of detections. However, no other mechanism has been implemented to assure nuclear security in the country.

The inadequacy of existing nuclear security measures and human resource development process was highlighted during the research, demanding a systematic approach to fulfill the urgent and important criteria that have to be met, to introduce NPPs to Sri Lanka.

NUCLEAR SECURITY CULTURE

Several proposals were suggested by respondents to assure the nuclear security of Sri Lanka and improve the nuclear security culture and scenario as follows:

- a. Establishing Nuclear Security Control Sri Lanka (NUSEC SL)
- b. Identifying the stakeholder accurately
- c. Assessment of nuclear threat, vulnerabilities, and consequence.
- d. Adopt regulatory requirements.
- e. Defining the roles and responsibilities.
- f. Periodic review and implications of changes
- g. Develop and maintain the documentation
- h. Implement an Integrated Nuclear Security Support Plan

NUCLEAR SAFETY

As per the IAEA definition, nuclear safety means the achievement of proper operating conditions, prevention of accidents, or mitigation of accident sequences, resulting in the protection of workers, the public, and the environment from undue radiation hazards. To ensure safety, monitoring, training, and education of the whole process of the nuclear cycle with its environment are important. In the

year 1990, the IAEA introduced the International Nuclear and Radiological Event Scale (INES), a logarithmic method similar to the Richter magnitude scale to create prompt communication of safety-significant in case of nuclear accidents. Concern on avoiding mismanagement of nuclear substances and reducing design errors and human errors by proper training and education is essentially required to ensure the nuclear safety.

Many aspects, such as the following have to be developed within Sri Lanka before acquiring NPPs:

- a. Nuclear Disaster Warning System
- b. Baseline Radiation Data Collection
- c. In situ Measurements.
- d. Training and Education (Nuclear education, awareness program)
- e. Human Resource (Radio Protection Officer)

NUCLEAR SAFEGUARD

Nuclear safeguards are the measures used to verify the legal obligation of individual countries and their ability to protect people and the environment by early detection and avoiding misuse of nuclear materials and technology. Several authorities such as the IAEA and UN have introduced treaties, regulatory infrastructures, and safeguard inspections including the following:

- a. Vienna Convention: adopted on 18th April 1961 (SL has not signed)
- b. Law of the Sea-1982. (Determination of suitability of materials for disposal at sea and prohibition of dumping radioactive waste to the sea in one of the aims)
- c. Paris Convention in 1960
- d. Brussels Supplementary Convention in 1963.
- e. Protocol to amend Vienna Convention in 1997.
- f. Convention of Supplementary Compensation in 1997.
- g. Protocol revising the Paris and Brussels Conventions in 2004
- h. Comprehensive Safeguard Agreements.

International legal frameworks on nuclear safeguards are needed to be adopted and implemented by integrating them into the domestic law in Sri Lanka. Further, during the research it was understood that, Sri Lanka needs to pay more attention to the implementation of safeguard measures introduced by authorized organizations such as the IAEA. This process requires expertise in the field. Even though in the past, Sri Lanka had eminent personnel such as Mr. Jayantha Danapala (Nuclear

Disarmament Process). Mr. RSS Gunawardane (Drafting Vienna Convention), Mr. Shirley Amarasinghe (Drafting the Law of the Sea 1982) representing Sri Lanka in international treaty drafting processes, at present, comparatively very limited Sri Lankans have engaged in this field.

EMERGENCY PREPAREDNESS

Emergency preparedness and response will enable the national response arrangements and capabilities to minimize the impact of nuclear and radiological incidents and emergencies. The IAEA introduced the *International Emergency Preparedness Framework* considering the legal instruments, safety standards, technical guidance, and international operational arrangements (International Atomic Energy Agency, 2020) with the following expectations:

- a. Develop safety standards, guidelines, and technical tools
- b. Assist member states to build capacity.
- c. Maintain the IAEA incident and emergency system efficiently
- d. Consider emergency planning and environmental protection.

Possible nuclear scenarios and nuclear response levels derived by the SLAEB have been introduced to relevant authorities such as SLPA. However, during the research, the following lapses were identified:

- a. Non-availability of response zones covering all the possible and suspicious areas.
- b. Lapses in reviewing the acceptance level and not prepared it considering the dynamics of locations and purposes.
- c. Inability to change the levels of regulations
- d. Delaying of baseline data collection process.
- e. Non-availability of sufficient real-time radioactive monitoring sensors.
- f. Lack of laboratory facilities.

The shortage of Front-Line Officers (FLO) to engage with the above process was observed and it is essential to increase the number of FLOs through training of cohort (IOT) programmes, with a proposal to train suitable interested personnel from relevant institutions such as the military and customs.

ENVIRONMENTAL SAFETY

The cooling system of NPPs requires a large amount of water. This heated water can be utilized to heat rooms in countries with a cooler climate. However, there is hardly any need for this water in tropical countries. Therefore, there is no alternative available to discharge it after processing it through a parallel water-cooling system. The discharge of this heated water without proper treatment may harm the marine environment.

It was observed that a radioactive waste storage is located within SLAFB premises with all the remote and physical monitoring facilities. It is essential to shift this arrangement to an area that is less populated. This arrangement required very limited space. However, frequent shifting of place cannot be done. Obtaining assistance from a service provider that has expertise in hazardous waste management processes was found the most suitable method to manage the waste in NPP. Compared to fossil fuels, NPPs are low carbon emission systems, therefore, causing less harm to the environment.

It is needed to follow the existing high-end power plant construction methods to avoid possible hazards while ensuring the proper nuclear waste management process. At present 22 NPPs are installed in India while five more are under construction. The emission of radiation, ash, or dust will directly affect Sri Lanka by air or sea. The effect of such will affect the fisheries, agriculture, and many other industries directly or indirectly in Sri Lanka.

IMPACT OF ACCIDENTS ON NUCLEAR ENERGY SECTOR IN SRI LANKA

Chernobyl and Three Mile Island NPP accidents were unable to create a considerable impact on the nuclear energy sector in Sri Lanka as the country was not on a path to acquire nuclear technology at the time. As per Respondent 4 (R4), the Fukushima incident has considerably impacted conversations on nuclear energy. This has negatively affected the promotion of NPPs in Sri Lanka and halted feasibility studies commenced by GoSL in 2010 to introduce NPPs to Sri Lanka.

All three major accidents related to NPP have happened in developed nations emphasizing the importance of the security and safety of NPP. Establishing independent legal authorities, acquisition of technical competencies, interconnection of stakeholders, and establishment of strong safety culture are some of the important lessons learned can be extracted for Sri Lanka.

ENERGY SECURITY AND NATIONAL SECURITY NEXUS

A proper energy mix is essential to avoid unexpected circumstances that may jeopardize the electricity supply of the country. At present, CEB owns hydropower and CEB thermal oil and coal supplies a mammoth amount of electricity requirement in Sri Lanka. The existing capacity mix in Sri Lanka has proven its incapability to ensure the sustainability and reliability of the Sri Lanka electricity sector. Energy-saving also has limitations as it compromises comfortability.

NPP can contribute positively to the optimal balance between human development and the protection of the natural environment. The World Nuclear Association target 1000 GWe of new nuclear capacity by 2050 with an increment of world nuclear electricity supply up to 25% (WNPA, 2016) from the 10% share at present. In the future nuclear, will be the high skill, high-pay job creator, the backbone of a clean electricity generator, and will be a critical pillar of national security (NEI, 2017).

The capital investment for NPP is comparatively high, and could greatly impact the impact of the economy of a developing country like Sri Lanka. Even after the commencement of the operation of NPP, external factors such as political and public influences may cause to function it. In the case of NPP, this influence is considerably high. This uncertainty may cause a considerable economic impact on the country.

CONCLUSION

Energy security is an important element in the national security of any country. Hence, it also has a nexus with economic security. All these nexuses emphasized the necessity of having a sustainable energy sector in a country. Electricity which can be converted to many other forms of energy is considered one of the important sources of energy. The energy management and saving process cannot be reached beyond a certain limit without compromising the comfortability of individuals and productivity.

Considering the rising electricity demand and available alternative power sources, the NPP can play a vital role in the future energy sector in Sri Lanka. Newer technologies in the nuclear industry may assist to develop peaceful nuclear engagements in the future in many countries including Sri Lanka. Nuclear security and safety are of utmost important aspects to ensure before introducing NPP. As a country, Sri Lanka has taken considerable effort to fulfill this requirement as per the IAEA standards being the apex body in the world nuclear industry. Being the pioneers in the local process, SI AFB and SI AFRC have rendered commendable service in this regard. Further, it is essential to pay adequate concern to nuclear safeguards

and the emergency preparedness process to ensure nuclear security. Accordingly, this research suggested several recommendations including establishing NUSEC, SI, and work according to an integrated nuclear security support plan.

Introducing NPP as a source of power would be a long-term as well as a difficult pathway to Sri Lanka due to various reasons including security dimensions and public opinion mostly against promoting nuclear-related industries based on security and safety dimensions. Hence, the best way to continue with this process is to carry out comprehensive studies of this nature to reveal an accurate picture and impart that knowledge to the general public.

Despite the non-availability of NPP at present in Sri Lanka, due to the development of peaceful nuclear industry in the country, the possibility of transshipment of nuclear-related material being the prominent transportation hub in Indian Ocean Region and exponential development of nuclear industry in powerful nuclear neighbors nearby, it is necessary to enhance better nuclear security and safety system by promoting vigorous nuclear culture within Sri Lanka.

RECOMMENDATIONS

Considering the data analysis and discussions, the recommendations made to enhance the nuclear safety and security aspects in Sri Lanka are as follows:

It is recommended that a Nuclear Security Council of Sri Lanka (NUSEC, SI) be established to control all the matters related to nuclear security, safety, safeguard and emergency preparedness within a centralized system. This is moreover similar to the national security council. Political, administrative and military authorities together with representatives from relevant authorities and experts in the field must be represented in this council.

It is essential to develop national nuclear capabilities by providing essential equipment for the field officers while enhancing the laboratory facilities for testing and calibration. Government must provide adequate cutting-edge technologies to uplift the nuclear security and safety measures in the country while empowering the frontline officers, frontline respondent and relevant authorities. The number of Radiation Monitoring Systems (RMS) established by STAFB covering the land area with special concern on coastal belt, major ports, airports and warehouses should be increased.

Nuclear awareness lessons as appropriate to the school curriculum should be introduced to enrich their understanding of the fundamentals of the subject. Similarly, it is important to identify and develop nuclear security-related topics in the curricula of higher education institutions.

Development of training facilities for Radiation Protection Officers (RPOs) and Front Line Officers (FLOs) and increase in the number of RPOs and FLOs should be a prerequisite for Sri Lanka's long-term nuclear management and safety strategy. The number of programs and trainings on a wide variety of potential nuclear threats conducted by SLAEB, SLAIRC, YNSSL needs expansion of awareness to cover all segments of the society including the general public. This may include conduct of frequent CPDs, training and awareness programs, and rehearsals on emergency preparedness and response systems to all the stakeholders. Creation of a pool of expertise on nuclear safeguard activities with the help of IAEA and other local and foreign expertise for further development of operating and regulatory activities will help overcome potential security threats and address bottlenecks to promote nuclear energy in Sri Lanka.

