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Research Questions

1. BACKGROUND

The concept of strategy has become a focus point in almost all walks of life. The businessman determines his strategy by setting goals, developing processes and structuring his business accordingly. At the same time, he would use some estimator to try and quantify how successful his venture would be, whether his strategy would produce optimal results or what the answers to a wide array of "what if?" questions would be. Many operations research methods have been developed to quantify these estimators.

In the military, however, this is not the case. Engelbrecht[1] has shown that the art and science of formulating military strategy has been labelled as dialectic. He goes on to quote Binmore[2] that Game Theory is able to be used in varying degrees to predict or explain the outcome of a strategy, investigate the causes of a particular outcome to a strategy, describe a particular type of situation with its associated strategies and prescribe optimal strategies. Also, the notion that an estimator for the probability of success for a particular military strategy could exist, is implied.

Exactly how such an estimator could be formulated and used is the object of this thesis. In order to develop appropriate research questions, it is necessary to place *military strategy* in context and to define the concept. The implications of the definition need to be analysed so as to find a secure departure point for the research questions.

2. DEFINITION OF STRATEGY

Owen[3] states that the intuitive meaning of a *strategy* is that of a plan for playing a game. Note that when he refers to a game, it is within the context of Game Theory. The game might range from a plan to play Naughts and Crosses to a plan to outsmart the business competition to

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[1] Engelbrecht, G.N., On the Relevance of Game Theory in Strategic Thinking, *Scientia Militaria*, Vol 29, 1999, p. 37.
[2] *Frontiers of Game Theory*, edited by Binmore, K., Kirman, A. and Piero, T., Cambridge, Ma: MIT, 1993, p. 3.
[3] Owen, G., *Game Theory*, 3 ed., San Diego: Academic Press, c1995, p. 4.

making a plan for war. In the strict Game Theoretical sense, a plan is a set of the sequence of decisions necessary to achieve a certain outcome. However, in a more general sense, a plan may also be a set of decision rules that are necessary to achieve a certain outcome.

The Concise Oxford Dictionary[4] defines *strategy* as the art of war, the management of an army or armies in a campaign, the art of moving troops, ships, aircraft, etc. into favourable positions, an instance of this or a plan formed according to it.

The two definitions above lead us to believe that military strategy has to do with a plan to make war. Before we explore the concept further, it is deemed necessary to place military strategy in its proper context.

2.1. MILITARY STRATEGY IN CONTEXT

As military strategy has to do with war, it cannot be confused with business or other strategies. In general the military establishment defines four levels of war [5] as follows:

- The Grand Strategic Level.
- The Military Strategic Level.
- The Operational Level.
- The Tactical Level.

In the discussion on the levels of war, we shall restrict ourselves to the Western view as embodied in UK and US defence doctrine as opposed to views held by the former Warschau Pact or modern Chinese thinking.

2.1.1. The Grand Strategic Level of War

Grand strategy is a nation's plan to deal with national issues such as the maintenance of its political independence, territorial integrity and the pursuit of its wider national interests. To this end, governments normally conduct international politics.

In order to conduct international politics, that is, to influence the behaviour of other nations, the nation conducting international politics must apply its national power within the international political system. The objectives being pursued, together with the way in which its is pursued constitutes a nation's *grand strategy*.

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[4] *The Concise Oxford Dictionary*, 9 ed., Oxford, UK: Oxford University, 1995, p. 1377.
[5] *British Defence Doctrine*, 2 ed., Swindon, UK: UK Government, October 2001, p. 1-2.

In the case of the United Kingdom, it is their view that their grand strategic position is a reflection of the realities of power exercised within the international political system[6]. They acknowledge that the national power consists of three instruments, *viz.*, the diplomatic, economic and military instruments.

The American military use the word strategy in the broader sense to denote Grand Strategy[7]. The American definition is that *strategy* is the art and science of developing and using political, economic, psychological and military forces as necessary during peace and war, to afford the maximum support to policies, in order to increase the probabilities and favourable consequences of victory and to lessen the chances of defeat[8].