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YOUTH PROPENSITY TO SERVE IN ARMED FORCES: AN ANALYSIS OF THE SRI LANKA AIR FORCE RECRUITMENT DRIVE OF VOLUNTEER AIRMEN

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ABSTRACT

Sri Lanka Air Force (SLAF) enlists Regular or Volunteer candidates bi-annually. In January 2021, SLAF launched a special recruitment drive to enlist 500 Volunteer Airmen who are skilled in construction fields such as mason, carpenter, plumber, electrician, and welder etc. to be employed in special projects undertaken by the SLAF. The data of 4,309 applications received in response to the vacancy announcement were examined to understand the level of youth propensity and to identify important trends in the labour force. The reasons for a high number of rejections of candidates at various stages of the recruiting process were examined with the data of the Regular Airmen recruitment drive conducted in the year 2020, to find emerging trends and developments. Important individual and external factors that influence the youth to serve in the Air Force and other salient facets that affect the quality of the labour force of Sri Lanka were critically analysed and identified. The findings revealed that the study can be used in shaping future recruitment strategies. The discussion of the study was conducted with the use of current and up-to-date literature to measure youth propensity, related trends and developments, which affect future military recruitments. Finally, specific and common future challenges were identified, and recommendations were presented to find the suitable force of the future Armed Forces of Sri Lanka.

Keywords: Enlistment, Labour Force, Propensity, Regular and Volunteer Airmen, Recruitment

INTRODUCTION

SLAF conducts its recruitments in an exclusive way by targeting a specific group of human resource in the country through attractive and robust publicity campaigns until they are selected for military training and employment. To be selected, candidates who apply under distinct categories undergo a rigorous interview/selection process, proving their qualifications, abilities, aptitudes as per the prerequisites set out by the Air Force. The objective of SLAF recruitment is always focused on the noble cause of protecting the skies of the motherland (guardians of the skies) and it extends an open invitation to Sri Lankan citizens to join the Air Force.

The recruitment of potential youth and professionals to SLAF are determined by the scheduled retirements, premature discharges, absentees, force majeure etc. Recruitment has been a challenging experience for SLAF in the past, as it has been largely affected by social, security, economic and individual factors. Sackett and Anne Mayor (2003) observe that military recruitment is among the most challenging human resources staffing operations conducted by any large-scale organization. In addition to the size of the recruiting effort, military services must also meet ambitious standards unlike those of civilian employers.

This paper empirically analyses the results/response of a special recruitment drive conducted by the 'Command Recruiting Office' in January 2021 to fill 500 volunteer airmen vacancies that were available in construction fields such as mason, carpenter, plumber, electrician, and welder to be employed in special projects undertaken by the SLAF. This recruitment drive was conducted when Sri Lanka was facing the initial realities of the Covid-19 pandemic. Therefore, organising a recruitment drive in a pandemic was a novel experience to the Air Force. The mixed responses of applicants to the vacancy announcement and a noticeable higher level of rejections/dropouts during the interview process required examination in shaping future recruitment strategies. The data relevant to this array of applicants and other important individual and external factors affecting the propensity of skilled youth labour in construction fields and SLAF recruitment standards is presented and analysed. It also focuses on other striking facets that affect the quality of labour force i.e., potential physiological and psychological problems and social trends, highlight probable impacts on future recruitment and recommends ways to attract the force of the future Armed Forces of Sri Lanka.

The scope of this paper is limited to an analytical overview of recent recruiting trends and future challenges about the recruiting process of 4,309 applications received in response to 500 vacancies. The data was compared with the last Regular Airmen enlistment in 2020, which received 3,251 applications, with the final enlistment of 418 personnel. The attendance and number of selected candidates diminished throughout the process due to many dropouts at each stage of the process due to medical/physical reasons, failure at interviews, practical tests, bad police reports etc. Besides the usual dropouts, a common observation was that a considerable number of personnel were absent without any valid reason at each stage of the process, widening the demand and supply gap. Analysis of data from such recruitment drives were important to ascertain whether there were any similarities, differences, common trends, or issues etc., that might be useful in shaping the future SLAF recruitment strategy. Therefore, the paper only presents and discusses data related to the enlistment category of Airmen in the SLAF to inquire into the reasons behind the rejection rate through an analytical overview.

RECRUITMENT PROCESS OF THE AIR FORCE

The Air Force conducts its own style of recruiting campaigns by enlisting Regular or Volunteer Officer Cadets, Direct Entry Officers, Airmen and Airwomen Intakes biannually unless otherwise decided by the Commander of the Air Force. There are two main types of enlistments to SLAF: Regular and Volunteer. The major difference between Regular and Volunteer enlistments are the age, conditions on the obligatory period of engagement with SLAF and their professional or skilled fields where they can be directly employed to SLAF duties.

As per SLAF Order number 760 (P760-1) on Personal Administration, school leavers after C/Ls or A/Ls (between 18-23 years) are enlisted to the Regular Air Force as Airmen/Airwomen initially for eight (08) years (with a reserve liability of four (04) years). Subsequently, they can opt to leave SLAF or can re-engage their service for another ten (10) years being eligible for pension after twenty-two (22) years of uninterrupted service.

SLAF Order number 786 (P786-1) explains, candidates for Airmen/Airwomen of Volunteer Air Force should be between 18 to 28 years (married/unmarried) and enlist for a maximum of five (05) years with SLAF. They may be granted an extension for a period of another five years, on each occasion until reaching the age limit of 35 years or at the completion of 22 years. Professionals and experts in different fields with skills who can be directly employed for SLAF requirements are enlisted through this category.

SLAF Order number 702 states the path that a Regular or Volunteer Airmen candidate must move through during the interview process is fixed as a preliminary interview, practical test, full medical examination and psychological assessment. PT test, pre-enlistment until the final selection. The other eligibility criteria and standards normally applicable to any enlistment are related to age, nationality, height, chest, vision and weight (body mass index), medical examination, psychiatric/personality test, illicit drug use, civil police reports, academic results, body tattoos/piercings/self-inflicted injuries etc. After successful accomplishments of those basic requirements, candidates who were accepted to the final enlistment will swear or affirm an oath of allegiance and sign their bond agreements.

DISCUSSION

In January 2021 the SLAF had a special recruitment drive, and the general impression of the recruiting staff was that the task at hand could be easily achieved due to the misconceived opinion that the Covid-19 may have negatively impacted the country's labour force, especially in the construction field. Concerning the expectation, the propensity of skilled youth labour in the construction fields to seek

employment in an institutionalised career was not satisfactory as expected. Under the pretext of expecting more propensity of skilled youth labour in construction fields during the Covid-19 situation in the country that affected almost all economic activities, the study examined the behaviour of the labour market under a pandemic environment.

IMPACT OF COVID-19 ON CONSTRUCTION LABOUR MARKET

The Department of Labour conducted an 'e-survey' in March 2020 by engaging 2,764 establishments in the formal private sector with a total employment of 596,022 in 21 types of industries to gain much-needed insight into the actual situation of the labour market. The survey report states that Sri Lanka has suffered a similar fate to that of other countries fighting to contain the spread of Covid-19 and the percentage of industries that were halted within the country is more than 60%. Another revelation of the report is that the percentage of employees who are not working was a staggering 64.26% compared to the total employment in February 2020. The manufacturing sector recorded the highest percentage (90.58%) of 'not in work' employees' followed by the Construction, Accommodation and Food services. The report found that 596,022 workers who were employed in the private sector in February 2020 reduced to 213,011 by May 2020, a significant drop of 64.26% within three months. In the case of the construction sector, out of 8,309 (1.43%) employees, 7,463 (87.71%) of them were 'not in work' by May 2020, which recorded the second highest percentage after real estate activities (90.58%).

The plight of labour market condition is apparent as the construction field is ranked at the ninth place with 8,309 respondents occupied in February 2020 and reached the sixth place of those who not employed by May 2020 with 7,463 employees (Department of Labour, 2020). Coincidentally, the SLAF too called its applications in January 2021 for 500 vacancies in construction fields with a robust publicity campaign on print, electronic and social media platforms. The age limit too was set to 18-30 years to attract a greater number of personnel. However, the response received from the target group was not as good as expected, where out of the 4,309 applications received only 2,472 matched the eligibility criteria.

THE PROPENSITY AND ACTUAL RESPONSE OF THE LABOUR MARKET

Even though the data from the Department of Labour indicates a higher number of job losses in the construction field since February 2020, the actual response received for the SLAF vacancy announcement from those candidates in the construction field raise a question about their inclination to join the Air Force. Military Leadership Diversity Commission Issue Paper No.12 (2020) describes that 'the propensity to serve refers to whether an individual indicates an interest in military service

ultimately joins or not". In this context, two methods were adopted to measure the propensity of those citizens representing the construction field and who have the potential to respond to the SLAF vacancy announcement. Initially, the number of applications the Air Force received was compared with the estimated number of employees in the construction field in the country at the time of Covid-19. Secondly, the absent and rejection rates of candidates who submitted applications at each stage of the interview process was identified.

A publication of the University of Ruhuna (2020) titled "*COVID-19 Socio Economic Impact on Sri Lanka Part-II: The Social Impact of the COVID-19 Pandemic in Sri Lanka*", states that the construction sector is vital in generating employment as it has been the destination of unskilled labour force participants of the country. The report also noted that as per the annual construction sector survey published by the Department of Census and Statistics, approximately 95,000 people find their livelihood from the construction sector. Accordingly, if 2/3 of the above labour force have lost their employment due to Covid-19, and are suitable to apply for the SLAF vacancies, an approximate 63,000 prospective candidates should have applied. Moreover, if another half of them were omitted due to their ineligibility, the number will further reduce to 31,500. If another 50% of those eligible were omitted for not being aware of the publicity campaign, unwillingness or other reasons, an approximate number of 15,000 personnel should have applied for these vacancies, which is relevant to their skillset. However, the total applications received were recorded as 4,309, which is 28% from the above 15,000 personnel. Comparison of this lower percentage applied to SLAF out of those potential candidates from the construction sector showcases their interest, which could be a result of the pandemic.

However, the above estimation found a contradiction with the argument presented in the report of the University of Ruhuna (2020) as it mentions that most workers are daily wage earners and may not have enough savings to effectively absorb this type of economic shock for months, so the vulnerability of falling into poverty is exceedingly high. In this case, a higher level of response could have been anticipated to the SLAF vacancy announcement from that skilled labour force, owing to higher level of poverty. Lawrence and Legree (1996) pointed out that the individuals who express their interest either toward or away from military enlistment but know little of military life might be more likely to change their position by learning more about it. This can be taken as a more inclined and reasonable factor for which this lower propensity level was found in the SLAF experience.

Another reinforcing idea to this experience is found in the United States Army Recruiting Command Publication No. 3-0 *Recruiting Operations* 2019, which mentions that economic factors can have a strong influence on the recruiting operational environment and the labour market has a direct effect on recruiting operations, while propensity may increase during periods of economic hardship. Other factors may reduce the number of individuals qualified for military service

Therefore, this idea is substantial to justify the particular response received for the vacancy announcement in measuring the propensity level. Moreover, the influence of 'other factors' may be the SLAF enlistment requirements and standards, which could have been one of the reasons for lesser number of applicants (28% from 15,000) who are invariably eligible to apply for vacancies, yet did not.

Identifying the absent and rejection rates of candidates throughout the interview process is the other method that the researcher used to measure the level of propensity. The first significant rejection was observed at the outset, as 1,617 of the 4,309 applications received during the initial sorting process were rejected due to insufficient information to proceed, not meeting required qualification etc. This is 42% of the total applications. Thereafter, 2,472 eligible candidates were requested to appear for a preliminary interview of which 574 candidates (23.2%) were absent. Consequently, 1,429 candidates (74.2%) out of the 1,898 candidates who attended the interview were disqualified as they did not meet the SLAF recruitment standards, which left 459 candidates for the final enlistment. Thereafter, a lower absent rate was reported as 27 candidates (5.8%) were absent out of the 459 candidates and finally 442 were enlisted. The above numbers illustrate a sample of Sri Lanka's labour force consisting of 95,000 individuals in the construction sector. The interest of a person to join the military has a direct link with the level of motivation. Lawrence et al., (1996) identifies eight frequently mentioned "motivations underlying enlistment decisions" such as Historical interest, Self-improvement (job/skill training), Money for education, Floundering – lack of goals or direction, Time out, Get away/escape, No other jobs/prospects. Accordingly, the underlying enlistment decision of the above 442 who were selected to join the SLAF out of the 4,309 applicants could be the lack of other options. They may have been motivated due to a variety of problems such as family or economic. Lawrence et al., (1996) further elaborate that the people in this category seem to feel that they are moving away from something negative in their lives, rather than moving toward something they want.

DROPOUTS, REJECTIONS AND ABSENTEES

The study also examined the reasons for the significant dropout rate during the interview process. Of the total 1,898 reported for the preliminary interview, a startling 1,429 candidates (74.2%) were disqualified for being substandard in many selection facets and reasons for their rejections/disqualifications are as follows:

Table 1: Reasons for Dropouts of Volunteer Airmen Candidates

Ser	Reason	No of Candidates out of 1898	Percentage
(a)	(b)	(c)	(d)
1.	Poor Vision/Colour Blindness	330	17.3%
2.	Inadequate Height/Chest	262	13.8%
3.	Failed Preliminary Interview/Practical Test	221	11.6%
4.	Body Tattoos	192	10.1%
5.	Over/Lower UML	192	10.1%
6.	Ear pricks/ Self-inflicted Injuries	104	5.4%
7.	Use of Illicit Drugs	70	3.6%
8.	Body Deformity/Critical Illness	33	1.7%
9.	PT test failed	14	.73%
10.	Unclear civil police report	06	.31%
11.	Psychological test failed	05	.26%
12.	Total	1429	74.2%

Source: Data collected by Command Recruiting Officer

An analysis of the reasons that contributed to the disqualification/rejection of a substantial number of candidates reveals their physiological, psychological, medical, social, professional status and background. Those 1,429 Volunteer Airmen candidates were between the ages of 18-30 and had either passed Grade 8 or were educated up to O/A or had some work experience or National Vocational Qualification (NVQ) Level qualifications.

Accordingly, it is imperative to compare the above data with the same rejected criteria of the last Regular Airmen recruitment drive, which was conducted in the year 2020, where out of the 1,830 candidates who proceeded through the interview process, 810 personnel (67.2%) were rejected/failed, and 395 personnel (12%) were selected for the final enlistment. The details are as follows:

Table 2: Absent and Rejection Rates of Regular Airmen Candidates

Ser	Interview Process	No. of candidates	No. of failed	No. of Passed	No. of Absent
(a)	(b)	(c)	(d)	(e)	(f)
1.	Suitable for Preliminary interview	1,830	Out of 3521 applicants 1830 were selected		
2.	Preliminary interviews and practical tests	1,205	282 (23.4%)	923 (76.5%)	625 out of 1830 (34.1%) absent
3.	PT Test and Final medicals	452	26 (5.7%)	426 (94.2%)	471 out of 923 (51%) absent
4.	Final Enlistment	395 (12%)	Note: Out of 426 selected for final enlistment 24 were absent and 07 were rejected for unclear civil Police reports		

Source: Data collected by Command Recruiting Office

REGULAR AND VOLUNTEER AIRMEN ENLISTMENTS

SLAF Order number 702 indicates the enlistment requirements of civilians. An analysis of the following differences depicts the profile, quality, and the general condition of Regular and Volunteer Airmen candidates. Those candidates who applied for Volunteer Airmen represent a set of elderly, married and mature personnel who possessed inadequate education qualifications, but had the required skills and experience in the respective field of work.

Table 3: Enlistments Requirements between Regular and Volunteer Airmen

Ser	Requirement	Regular	Volunteer
(a)	(b)	(c)	(d)
1.	Age	18- 23 years	18-30 years
2.	Civil status	Unmarried	Married/Unmarried
3.	Height	5' 5"	5' 3"
4.	Chest	32" above	30" above
5.	Education Qualification	GCE O/L or GCE A/L	Passed Grade 8. Work experience, NVQ Level

Source: Data collected by Command Recruiting Office

These candidates who applied for construction field vacancies represent the actual labour force of the country. Hence the respective selection criteria were set to attract more numbers concerning the substantial mismatch between the demand for and

supply of workers. Therefore, the selection of the targeted workforce as Volunteer Airmen constitutes paradoxes, mainly in their quality and standards as they have attended up to Grade 8 for formal education. Nanayakkara (2020) highlighted that approximately one-fifth of poor children drop out of school after the age of 14 years and another two thirds after the age of 16 years to join the labour force as unskilled or semi-skilled personnel. However, others may reach the required skilled levels after attending formal vocational training courses.

COMMON REJECTION CRITERIA

The comparison made about the common rejection criterion of both types of candidates reveals emerging and important trends in the enlistment of Airmen to SLAF in terms of psychological, physiological, social, professional aspects of candidates. Of the reasons that caused rejections, body deformities/clinical illness, failing the Physical Fitness and Psychological Test were excluded as they were not directly connected to the problem area that the paper studies.

Table 4: Rejection Reasons of Regular and Volunteer Airmen Candidates

Ser	Reason	No. of Candidates out of 1,205 Regular Airmen- Year 2020	%	No. of Candidates out of 1,898 Volunteer Airmen- Year 2021	%
(a)	(b)	(c)	(d)	(e)	(f)
1.	Poor Vision/Colour Blindness	200	16.5%	330	17.3%
2.	Low height/Chest	243	20.1%	262	13.8%
3.	Preliminary Interview/ Practical Test Failed	203	16.8%	221	11.6%
4.	Body Tattoos	11	.91%	192	10.1%
5.	Over/Lower BMI	42	3.4%	182	10.1%
6.	Ear pierces/ Self-inflicted Injuries	17	1.4%	104	5.4%
7.	Use of Illicit Drugs	28	2.3%	70	3.6%
8.	Body Deformity/Clinical Illness	36	2.9%	33	1.7%
9.	PT Test failed	09	.74%	14	.73%
10.	Unclear civil police reports	07	.58%	16	.84%
11.	Psychological test failed	14	1.1%	05	.26%
12.	Total	810	67.2%	1,429	74.2%

Source: Data collected by Command Recruiting Office

VISION STANDARDS

The highest rejection rate for Regular and Volunteer candidates were reported from the visual acuity standards. A similar percentage of 2187 Regular Airmen candidates (16.3%) out of 1,203 candidates and 336 Volunteer Airmen candidates (17.3%) were reported as having Poor Vision/Colour Blindness as per SLAF Medical Order number 6H3 (2015) during Medical Examinations. This number reported from those between 18-30 years age is at a distressing level that indicates an increasing trend of visual impairment and prevalence of disability in vision standards among the youth of the country. According to Dasanthi Fonseka, the CEO of Vision Care Optical Services (2018), over 9.3 million Sri Lankans have some type of vision impairment and those over 40 require some form of visual aid. However, the Sri Lanka National Blindness, Visual Impairment and Disability Survey (2018) states that there is a paucity of evidence on blindness, visual impairment, and ocular morbidity at the national level in Sri Lanka. The report highlights that the only population-based estimates was conducted in Kandy, which reported the prevalence of blindness and visual impairment, based on Best Corrected Visual Acuity, to be 1.1% and 5.9% respectively among those aged 40 years. Hence, the importance of taking note of reporting 17.3% candidates with visual impairments implementation of necessary measures to arrest the situation by health authorities is required to ensure future supply of youth to armed forces of the country.

HEIGHT AND CHEST STANDARDS

The lack of height and inadequate width of the chest standards was the next reason for rejections for both types of candidates. While 243 candidates (20.1%) out of 1,203 Regular Airmen candidates were rejected, 262 candidates out of 1,898 candidates were rejected from Volunteer Airmen candidates for not meeting the minimum height and chest requirements as per SLAF Medical Order number 6H3 (2015) on Medical Examinations. The figures may be an indication of stunting and wasting among youth, which is an important indicator of nutritional status and health in populations. According to the World Health Organisation (2017), children are defined as stunted or wasted if their height-for-age or weight-for-height is more than two standard deviations below the WHO Child Growth Standards median. It further presents that the percentage of children with a low height-for-age (stunting) reflects the cumulative effects of under nutrition and infections since birth, and the percentage of children who have low weight-for-age (underweight) can reflect wasting (i.e. low weight-for-height), indicating acute weight loss or stunting, or both. Therefore, a systemic study on the possible effects of childhood stunting and wasting in society and its impact on future youth is required to be done to circumvent challenges in finding suitably qualified youth for military enlistment.

PERFORMANCE AT PRELIMINARY INTERVIEW/PRACTICAL TEST

The rejection/failure rate at Preliminary Interview/Practical Test shows 203 candidates (16.8%) out of the 1,205 from Regular Airmen candidates and 221 Volunteer Airmen candidates (11.6%) out of the 1,898 candidates. Even though the failed percentage is higher among Regular Airmen candidates, their skill aspects were not lengthily measured as they were school leavers. In the case of those Volunteer Airmen candidates, they were exceptionally evaluated on their skill/specialization in the construction held performances. However, a question rises on the quality of majority of Volunteer Airmen candidates who were in possession of NVQ 1 to 4 levels and their mediocre performance at practical tests. A World Bank study titled *Sri Lanka Education Sector Assessment Achievements, Challenges, and Policy Options*, suggests that two types of skill constraints seem to be hurting the economy: (a) employers do not find enough skilled labour to meet their needs; and (b) firms, particularly those in modern high-value-added industries, complain that the quality of training provided to Technical and Vocational Education and Training (TVET) graduates is inadequate (Dundar et al., 2017).

BODY TATTOOS

Body tattoos was a common reason for rejection in both recruitment drives. Of 1,205 Regular Airmen candidates, 11 candidates (0.91%) were rejected for having body tattoos. In the case of Volunteer Airmen candidates, 192 candidates (10.1%) were rejected for this reason as per SLAF Medical Order number 683 (2013) on Medical Examinations. It is found that the Volunteer Airmen candidates who are between 18-30 years, with low education level, exposure and experience in society tend to have more body tattoos than other type of candidates. Even though tattooing is widely accepted in Western cultures, it is not accepted in Asian cultures. It is the psychological dimension that is established on the mere rejection of a person with a tattoo in Sri Lankan Military where it is believed to be transcending negative impulses of psycho-oriented deeds of a candidate. Rewathy and Linojah (2018) noted various reasons that motivate an individual to be tattooed and pierced: false courage and heroism, expose their maturity, get peer's attention, relieve stress, bad or negative experiences, show affection towards their loved ones, overcome heartbreak, overcome negative feelings/memories etc.

This trend among 18-30-year-old workers in the construction industry will have many negative impacts in the future military enlistments of Sri Lanka. Even though, the number of Regular Airmen candidates found with tattoos were low, this trend can have a fast-spreading effect over other age groups very soon. Interestingly, 99% of those rejected for tattoos did not have any idea that tattooing is grounds for rejection in the SLAF. Therefore, development of this trend among youth population is inevitable with their ignorance of consequences and military recruiters will face challenges of finding suitable young citizens in its ranks and files in future.