The American definition seems broader than the British one. However, if one understands the diplomatic instrument of grand strategy to include both political and psychological forces, then the two definitions are alike in essence.

2.1.1.1. *The diplomatic instrument of grand strategy*

The diplomatic instrument of grand strategy comprises a wide range of attributes. These attributes include, *inter alia*, the ability to negotiate, to maintain good relations between one's allies and potential partners and to get one's way by forceful argument rather than by economic or military coercion.

2.1.1.2. *The economic instrument of grand strategy*

The economic instrument of grand strategy is multi-faceted. International investment and the resultant capital flow to and from countries provide for opportunities to exercise economic influence. However, economic action must be used appropriately and under circumstances that are conducive to its use. A harsh application of the economic instrument is the threat of or the imposition of economic sanctions. Such an economic course of action often requires the use of the military instrument as well to ensure the effectiveness of sanctions.

2.1.1.3. *The military instrument of grand strategy*

British defence doctrine contends that military power is the ultimate instrument of policy[9]. The military instrument of grand strategy will normally be used only when the diplomatic and economic instruments have failed.

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[6] *British Defence Doctrine*, *op.cit.*, p 2-4.
[7] *Strategy and Force Planning*, 2 ed., edited by the Strategy and Force Planning Faculty, Newport, R.I.: Naval War College, 1997, p. 389.
[8] *Department of Defense Dictionary of Military and Associated Terms*, Washington D.C.: Joint Chiefs of Staff, 1994.
[9] *British Defence Doctrine, op. cit.*

2.1.2. The Military Strategic Level of War

Military strategy is the military component of grand strategy[10]. It consists of a plan to develop and employ military forces consistent with grand strategic objectives. Owens[11] is clear that military strategy is concerned with the employment of military power in peace and in war. He deduces that in peacetime military strategy provides a guide to program decisions, that is, decisions about the strength of military forces, their composition and readiness, deployment rate, etc., as well as how military forces are deployed during peacetime to deter war. Furthermore, in wartime, military strategy guides the employment of military force in pursuit of victory.

The American definition of strategy at the military strategic level is as follows[12]:

> [military strategy is] the art and science of employing the armed forces of a nation to secure the objectives of national policy by the application of force or the threat of force.

From this definition, we see that military strategy must transform the objectives of national policy [grand strategy] into the military strategic objectives to guide the operational level of war.

2.1.3. The Operational Level of War

British thought on this level of war has it that the operational level of war is the level at which campaigns are planned[13]. It links a military strategy to tactics and it does so by establishing operational objectives, initiating action and applying resources to ensure the success of the campaign.

To underscore this point, Jablonski[14] indicates that the operational level's basic mission … is to determine the sequence of actions most likely to produce the military conditions that will achieve the [military] strategic goals. Thus the operational commander must be constantly interacting with the [military] strategic level even as he gauges his adversary and determines how to use tactical forces to accomplish that sequence of actions.

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[10] *British Defence Doctrine, op. cit.*, p. 1-2.
[11] *Strategy and Force Planning*, *op. cit.*, p. 389.
[12] *Department of Defense Dictionary of Military and Associated Terms, op cit.*, p. 302.
[13] *British Defence Doctrine*, *op. cit.*, p. 1-2.
[14] Jablonski, D., Strategy and the Operational Level of War, Part 1, *Parameters*, *Journal of the U.S. Army War College*, Vol. 17, No 1, Carlisle Barracks, PA, 1987, p. 68.

2.1.4. The Tactical Level of War

At this level, the serious business of fighting takes place. A definition of tactics is that it is the art of disposing maritime, land, air and Special Forces for battle and logistics for direct support of those engaged in combat to achieve success in battle[15].