DELIBERATE SELF-HARM

Deliberate self-harm including ear piercings inflicted on oneself without suicidal intent was the other key area where 17 personnel (1.4%) out of the 1,205 Regular Airmen and 104 (5.4%) Volunteer Airmen candidates were rejected as per SLAF Medical Order number 683 (2015) on Medical Examinations. Areas such as forearms, wrists, and arms, front of the torso, legs, and forehead were commonly targeted for self-injury. The combination of above figures shows that 3.8% personnel out of 3,103 who are between 18-30 years have self-inflicted harm or ear piercings. Ratnaweera and Gunaratne (2020) states that the prevalence of reported deliberate self-harm in Sri Lanka was 1.4% and they observed a similar prevalence rate of 1.3% in their study. The authors highlight the highest percentage of cases were reported from the age group of 21 to 25 (39%) followed by the age group of 16 to 20 (21%). They identified that low-level of education, unemployment, substance abuse and presence of a psychiatric illness were among the identified risk factors. However, as a common policy, candidates with deliberate self-harm are not enlisted to the Sri Lankan Armed Forces. Ratnaweera and Gunaratne (2020) describes psychological motivations under psychological category include to obtain sympathy, to gain recognition or admiration, for pleasure and as a manifestation of mental disorder or disease. Hence, this can be identified as a contemporary trend and will offer a great challenge in finding quality youth suited for military service.

USE OF ILLICIT DRUGS

Of the 1,205 Regular Airmen candidates, 28 candidates (2.3%) were tested positive for the use of illicit drugs. The corresponding amount from the Volunteer Airmen was remarkably high, as 70 candidates (3.6%) out of 1,898 were found positive during the test. Use of illicit drugs such as cannabis, heroin etc. has become a complex, multi-faceted, all pervading social problem in Sri Lanka and those figures are a classic example to show how this issue has infested into youth of the country. For military candidates, drug addiction is regarded as a moral failure as it tends to be a chronic disorder which indeed affects military performance standards, readiness, and discipline.

Dissanayake *et al.* (2009) elaborates that most of the drug addicts had received low levels of education, and experienced childhood delinquency and a deprived upbringing. Drug use is largely initiated during early adolescence then continued to chronicity and to the development of drug dependence. According to the Drug Related Information Monthly Report (2020), 2,597 persons were arrested for drug related offences during April and May in 2020. It is pertinent to mention that 65% of arrested persons belonged to the 20-34 age category. Above fresh details and Volunteer/Regular Airmen candidates who were rejected for illicit drug usage would suggest that there is a higher possibility that an increased number of drug addicted candidates may attempt to future military recruitments. Therefore, the

young of the country is at a vulnerable position of victims of illicit drugs, which pose a strong challenge to military recruiters to select and retain the best youth for military.

CONCLUSION

The analysis of the data gathered from Regular and Volunteer Airmen candidates illustrate a side of the social profile, quality of labour force, related recent trends and propensity of Sri Lankan youth to serve in Armed Forces. Paradoxically, the low-level of enlistment propensity of construction field labour force in the country at a time they are highly affected due to Covid-19 pandemic, leaves a question as to why the majority of them did not avail the opportunity offered by SLAF. The impact of social and individual imperatives on the levels of supply and demand determinants in this recruitment drive was extensively studied and findings were empirically assessed through available literature.

Military recruitment of a country is obviously and solely responsible to ensure National Security. Whatever predicaments the military recruitment faces i.e., health, social, education, economic etc. they are to be addressed forthwith through sustainable and long-term measures through a coordinated effort with national policy makers who are responsible to ensure a healthy, quality, and strong youth/ labour force available for military recruitments. Based on the discussion and findings, following recommendations are made to circumvent challenges and issues for smooth force generation of Armed Forces of Sri Lanka.

As identified in the study, the propensity for youth to join the military depends on the robust and effective publicity campaign aimed at raising individual awareness and interest. Therefore, revisiting the current publicity campaign methodology of SLAF and planning future publicity campaigns based on the behaviour and qualities of target group through appropriate channels is essential.

As the study reveals increasing trends of visual impairment and prevalence of disability in vision standards, stunting, and wasting levels and over or lower standards of BMI Health authorities are to take note of the prevailing among those candidates which is an important indicator of nutritional status, health and take appropriate measures accordingly to curb the situation.

It is evident that armed forces of the country and police conduct the country's largest level of recruitment annually with the participation of thousand youth. The systematic and normative data available with military recruiters on the state of rejected candidates can be used as a precise source to identify emerging psychosocial, health, education, economic, and labour market trends and developments. Therefore, providing access to those valuable databases to relevant civilian authorities is recommended to study and make remedial measures to sustain an

inventory of best youth for military in future.

Drawing attention to one of the findings of the study that a considerable number of candidates with NVQ Level qualifications had failed practical tests is a clear sign of the quality of vocational education in the country. Hence, a requirement exists to re-evaluate effectiveness of TVET programmes to cater to the local job market demands and make necessary changes in the curriculum, if required, with the use of data available with the military. Also, a periodical revision of the content of the TVET programmes matching with job market trends is to be done. The deficient performance of TVET students at practical tests indicates their part of responsibility too which shows lack of commitment and continuous engagement during the course.

Annually, military forces in the country are recruiting thousands of candidates for specialised jobs in construction field. The TVET programmes conducted island-wide are a useful source to attract potential candidates for vacancies in the above fields and establishment of an integrated system will ensure a demand and supply equilibrium. The importance of employment in a stable job locally is one of the lessons-learned under Covid-19 pandemic situation where the global job market collapsed with large numbers of Sri Lankan workers losing their jobs and being repatriated to Sri Lanka. This highlights the requirement of this type of a system and offers an excellent opportunity to implement it.

The study observes an increasing trend of rejection rate due to body tattoos; deliberate self-harm including ear pricks and use of illicit drugs among youth which is a social issue which also has a psychological dimension. It is required to conduct awareness programmes at school, National Cadet Corps, National Youth Corps levels on such disqualification at military enlistments.

Considering the data analysis in the paper, attracting and selection of qualified recruits and the costs involved have made military recruitment an on-going challenge. Although the SLAF special recruitment drive discussed above did not yield much expected results, a critical analysis into crucial factors such as youth propensity to serve in the military and the recruiting trends and their implications contributed to identify multiple lapses in the job market. It is important to note that the military recruitment is not an isolated activity that is solely performed by the members of military forces. As this brings the largest Human Resource function of the country, it must have the involvement and coordination of other important

stakeholders including government institutions/ civilian agencies which can work together to ensure specific supply and demand factors on enlistment of potential youth to country's armed forces.

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EMERGING CBRNe THREATS FROM INDUSTRIAL AND MEDICAL FIELDS TO THE NATIONAL SECURITY OF SRI LANKA

Wing Commander Daham Wickramaratne

ABSTRACT

Several manufacturing industries and medical institutions in Sri Lanka are using a variety of Chemical, Biological, Radiological, Nuclear, and high-yield Explosive (CBRNe) agents. These agents could cause severe damage if they are released to the environment due to human negligence, unawareness, and lack of supervision. Inadequate care on CBRNe agents can also cost lives and if these agents fall into the wrong hands, those could be used as Weapons of Mass Destruction (WMD). The regulatory framework of the country has not adequately indicated the rules and regulations to protect national security from emerging threats of this nature. Therefore, several lapses have been identified in CBRNe security and their industrial usage. Following a qualitative approach, the research looks at whether the parties involved in CBRNe-related production are concerned about the national security aspect along with the revenue aspect in the context of defence-in-depth theory. The research revealed that Sri Lanka is vulnerable to CBRNe incidents due to various aspects such as terrorism, human errors, and possible industrial emergencies. Lapses in the regulatory framework further aggravate the emerging threats. Therefore, it is important to be mindful of unrecoverable damage and dire consequences of CBRNe incidents.

Keywords: CBRNe, National Security, Weapons of Mass Destruction

INTRODUCTION

The modus operandi of contemporary terrorists illustrates that religious cults and various groups with a transnational criminal orientation tend to cause severe damage to society by using methods that security forces are not equipped to face. Therefore, Chemical, Biological, Radiological, Nuclear and Explosive (CBRNe) or the use of Weapons of Mass Destruction (WMD) can be used for destructive purposes by terrorist elements at unexpected times. Moreover, accidental, or deliberate discharging of CBRNe agents due to negligence from the commercial-oriented entities such as industries and medical firms can also result in the same devastating impact on society. Many nations have adopted several measures to counter the CBRNe threat, such as monitoring of illegal trafficking of chemical and biological warfare agents, toxic industrial chemicals, radioactive and nuclear

materials through the ports, monitoring of infected or contaminated personnel and materials during embarkation and disembarkation, systematic disposal of medical waste and activation of national response plans for CBRNe emergencies. Unlike in other countries, it remains a question as to whether Sri Lanka has paid sufficient attention to emerging CBRNe threats due to limited knowledge on the possible severe consequences of a CBRNe attack or emergency. Additionally, awareness among the public regarding CBRNe emergencies are also minimum, thus further worsening the problem. Given the novelty of the topic and the fact that the impact of CBRNe is only being discussed within limited spheres, there seems to be no open dialogue at the societal level on the impact of CBRNe emergencies.

A limited number of CBRNe agents are used for peaceful purposes such as medical treatments, manufacturing processes, sterilization through gamma radiators, agriculture, and food processing by various industry stakeholders. In Sri Lanka, Toxic Industrial Chemicals (TIC), pesticides and high radioactive materials that possess potential radiation hazards are commonly used.

Emergencies related to CBRNe are rarely discussed in the national security agendas of non-nuclear states. However, hazardous nuclear substances are used by the non-nuclear-weapon states to support peaceful industries and they still possess risks. It is evident that several industries have been using toxic industrial chemicals such as Calcium Nitrate, Acid, Methanol, Ammonia, Caustic Soda in their production line and medical institutions have been using radioactive materials such as Caesium 137, Iodine 131, and Cobalt 60 for their treatment respectively. According to the enacted domestic laws and the regulations such as *Regulations on Ionizing Radiation Protection of the Atomic Energy Safety Regulations No. 1 of 1999*, respective organizations are compelled to adhere to several safety standards when handling CBRNe agents.

However, several incidents have been reported due to accidents and mishandling of CBRNe agents and ended with loss of lives around the globe. The Chernobyl nuclear power plant accident 1981 in Ukraine, the Bhopal gas tragedy 1984 in India, Goiânia radioactive material contamination 1987 in Brazil and the Fukushima Daiichi nuclear accident 2011 in Japan are some of the significant disasters that occurred in history (IEAE, 2006). The Beirut Port explosion due to the detonation of 2,750 tons of ammonium nitrate causing more than two hundred deaths and USD fifteen billion economic damage to Lebanon was the latest accident that happens because of poor storage conditions (BBC News, 2020). Furthermore, chemical leakage into the environment by a detergent manufacturer in 2014, an explosion of a 'Thinner' pipe in a paint manufacturing factory in 2015, Leakages of Hydrogen Sulfide gas from waste tank in a rubber manufacturing factory in 2018, are some of the incidents occurred recently in Sri Lanka (NBRO,2016).

Moreover, if CBRNe agents fall into the wrong hands such as terrorists and extremist groups with a transnational criminal orientation, it can be used as WMD causing severe damage to society. Sarin gas attacks at Matsumoto in June 1994 and Tokyo subway in March 1995 in Japan, Anthrax attack in the USA in 2001, the assassination of Kim Jong Nam a half-brother of North Korean leader Kim Jong Un using nerve agent VX at the Kuala Lumpur International Airport in Malaysia in 2017, Novichok agent attack against a former Russian intelligence agent and three individuals at Salisbury in the United Kingdom in 2018 and poisoning of Russian Opposition Leader Alexy Navalny at Siberian Airport in August 2020 are some of the recorded criminal activities in the recent past (BBC News 2020). Having critically analysed the nature of past CBRNe incidents in the world, the following major CBRNe threats were identified:

- a. CBRNe accident or emergency due to behavioural aspects such as human negligence, unawareness, and uncontrollable events like natural disasters.
- b. Sabotage or unlawful activities due to extremist ideology and terrorism

Keeping these threats in view, the author chose to follow the qualitative approach and theory of Defence in Depth (DiD) were used as the theoretical framework for the research. Based on the core argument, whether the parties involved in CBRNe related production are concerned about the national security aspect along with the revenue aspect, primary data were collected through structured interviews with a selected samples of local and foreign experts in the CBRNe field. Relevant theories, previous research, journal articles, annual and audit reports of local regulatory authorities and websites were used as secondary sources. Collected data were analysed through a qualitative technique based on thematic analysis.

TRENDS AND THREATS OF CBRNe USE

Threats related to CBRNe use are developing swiftly combined with the political environment as well as developments in technology. The substantial use of Chemical Weapons (CW) throughout global armed conflict particularly highlights the fragile nature of the world's arms control treaties. Further, the latest CBRNe attacks that took place in Europe and the Asian region using nerve agents and radioactive materials seems to be a new concern on attempted assassination or state-sponsored assassination which required to be incorporated into the national security perspective (Cowell, 2006). Such confirmed cases of using CBRNe agents by the state and non-state actors underscore the important challenges that the world is facing in this context. Therefore, it is essential to identify the threats posed using CBRNe agents and to understand difficulties that obstruct the cooperation between regional and international levels. For this paper, it is important to define the following forms of threats to understand what potential threats they entail.

CBRNe Terrorism: CBRNe terrorism provides a huge risk to the public health and safety by posing threat to national security as well as economic and political stability on both regional and global levels. Therefore, the prevention and mitigation of such incidents are at the highest priority level (INTERPOL, 2020).

Bio-Terrorism: Bioterrorism denotes the intentional release of biological agents to kill or harm people, animals, or plants to suppress a government or civil population to accomplish political or social objectives. In the present context, bioterrorism poses a real threat as certain individuals, criminals and terrorist groups possess the capability and intention to use biological agents to cause damage to society (INTERPOL, 2020).

Even though the manufacturing and stockpiling of biological weapons are banned by the Biological Weapons Convention, the technology of development, production and stockpiling of biological weapons already exists. There are several viruses, bacteria and toxins that pose high biological threats. Anthrax and botulinum toxins are considered a severe threat since they are comparatively easy to produce and suitable for weaponisation. These agents can be cultured from the environment without acquiring from a secure facility (BWC, 2019).

Chemical and Explosive Threat: The use of explosive materials as well as chemicals by terrorist and criminal groups provide a substantial threat to the national security of any country. Bomb blasts and chemical attacks heavily endanger public safety and can pose a huge impact on the economic and political stability of a state (INTERPOL, 2020). The threat posed by future chemical attacks seems potent since the knowledge, accessories, materials are also readily accessible and available. Apart from that, due to the property of dual-usage certain chemicals such as pesticides could be converted as weapons (Fei an and Anthony, 2019).

Radiological and Nuclear Threat: Radioactive and nuclear materials are used in the fields of energy-producing, medical, agriculture and industries. However, there is a risk of these radioactive and nuclear materials being used for criminal acts or in terrorism (IRMI, 2019). The detonation of an Improvised Nuclear Device (IND), Radiological Dispersal Device (RDD), or the placing of a Radiological Exposure Device (RED) provides severe consequences to the human health and environment. Further, that will create panic among the public and badly affect the economy and political stability (INTERPOL, 2020).

CBRNe Accidents and Emergencies: Due to uncontrollable extreme environmental conditions and poor handling, CBRNe agents could trigger fatal emergencies. There has been a growing trend in industrial chemical accidents over the past decades in Sri Lanka. However, most of the industrial accidents were reported inside the industry with most accidents being able to be managed within the factory safety framework, and the chemical accidents that occurred beyond the factory perimeters have led to chemical disasters connected with the release of one or more hazardous chemical substances into the environment triggered by fire (Kaushalya and Premasiri, 2016).

A review of the chemical disaster events in Sri Lanka suggested that most of these chemical accidents happened due to lack of knowledge, poor supervision, and maintenance (NBRO, 2016). Furthermore, when a disaster strikes, the situation has propelled out of control from the industrial management as well as the local incident management capability resulting in delayed emergency operations while exposing the community to an uncertain vulnerability. Additionally, the lack of a sound chemical disaster management framework for the response was a major concern and that was resulted in many industrial accidents propagated to a state of chemical disaster incident (Kaushalya and Premasiri, 2016).

Import of Clinical Waste from Developed Countries: The import of clinical waste from the developed countries is highly hazardous from the biological perspective. Import of this clinical waste has become a lucrative business for some leading companies in Sri Lanka under the guise of weak rules and regulations in the country. It was revealed that 111 containers filled with chemical waste including human remains were imported in 2019 (Daily News, 2019).

EXISTING REGULATORY FRAMEWORK IN SRI LANKA

Radioactive materials are used in industrial, medical, teaching and research applications in Sri Lanka. According to IAEA categorisation of Radioactive Sources, Category 1 sources with high radioactivity pose a very high risk to human health if not managed securely and they have been used in several medical and industrial institutes within the country (INES, 2008). These sources are mainly used in cancer treatments and the sterilization process. Atomic Energy Regulatory Council (AERC) and Atomic Energy Board (AEB) are the authorities established under the Sri Lanka Atomic Energy Act No. 40 of 2014. Those agencies are responsible for controlling the utilization, ensuring the security and safety of radiation sources as well as protecting the population from unwarranted exposure to ionizing radiation. Further, they are empowered to issue licenses and carry out inspection in accordance with the Regulations on Ionizing Radiation Protection of the Atomic Energy Safety Regulations No. 1 of 1999, import and export of radioactive sources authorization for transport (De Silva and Ranjith, 2015).

Several organizations have been assigned to handle the chemical management safety and security aspects in Sri Lanka. These organizations are empowered through various conventions and protocols. Subsequently, several Acts were enacted for these purposes. The National Authority for the Implementation of Chemical Weapon Convention and Chemical Weapons Convention Act No.58 of 2008 is a major component in this regard (NACWC, 2019).

TYPES OF CBRNE AGENTS USED IN SRI LANKA

A range of CBRNe agents are used in several industries and medical institutions in Sri Lanka. As revealed during the research, the following table lists the CBRNe agents used in Sri Lanka.

Table 1: Types of CBRNe agents used in Sri Lanka

Set (a)	Type (b)	Agent (c)	Usage (d)
1.	Radiological	Cobalt 60, Iridium 192, Iodine 131, Caesium 137	Cancer treatments, Sterilization
2	Chemical	Ethanol, Calcium Nitrate, Sulfuric acid, Nitric Acid, HCL, Chlorine, Ammonia, Solvents, Hydrogen Cyanide, Potassium Cyanide, insecticides, herbicides, and fertilizers such as Urea, Calcium Nitrate, Ammonium Nitrate	Industries Agriculture

Source: Developed by the researcher (2020)

Most of these CBRNe agents pose potential hazards to humans as they can enter the human body through inhalation, ingestion, absorption, or injection. Irrespective of the mode of entry, these agents are highly lethal and can directly impact the nerve system, respiratory system, or blood circulatory system according to the physical characteristics of the exposed agent (NACWC, 2019).

TERRORISM AS A DIRECT CBRNE THREAT

Terrorism is a leading method of CBRNe agent proliferation. The national security of any nation can be threatened by terrorism, and the use of CBRNe agents for terrorist activities will be the most disastrous. CBRNe terrorism can be exercised in several forms such as extremism, illegal activities, and sabotage. The massive devastation impacts of CBRNe attacks will create a huge fear among the public and such attacks claim mass casualty handling, and decontamination. On the other

hand, CBRNe attacks can paralyse the economy, therefore, extremists are more liable to use CBRNe agents due to maximum devastation impact.

There is a possibility of employing people with extremist ideologies into sensitive CBRNe related works allowing passage for lone-wolf attacks. It is exceedingly difficult to identify those types of personnel since they act alone without making any signs. If such a person joins as an employee of extremely sensitive chemical storage or a Gamma irradiator, they can cause severe damage.

CBRNe agents are highly vulnerable to be used in sabotage activities. Many stores that contain hazardous chemicals follow several precautions to minimize the risk. However, employees of such storage facilities can intentionally create situations like deliberately letting hazardous chemicals leak into the environment or creating fire inside the stores or by deliberately storing two highly reactive chemical compounds together.

It is noteworthy that toxic industrial chemicals can be converted into chemical warfare agents due to the dual properties of chemicals. Chlorine is an industrial chemical but it is a chemical weapon, with a slight chemical reaction chlorine powder can be converted into form of gas and it will be a classified choking agent. On the other hand, there is a possibility of producing chemical weapons and high-yield explosives inside clandestine laboratories.

Illegal activities are revealed as another means of CBRNe proliferation. Radioactive materials are highly vulnerable to hijack or steal during transportation therefore providing security is essential. In Sri Lanka, STF provides escorts during road transportation. However, adequate security must be provided even in the harbour and the airport also.

Information security in sensitive data was found as an especially important aspect as CBRNe agents are concerned. Details of the chemicals, quantity, mode of transportation, place of storing, arriving dates to the port are overly sensitive data for the outside interested parties. Therefore, industries are to ensure that only trustworthy and responsible persons to be utilized.

WORKPLACE INCIDENTS AS DIRECT CBRNe THREAT

CBRNe incidents are one of the major threats to national security. Human errors are a prime factor for CBRNe incidents. It was revealed that organizational, behavioural, and occupational matters as contributing factors for human errors. Most organisations hire manpower due to low cost and they tend to employ them in high-risk jobs. If they employ permanent workers, they must provide insurance, and certain allowances. However, employing under-competent workers for sensitive jobs possess a substantial risk.

One of the chemical and environment experts interviewed during the research revealed that certain behavioural patterns of the workers are leading to CBRNe incidents. Some workers are inherently reluctant to adhere to the safety measures, which are compulsory to follow. Prior to commencing welding work in damaged chemical containers, the sludge should be drained from the container. However, most often workers do not follow such safety rules leaving room for catastrophic fire hazards.

The common occupational attributes such as poor handling, lack of supervision, lack of experience, negligence and carelessness were revealed as contributing factors for human errors. Most sensitive chemical consignments are moved by the forklifts, however, due to poor handling those consignments can fall off generating sparks due to friction of the forklift arms.

Findings of the research revealed that CBRNe emergencies can occur due to natural disasters, siting, maintenance, storing and during transportation. High prominence is to be given when storing several chemical compounds together. Certain industries store Calcium Nitrate and Ammonia in huge quantities for their production purposes. Calcium Nitrate possesses a blasting effect and Ammonia is not highly flammable but can be exploded under extensive heat.

LOOPHOLES IN REGULATORY FRAMEWORK AS DIRECT CBRNe THREAT

Regulatory framework is the key character that controls CBRNe events within the country. Supplementary attributes of the regulatory framework are identified as regulations, procedures, and bureaucracy. The requirement of a substantial regulatory framework without having loopholes is essential to ensure sustained economic well-being. Certain companies import clinical waste from developed countries under the re-export concept and local authorities such as Central Environmental Authority have not been empowered to check those consignments at the harbour prior to disembarkation. Lapses in the Sri Lankan regulatory system create favorable avenues for illegitimate trade practices being entire nation victimized.

Government-owned medical institutes and industries that use radioactive materials are adhering to adequate procedures to prevent highly unlike scenarios. Furthermore, professionalism and awareness about the consequences of unwanted radiation exposure were the key factors for strict adherence to the SOPs and standards whereas it is observed that the private sector pay less attention to the same. Maintaining uninterrupted technology-based security systems, strictly controlled access and round-the-clock monitoring, measuring maximum radiation exposure limits as per international standards which is 20 millisieverts per annum, wearing

and calibration of personnel dosimeters are prerequisites for authorization. Laying down mechanisms and guidelines for licensing and the certification is also not effective due to lacuna in the continuous monitoring, employee, and infrastructure shortage in the regulatory bodies.

Bureaucracy in certain government organizations within the regulatory framework creates an adverse impact on the emergency response while military and health sectors are effectively engaged. In the Sri Lankan context, a limited numbers of government organizations are directly involved in CBRNe events. Having understood the devastating properties and possible consequences of CBRNe agents most of the organisations are positively working together, whereas some officials are reluctant to cooperate due to bureaucratic attitudes and highly-structured, rule-bound work situations. CBRNe emergency response is an inherently challenging task where it totally depends on the specific equipment and competent First Responders. The technology and equipment needed to be shared between First Responders and government organisations, however bureaucratic officials unintentionally deny such access by leaving the entire nation in danger.

CONCLUSION

Industrial development is an essential component of the economic well-being of any nation. However, that should not compromise military interests. CBRNe protection is one of the premier military concerns since it directly threatens the national security of a country. In the Sri Lankan context, CBRNe agents are used in certain industrial and medical institutions. Due to massive devastating consequences of CBRNe incidents those are to be carefully managed without leaving passage to fall those agents into the wrong hands and minimising industrial incidents.

The findings of the study revealed that Sri Lanka is vulnerable to CBRNe incidents due to terrorism, human errors, and possible industrial emergencies. Loopholes in the regulatory framework further aggravate the emerging threats. The regulatory framework must play a major role in this concern, revenue-oriented industries are worrying about their profit margins by negating the safety and security concerns. However, any CBRNe incident will lead to unrecoverable damage.

The study confirmed that terrorism, intentional and unintentional incidents are direct threats to the security apparatus. Loopholes in the regulatory framework provide favourable space and can impact the national security of Sri Lanka in terms of emerging CBRNe threats. Hence, the following recommendations have been made considering the findings of the research. First, state intelligence networks should be utilized for early identification of extremist, illegal and sabotage activities that may lead to CBRNe terrorism. Furthermore, comprehensive security investigation should be conducted before enlisting sensitive CBRNe related

occupations and periodic security investigations on the existing employees should be conducted. Second, premises that store hazardous chemicals should be kept under twenty-four-hour CCTV surveillance systems and this requirement needs to be promulgated as law. In addition to that, random checks should be conducted by the relevant authorities to scrutinize small-scale laboratory facilities. Adequate security for the radioactive material storage at harbour and airport should be provided, and a mechanism for sharing sensitive data between customs and end-users should be put in place on-a-to-need-to-know-basis. Moreover, industries should be encouraged not to utilize temporary or hired manpower for high-risk jobs. Employees should be continuously educated regarding workplace hazards, safety measures and regular monitoring of the same should be conducted. Thirdly, authorities should be more concerned about hazardous aspects before issuing a licence for the siting of new CBRNe-related industries and revising the entrepot trade policy and allowing local authorities to check imported consignments prior to entering the country. Additionally, issuing of sufficient personnel dosimeters for the private sector radiation workers. Finally, a multi-organizational committee should be established under the Ministry of Defence for stakeholders in the CBRNe field for coordination and mutual understanding.

Being an island nation Sri Lanka can utilize that advantage positively to mitigate CBRNe incidents on the other hand responding to a CBRNe emergency is also a challenging task and requires special equipment, well-trained troops as well as unique decontamination and medical facilities. In simple terms that is an expensive business. Therefore, it is the mandate of any nation to prevent the CBRNe incidents and protect the nation from such threats. Hence, this is an appropriate time to research and implement an initial precautionary method to save the nation from dangerous incidents that can take place in future.

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THE KNOWLEDGE AND PROFESSIONAL SKILLS OF SRI LANKA ARMY WOMEN'S CORPS SOLDIERS ON DISASTER RESPONSE

Major Swarnamali Dharmasena

ABSTRACT

Sri Lanka faces a range of complex disasters. The importance of women's participation in disaster risk management has received a high-level of attention in the aftermath of the world's recent experience with both natural and manmade events. However Sri Lanka Army Women's Corps (SLAWC) contribution in disaster response operations is still quite negligible due to the lack of knowledge and professional skills in the disaster response field. It was found that the lack of knowledge of SLAWC troops on disaster response, legal, technological, and institutional aspects and lack of skills of technological equipment handling, decision making, situation awareness, first aid and search and rescue were the root causes for the ineffective employment of SLAWC troops in disaster response. In addition to that, the existing role, and tasks of SLAWC troops, challenges pertaining to their employment in disaster response field were identified. Further, after conducting a sound analysis on the subject it has derived recommendations pertaining to the effective future employment of SLAWC troops in disaster response operations.

Keywords: Disaster Response, Disaster Response Skills, Disaster Response Knowledge, Sri Lanka Army Womens Corps

INTRODUCTION

Sri Lanka experiences a considerable number of disasters annually. Generally, women are more vulnerable to disasters than men due to their physical, social, and cultural restrictions. Even though women are the majority to be victimised during a disaster, the vital role of women in managing the aftermath of disasters has been neglected. Thereby, it is of utmost importance to integrate the role of women into the Disaster Risk Reduction (DRR) Strategy by mobilising their skills and capacities to enhance efforts to protect their safety. Unfortunately, the participation of women in planning, designing, implementing, and monitoring emergency projects remains negligible.

Disaster Management is a collaborative effort of both government and non-government sectors. Military plays a significant role in various aspects of the disaster management field because of its readiness, preparedness, facilities, capabilities, mobility, and systematic organizational structure. However, the disaster response framework of the military is male dominated, and women's participation is significantly very less. Even though, Sri Lanka Army (SLA) comprises of the SLAWC Regiment with 206 lady officers and 3,448 women soldiers, women soldiers' participation for disaster relief operations in Sri Lanka is negligible (Strength Report of SLAWC, 2020).

However, Sri Lanka Army has the capability to effectively employ SLAWC troops in disaster response processes by providing a gender-based approach to disaster response operations within the military framework. Nevertheless, to achieve the maximum effectiveness of such employment, it is important to identify the SLAWC troops' existing knowledge and professional skills on disaster response operations as they are key competencies in disaster response effectiveness. Therefore, this research was conducted to evaluate the existing knowledge and professional skills of the Sri Lanka Army Women's Corps on disaster response operations and identify the challenges pertaining to their employment.

This study is significant as it addresses the requirement and possibilities of enhancing the military women leadership in disaster response operations by promoting the most essential gender-based approach to disaster response. Furthermore, the outcome of the research augments the knowledge and professional skills of SLAWC troops on disaster response and allows scholars, researchers and military students who wish to explore more in this field of study. Moreover, this is a useful guide for policymakers and planners of SLA and SLAWC to foresee the possibility of effectively employing SLAWC troops in disaster response. However, the scope of this study was only limited to identifying the potentialities of employing of SLAWC troops in disaster response operation. Thereby, the conclusion and recommendations of the study are only applicable to the SLAWC troops and lack of experience of SLAWC troops in disaster response operations was one of the major limitations of the research.

METHODOLOGY

This research was conducted in the mixed method approach, by adhering to the procedure of collecting and analysing both quantitative and qualitative data within a single study. Further, the research was driven through sequential explanatory mixed method in two distinct phases. In the first phase, quantitative numeric data were collected from the sample to evaluate the existing knowledge and professional skills of SLAWC troops on disaster response and factors affecting in the disaster response effectiveness. This was conducted by distributing a questionnaire that consisted of close-ended and Likert Scale questions.

In the second phase, a qualitative approach was used to gather data by means of seven structured interviews with the senior military officials of SLAWC to study the following aspects in-depth:

The importance of integrating SLAWC soldiers in the disaster response role, Existing role, and tasks of SLAWC in disaster response operations, feasibility of effectively employing SLAWC troops in disaster response operations, challenges pertaining to the employment of women soldiers in disaster response role. Hence, the study focused on evaluating the existing knowledge and professional skills of SLAWC troops on disaster response of all the troops of SLAWC Regiment, which consists of 206 officers and 3,580 soldiers taken as the population of the research. The study used the stratified sampling method to select the sample based on the battalion's deployment and service of the troops since the magnitude of disasters varied according to a battalion's deployment area. Furthermore, the working experience of the military is considered as a decisive factor for disaster-related knowledge, skill, and effectiveness. The rationale for using this sampling technique was to ensure the accuracy of data and to reduce the sample bias. Based on the total population of the research, the researcher gathered quantitative data from 351 SLAWC troops, which was determined based on the sampling Chart (Kieper and Morgan, 1973).

After analysing the quantitative data which was gathered through the questionnaire from the selected sample, the researcher realised the positive impact of disaster response knowledge and skills to disaster response effectiveness. Further, it was revealed that the knowledge and skill gap of SLAWC troops on disaster response as a major challenge which affects the effective future employment of SLAWC troops on disaster response operations. Thereby, to study further, on this matter the researcher conducted structured interviews with SLAWC senior officials who participate in the decision-making process in SLAWC deployment, employment, training, and welfare related activities.

The interviews were conducted with the SLAWC Centre Commandant, four Commanding Officers of SLAWC battalions, Regimental Adjutant, and General Staff Officer 2 (GSO2) and one of the former 2nd In Command (2IC) of 7 SLAWC with the intentions of identifying the role and task of SLAWC, challenges which could affect the effective employment of SLAWC on disaster response operations and suggestions to overcome them in order to effective future employment of SLAWC troops in disaster response operations. The thematic analysis was conducted under several coding and themes. The main themes of the thematic analysis were important in integrating women into disaster response, tasks of SLAWC troops in disaster response, challenges pertaining to employment of SLAWC in disaster response operations and the effective future employment of SLAWC troops in disaster response operations.

Additionally, the secondary data relevant to the research were collected through the military and government transcripts, journal articles, government publications, magazines, printed books, and theses written on the subject. Further, the data was analysed by using SPSS and thematic analysis.

THE IMPORTANCE OF WOMEN'S CONTRIBUTION TO DISASTER RESPONSE OPERATIONS

There is emergent literature that addresses the role of women in disaster response operations and attempts to identify their inclusion in disaster management. Therefore, while highlighting the gender differentiated vulnerabilities, it is important to underscore that "Women are integral parts of functioning societies, with established roles and roles" (Wiest *et al.*, 1994). Traditionally, must believe that there is no room for gender-based discrimination in a disaster. Nevertheless, most disasters have proven that it treats men and women differently due to the distinct gender role and perceptions in societies. According to Asia Pacific Economic Cooperation (2009), lack of access to resources and information has accelerated women vulnerabilities to disasters. As stated by Anyabandu (2005), if the women participation is less in planning, implementing, and monitoring in all transitional phases of emergency, women's security is in danger in such instances, as women may come across certain difficulties, specifically the biological needs such as safety, security, privacy, sanitary needs, childbirth, pregnancy related issues and reproductive health in the absence of women leadership in disaster management. Having considered women's vulnerabilities in disasters as well as the importance of protecting women and children, at present the attention is shifting towards promoting women's contribution in the disaster management role in all aspects of planning, implementing, and monitoring. Women are more familiar and aware about women needs and thereby, the presence of women in decision making, and disaster response roles can play a crucial role. Having identified this requirement, leading development agendas such as the Hyogo Framework for Action (HFA) 2005-2015, and Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 have highlighted the necessity of promoting women's leadership in disaster management roles to achieve the Sustainable Development Goals (SDGs).

KNOWLEDGE REQUIRED FOR EFFECTIVE DISASTER RESPONSE OPERATIONS

Disaster response is a collaborative effort of a large workforce in varied professional disciplines and experience. However, regardless of their professional background, everyone involved in disaster management needs to obtain a task orientated, professional and cross disciplinary competency training on disaster response through a credited educational or training programme. Pathirage *et al.* (2014) has recognized eight knowledge factors that have an effect in managing disasters

effectively in all phases of 'Disaster Management Cycle'. He categorized those factors are as social, technological, environmental, legal- economical, operational political, and institutional aspects of knowledge which are applicable not only to the disaster response but also for all phases of disaster management.

According to Pathirage *et al.* (2014), the technological knowledge of disaster response covers the application of advance scientific tools and techniques such as early warning, communication, and other structural measures such as artificial intelligence, operating unmanned aerial vehicle (UAV), drones, big data etc. The technology and innovation assist disaster risk management in its all five pillars of actions called risk identification, risk reduction, preparation, financial protections, and resilient recovery.

Rodriguez *et al.* (2005) describe disaster management related social factor as knowledge of which humans use their different perspectives to cooperate with the members of the society to manage disasters successfully by means of educating us people, expanding the level of employment opportunities, and enhancing the role of decision making process. In addition to that the social knowledge of disaster management further highlights the importance of knowledge on unique needs of various affected communities, based on their socio-economic and cultural conditions (Oloruntimehin, 2005).

The disaster management legal knowledge consists of law, rules, and regulations applicable to accomplish the disaster management process and these laws and regulations can be enacted based on the hazard and vulnerability assessment. The institutional knowledge factor of disaster management refers to all the characteristics related to an organization which is found and devoted to disaster management activities (Pathirage *et al.*, 2014). For disaster management to be successful, an appropriate institutional arrangement is required. While the primary responsibility entity must be defined, other units at various levels, including the province, district, and village, should also be identified. The environmental knowledge factor of disaster management has basically been focused to address the concept of protecting the natural environment whilst the economic knowledge factor of disaster management assists to formulate long term economic planning and financial aspects of disasters. The operational/managerial knowledge describes how to plan, coordinate and manage disaster related activities, and lastly the political knowledge factor of disaster management addresses to the political environment of disaster management process (Pathirage *et al.*, 2014).

SKILLS REQUIRED FOR DISASTER RESPONSE OPERATIONS

Disaster skills can be basically divided into two forms. Those are, disaster response related soft skills and specialized skills. Soft skills are also known as non-technical skills. They are the perceptive, social, and personal resource skills that are a supplement to technical skills that require to perform a task efficiently (Bareli, 2014). According to Bareli (2014), there are five major soft skills which provide a solid foundation to disaster rescue teams. Those are communication, leadership, teamwork, decision making and situational awareness.

Apart from those soft skills, Flint and Bernan (2006) have introduced six basic skills, which are also required to assist victimized people in the emergency phase of a disaster. Those are early warning, first aid, disaster triage, logistic, communication, search, and rescue (SAR) and team organization skills. Kauo et al., (2005) note that first aid skill is essential to assist wounded victims to control their bleeding, treat shock and to stabilize fractures. United Nations Disaster Assessment and Coordination (UNDAC, 2011) indicate SAR as a capability of providing aid to people who are in an imminent threat of losing their life. The research focused on searching for strategies, methods, resources, and rescue is involved with the specialist skills such as the use of boats, helicopters, ropes, rapid water rescue and first aid (UNDAC, 2011).

Pathirage et al. (2014) describe technological knowledge as one of the key knowledge factors of disaster management and emphasize the importance of enhancing technological equipment handling skills such as early warning. Flint and Bernan (2006) also stated it as an important skill which must be processed by Emergency Management Teams (EMTs). Thereby, those who engage in disaster response operation should have to have a sufficient level of skills in handling and managing early warning equipment since it enables rapid responses during disasters.

Triage and casualty evacuation are the other specialized skills which helps effective disaster response. Workforces who engage in disaster response should have sufficient skills on evacuating casualties and triage hence, the circumstance may arise where the situation may not permit to move sick or injured victims directly to the medical transport in a short span of time due to the magnitude of disasters.

DISASTER RESPONSE EFFECTIVENESS

Effectiveness is the power of producing a desired outcome (Wilson et al., 2018). According to Arain (2015), the knowledge on disaster response influences enhancing the effectiveness of EMTs and further, it assists to make good and valuable decisions at the correct time. As explained by Zheng et al. (2010), knowledge management

plays an important intermediate role in every organization by opening a platform to accelerate its organizational effectiveness.

Scullen *et al.* (2003) has identified four different managerial skills which are required to manage the process to achieve the effectiveness of their role. Those are technical skills, administrative skills, human skills, and citizenship behaviours. According to Tonidandel *et al.* (2012), human skills are the skills which facilitate a manager to interact and collaborate more effectively with members of the team to gain the best outcome. It is more community-related and technical skills are the skills more relevant to the proficiency in this specific method. Tonidandel *et al.* (2012) further highlight those administrative skills play a significant role in managerial skills by subsuming areas in planning, coordinating, organizing, and delegating and coordinating the things. However, as proven by Tonidandel *et al.* (2012) human-related skills have more bearing to the organizational effectiveness and their application of soft skills play a significant role. Since disaster management has a prominent level of community management, the human skills on disaster response have a direct bearing on disaster response effectiveness.

MILITARY ROLE IN DISASTER RESPONSE

Disaster management is a cooperative and collaborative effort between government and non governmental organizations in multiple sectors (Zaw and Lim, 2017). Whilst retaining its primary role of safeguarding the country from external threats, military in any country plays a protagonist role in disaster response by assisting the local authorities (Banks, 2004). The inherent capabilities of military such as preparedness, readiness, resources and systematic organizational structure have made the military the best suited organization to conduct any kind of disaster response operation (Malesic, 2015). Thereby, most countries have recognized their armed forces as the first responders in disaster response.

According to Schrader (1993), there are basically three response sectors where military can assume in disaster response. Those are specific skills that facilitate the assistance of response operation, communication required for command and control and organized force to provide broad support. In addition to that, military capabilities such as surveillance and information gathering, radiation monitoring, situation awareness and damage assessment and other transport, technical skills and experiences have also provided an added value to the success of disaster response operations (Schrader, 1993).

According to Sylves (2008), during a disaster situation the military conducted search and rescue operations, maintaining essential services such as providing emergency medical assistance, transportation and power supply epidemiological work, disease control, decontamination, mass feeding, sheltering, firefighting,

removals of debris, and as well as to provide security to victimized people. The Sri Lankan Military comprises of Army, Navy and Air Force, which perform a leading role in the country by being the first respondents to the disaster response operations.

EMPLOYING OF SRI LANKA ARMY WOMEN'S CORPS TROOPS IN DISASTER RESPONSE OPERATIONS

Even though Sri Lanka Army plays a forefront role in disaster response operations in Sri Lanka, still the employment of women troops in disaster response is significantly low. However, Sri Lanka Army has a Women's Corps Regiment that comprises of more than 206x Lady Officers and 3148x Other Ranks (Strength Reports SLAWC, 2020). It is the only women regiment in the world which exclusively consists of women soldiers. Sri Lanka Army can effectively use these confident women troops who are qualified in various local and overseas courses such as para jumps, physical training instructors, leaderships, swimming, driving, first aid, nursing, and combat life serving which have a direct and indirect link to improve disaster response skills. In addition, Tamil women soldiers in the SLAWC can be used as interpreters during disaster response operations. Thereby, considering the above facts the Sri Lanka Army should pay attention to employ these valuable women troops' resources effectively in disaster response field to provide a gender-based approach to disaster response operations within the military framework in Sri Lanka.

CONCEPTUAL FRAMEWORK OF THE RESEARCH

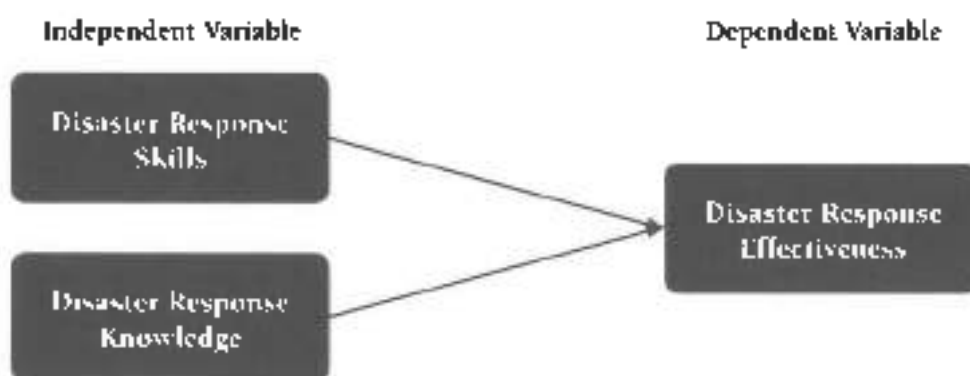


Figure 1. Proposed Conceptual Framework of the Study

Source: Designed by Author 2020

Since the focus of the research was to evaluate the existing knowledge and skills of SLAWC troops on disaster response, the disaster response skills and disaster response knowledge were selected as the independent variables and disaster

response effectiveness was considered as the dependant variable. Under the disaster response skills, the researcher attempted to assess the SLAWC troops' soft skills and specialized skills on disaster response. Soft skills were communication, leadership, situational awareness, decision making and teamwork (Barelli, 2014). Additionally, the researcher assessed the disaster response specialized skills of SLAWC troops such as first aid, SAR, technological equipment handling and casualty evacuations (Flint and Bernini 2006). Knowledge of the social, legal, technical, and organizational aspects of disaster relief operations is important for the deployment of troops in disaster response operations, the researcher selects them as sub-variables of disaster response knowledge (Pathirage et al., 2008).

DISCUSSION

Demographic information is essential to identify the characteristics of the selected sample of the study. The study took 351 SLAWC troops as the sample of the research and the rank structure, service duration, education background and the experience of the troops in disaster response operations were considered. According to the collected data, 32% were SNCOs and 68% of troops represented NCOs and ordinary soldiers. Further, 64% of members of the sample had passed GCE Ordinary Level examination, whilst 32% had passed GCE Advanced Level. In addition to that, since the service duration has a significant impact on disaster response experiences it was focused to identify the average service duration of the sample. Most of the selected sample was under the service duration group of 8-12 years, and they represented 47.8% of the total sample.

EXPERIENCE OF DISASTER RESPONSE OPERATIONS

Experience in disaster response operation affects disaster response knowledge and skills. According to the responses of the sample, 67% of participants have previous experience in disaster response operations. However, 33% of the population was new to disaster response field. In addition, the level of the disaster response experiences of the selected sample was evaluated by analysing the number of times they had participated for disaster relief operations such as flood, draught, pandemic (Covid-19), tsunami, terrorism, cyclone, and wildfire which are more common to Sri Lanka. The data indicated that most had more experience in flood, draught, civil disturbance, and terrorism related events. Nevertheless, only 6% of the soldiers had previous experiences in managing pandemic situations. However, none of the women soldiers had experience in relief operation in wildfire and cyclone situation since these disasters are uncommon in Sri Lanka.

Status of the Disaster Response Related Training

Training courses are essential to enhance knowledge and skills on disaster response operations. Here the researcher identified four main training courses which would facilitate SLAWC troops to enhance their knowledge and skills on disaster response. Those are, Combat Life Saving Course, First Aid/ Nursing/ Medical First Responder Course (MFR), Leadership courses, and Basic/ Advance Disaster Management Course. However, out of the total sample which consisted of 351 SLAWC troops, only 146 troops had participated in disaster response related knowledge and skill development courses, and they represent 41.5% of the sample. Nevertheless, out of the sample only 12% and 5% have attended the Combat Life Saving Course and Nursing / First aid /MFR courses respectively and it was revealed that none of the soldiers had undergone any course on Disaster Management.

Status of the Disaster Response Knowledge

In this section, the researcher focused on presenting the descriptive statistics of independent variables and dependent variables of the conceptual framework. Here, the researcher only considered the responses of the population who has experience in disaster relief operations at least once during her career as a member of a disaster response team since the previous experience in disaster response operations was vital to evaluate the existing knowledge and skills of soldiers in disaster response. There were only 235 respondents who have had experience in disaster response operations in the selected sample and the table 1 shows the descriptive statistics under the disaster response knowledge of SLAWC troops.

Table 1: Descriptive Statistics of Disaster Response Knowledge

Ser	Description	N	Min	Max	Mean	Std. Deviation
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1.	Personal satisfaction on disaster response related technological knowledge	235	2	5	3.01	1.040
2.	Personal satisfaction on disaster response related legal knowledge	235	1	4	2.33	.943
3.	Personal satisfaction on disaster response related social knowledge	235	2	5	4.17	.465
4.	Personal satisfaction on disaster response related institutional knowledge	235	1	5	3.34	.976
5.	Valid N (List wise)	235				

Source: Survey Data, 2020

According to Table 1, the majority responded neutrally, which indicates the dissatisfaction of soldiers on their knowledge on disaster response related technological, legal, and institutional knowledge. Nevertheless, it depicts that they are satisfied with their knowledge on cross-cultural awareness related to disaster response.

Disaster Response Skills

Disaster response skill is important for any soldier to participate in disaster response operations. According to Anda *et al.* (2012), a skill is a vital factor which helps to act for immediate situations under the urgent guidance activities. In this study, the researcher has identified disaster response soft skills and specialised skills. Leadership, teamwork, decision-making, situational awareness, and communications have been identified as soft skills while first aid, search & rescue and technological equipment handling skills and casualty evacuation have been identified as disaster response specialised skills. Table 2 shows the descriptive statistics of the standard of disaster response skills of respondents.

Table 2: Descriptive Statistics of Disaster Response Skills

Ser	Description	N	Min	Max	Mean	Std Deviation
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1	Leadership skill	235	2	5	4.16	.486
2	Teamwork skills	235	4	5	4.48	.501
3	Decision making skill	235	2	5	3.18	1.018
4	Situational awareness skills	235	2	5	2.74	1.012
5	Communication skills	235	2	5	3.16	1.184
6	First aid skill	235	1	5	3.00	1.052
7	Search and rescue skills	235	1	4	2.13	.648
8	Technological equipment handling skills	235	1	5	2.63	.866
9	Casualty evacuation skills	235	2	5	3.29	1.185
10	Valid N (list wise)	235				

Source: Survey Data, 2020

According to the above data, the participants were satisfied with their leadership skills and teamwork capabilities. However, it was identified neutral answers were received for decision-making, communication skills, first aids and casualty evacuation skills with high degree of deviations between actual responses and the mean values, which means many participants do not possess adequate decision-

making, communication skills, first aid and casualty evacuation skills as per the required level to operate in disaster response situations. On the other hand, the researcher found that the ineptitude of the selected sample to act upon changing situations on disaster related issues and low capabilities of SAR skills and technical equipment handling skills such as handling of early warning equipment, navigation/ GPS and radio communication equipment. However, it shows that the minority possess situational skills, SAR skills and navigation/GPS and radio communication skills than other members in SLAWC.

MULTIPLE REGRESSION ANALYSIS

Multiple regression analysis shows the linear relationship between the independent variables and dependent variables in this study. In this study, the two main independent variables were knowledge and skills associated with disaster responses and the dependent variable was the disaster response effectiveness. Hence, the following equation was derived to identify the relationship between the dependent variables and independent variable.

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \alpha$$

Y = Disaster response effectiveness
 a = Intercept
 β_1 = Coefficient of disaster response knowledge
 X_1 = Disaster response knowledge
 β_2 = Coefficient of disaster response skills
 X_2 = Disaster response skills
 α = Error term

As per the above linear equation, the regression has been derived to achieve research objectives under the recognized rules on disaster response effectiveness and following model summary, ANOVA table and coefficient tables were important outputs of the multiple regression analysis.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.610(a)	.372	.366	.78174

Predictors: (Constant), Disaster response skills, Disaster response knowledge

Source: Survey Data, 2020

According to the above model summary, 37.2% has represented all of the predictors by the identified model and the dependent variables. This was the acceptable amount of representation of independent variables by the dependent variables through the model. The following ANOVA table shows the overall model significance in this study. Dependent Variable was disaster response effectiveness and the predictors were (Constant), disaster response skills and disaster response knowledge.

Table 4: ANOVA for overall model significance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	83.947	3	41.973	68.682	.000b
Residual	141.781	232	.611		
Total	225.728	235			

Source: Survey Data, 2020

As per the above table, 4 shows a significant value as 0.000, this was less than 0.05 under the 95% confidence level. Therefore, it has a better significant level with different circumstances. The following coefficient table shows the relationship between independent variables and dependent variable:

Table 5: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.531	.432		4.235	.000
	Disaster response knowledge	.322	.109	.162	2.945	.004
	Disaster response skills	1.177	.120	.539	9.812	.000

(Dependent variables: Disaster response effectiveness)

Source: Survey Data, 2020

The above table 5 shows the relationship between disaster response knowledge and disaster response skills with disaster response effectiveness. As per the regression, output shows that there was a positive relationship between disaster response knowledge and skills in disaster response effectiveness under the 95% confidence level. In this stage, the researcher has identified a significant level for the overall models and all the variables under the disaster response knowledge and disaster response skills.

ANALYSIS OF QUALITATIVE DATA

According to thematic analysis, the researcher identified the safety of women in distress as a key requirement for involving women in disaster response operations. Brigadier RMJB Ramayake, the Centre Commandant of SLAWC stated that social, cultural, physical barriers and lack of mobility and lack of access to resources as the main reasons for women's insecurity in times of disaster. Moreover, Major Rashmi Galhena the Commanding Officer of 7SLAWC highlighted the requirement of enhancing the women's role in camp management to provide special attention to women's health, sanitary, and reproductive health whilst preventing the violence and abuse against them. Moreover, five interviewees highlighted the importance of integrating the potentiality of women soldiers to provide psychological recovery to the victimized women and children during a disaster.

According to the response of interviewees, the researcher found that the tasks of SLAWC troops in disaster response operations have primarily been limited to administrative roles such as providing security for victimized women and children as well as to distributing food and other essential items to the disaster victimized community.

CHALLENGES FACED BY THE SRI LANKA ARMY WOMEN'S CORPS TROOPS WHEN EMPLOYED IN DISASTER RESPONSE OPERATIONS

All the interviewees emphasised the lack of knowledge and skills of SLAWC as the main cause for the underutilisation of SLAWC in disaster management field. According to them this is a result of lack of training opportunities allocated for SLAWC troops in disaster response field and the lack of disaster response related equipment and training aids available in the Regimental Centre. Moreover, Rashmi Galhena (2020) said, "Underestimation of women's power and gender inequality are some of the social challenges faced in deploying SLAWC troops in disaster response operations." Further, three respondents highlighted the issue of lack of glorification of SLAWC role in disaster response. Lack of feasible studies conducted to evaluate the SLAWC capabilities as operational issues related to employment of SLAWC troops in disaster response. Furthermore, they highlighted the exclusion of SLAWC in disaster management committees and the under employment of SLAWC soldiers in disaster response as other operational challenges related to employment of SLAWC troops in disaster response operations. According to respondents, substantial risk involvement in disaster response is one of the other key concerns which have affected the employment of SLAWC troops in disaster response activities.

EFFECTIVE FUTURE EMPLOYMENT OF SRI LANKA ARMY WOMEN'S CORPS TROOPS IN DISASTER RESPONSE OPERATIONS

Effective future employment of SLAWC troops in disaster response operations were highlighted under the codes of training, motivation of troops and possible fields of employment in disaster response. Under training, all respondents highlighted the requirement of providing task-orientated training to SLAWC troops including both local and overseas. In addition to that, they also highlighted a pay for the selected disaster response courses, providing disturbance allowances to the period of employment in disaster response operations to motivate the troops. Further, Lieutenant Colonel Manathunga, the Commanding Officer of 2(V)SLAWC (2020) suggested that employing of SLAWC as medical assistants, counsellors, light and heavy vehicle drivers, drone operators, GIS analysis, boat operators, lifesavers and as interpreters (Tamil women soldiers) as the possible and best suited skill areas that can be successfully explored in the disaster response role. However, they should be provided with task-orientated training prior to employment of such fields. In addition to that, he highlighted the importance of establishing a 'Army Women SAR' team with the participation of SLAWC troops to operate along with male soldiers during disasters since it provides more gender sensitive approach to the disaster response role.

CONCLUSION

Employing SLAWC troops effectively in disaster response operations will provide a gender sensitive approach to the disaster management process within the Sri Lankan military framework. However, to achieve the highest degree of success in such employment, the Sri Lanka Army should adopt a systematic procedure to enhance professional skills and knowledge of the SLAWC soldiers in the relevant field. According to this survey, it was identified that SLAWC soldiers' knowledge on disaster response legal aspects, institutional aspects and technological aspects were extremely limited and the specialised skills such as managing technological equipment, first aid, casualty evacuation, search and rescue and situational awareness were minimum.

However, after conducting feasibility study to analyse and identify the possibility of employing women soldiers in disaster response, it was revealed that the Sri Lanka Army should provide a task-orientated training to selected groups of soldiers to uplift their skills to meet the required professional standards. Further, these task-orientated trainings need to be designed in such a way to cope with the future employment fields of the women soldiers. A few possible fields to employ women soldiers would be as counsellors, emergency medical responders with professional medical staff, drone operators, boat riders, GIS analysts, early warning equipment operators, camp administration, and light and heavy vehicle drivers. Moreover, in providing the required level of task-orientated training to the

selected group of SLAWC troops the SL Army should also foresee the possibility of establishing an Army Women SAB Team that comprises of minimum 2x SLAWC platoons. Further, they should be effectively grouped with army male troops SAB teams during disasters to provide a gender sensitive approach to the disaster response operations.

The risk involvement, lack of glorification of the role played by the women troops in disasters and gender discrimination were identified as key issues that may negatively affect the employment of women troops in the disaster response field. Hence, the Army should implement possible measures to motivate and ensure the security and welfare of SLAWC troops who engage in disaster response roles. Various steps can be implemented in this regard such as introducing of life insurance for soldiers who engage in disaster response operations by conducting a risk assessment, provide qualification pay to selected disaster response courses in the Army and increase the disturbance allowances to troops who engage in disaster response operations considering the duration of disaster response operation. In addition to that, SLA should formulate/amend its Rule of Engagements (ROEs) where appropriate keeping in mind the SLAWC's role in disaster response. Sri Lanka Army with its reputation of unparalleled military feats and human assets, it would be beneficial if the SLAWC's efforts and capabilities are made known to the public by effective use of media propaganda that will glorify the women's role in disaster response.

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Lieutenant Colonel Mohamud Zahid Hossain was commissioned in the Corps of Artillery in the year 1998. He has served in two field regiment artillery units and later commanded one of them. He has served in two artillery brigade headquarters as a staff officer both as a Captain and as a Major. He served under the blue helmet twice, in Timor Leste and Central African Republic (CAR). He is a graduate of Defence Services Command and Staff College, Bangladesh and Sri Lanka. Lieutenant Colonel Zahid has obtained Master's in Military Science from Bangladesh University of Professionals and Master's in Defence and Strategic Studies at General Sir John Kotelawala Defence University. In addition, he has a Masters' degree in Business Administration (Executive Programme) from the Institute of Business Administration of Dhaka University. At present, he is serving as an instructor in a training institute of Bangladesh Army and reading for his PhD in International Relations.



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