2.1.5. The Significance of the Levels of War

The levels of war provide a general framework for the command and control of operations and a useful tool for the analysis of politico-military activity, before, during and after the conduct of military operations[16]. However, note that Handel[17] warns that in the real world … operational or tactical considerations can and do influence strategic decisions often as much as they influence tactical and operational decisions. An example is that in the First World War the combination of trenches, machine guns and barbed wire exerted a decisive influence on the military strategies employed.

2.2. CONTEMPORARY DEFINITION OF MILITARY STRATEGY

From the initial discussion to this section, we have deduced that military strategy has to do with a plan to make war. Furthermore, the discussion on Military Strategy in Context places military strategy at the military strategic level of war. Thus we now have a plan to make war at the military strategic level of war.

Lykke[18] reports that during a visit to the US Army War College in 1981, General Maxwell D. Taylor characterised strategy as consisting of objectives, ways and means. Lykke goes on to say that [military strategic] ends can be expressed as military objectives … Ways are concerned with various methods of applying military force … Means refers to the military resources (manpower, material, money, forces, logistics and so forth) required to accomplish the mission.

We express this concept by saying that the plan at the military strategic level consists of a set of military strategic ends (objectives prescribed by the grand strategy), ways (courses of action) and means (instruments of a military strategy). For the purposes of this thesis, we define military strategy as follows:

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[15] *British Defence Doctrine, op. cit.*, p. 1-3.
[16] *Ibid.*
[17] Handel, Michael I., *Masters of War – Classical Strategic Thought*, 2 ed., Portland: Frank Cass, c1996, p. 225.
[18] Lykke, A.F. Jnr., Defining Military Strategy, *Military Review*, January – February 1997, p. 183 – 186.

> *Military Strategy* is a plan at the military strategic level of war that consists of a set of military strategic ends, ways and means and the relationships between them.

Furthermore, this definition is requisite as no new intuitions emerge about it[19].

3. ASSUMPTIONS UNDERLYING STRATEGY

John Garnett[20] states that although the assumptions that underpin a good deal of contemporary strategic thought are rarely articulated, strategists in the Western world share a common set of assumptions about the nature of international political life and the kind of reasoning that is appropriate for handling politico military affairs. Note that we refer here to pure strategists and this does not readily include political thinking such as the political rationale for the US and the UK to invade Iraq despite being in breach of International Law.

These assumptions can be summarised under the following headings:

- Realism
- Moral Neutrality
- Peace and Security
- Rationality

3.1. REALISM

The philosophical tradition of realism has dominated the literature of international relations since the end of the Second World War. Oakeshot[21] elucidates this philosophical tradition when he says:

> "in political activity then, men sail a boundless and bottomless sea; there is neither harbour for shelter nor floor for anchorage, neither starting place nor appointed destination. The enterprise is to keep afloat on an even keel; the sea is both friend and enemy; and the seamanship consists in using the resources of a traditional manner of behaviour in order to make a friend of every hostile occasion."

Garnett[22] states that as there are important differences amongst the self-professed realists, it is impossible to summarise the body of ideas and

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[19] Phillips, L.D., Requisite Decision Modelling, *Journal of the Operations Research Society*, Vol 33, 1982, p. 37.
[20] Baylis, J., Booth, K., Garnett and Williams, P., *Contemporary Strategy 1*, 2 ed., London: Croom Helm, 1987, p. 9 – 20.
[21] Oakeshot, M., *Rationalism in Politics*, London: Methuen, 1962, p. 127.
[22] Baylis, *op. cit.*, p. 9.

attitudes normally associated with realism. However, the realist position is unmistakable. Realists are generally conservative in their views, they

- see virtue in evolutionary change that is sufficiently slow for that which is best in international society to be preserved,
- are cautious both in their estimate of what can be done and what ought to be done to ameliorate international relationships,
- accept a world subdivided into independent sovereign states as being normal, if not permanent, and
- consider realpolitik an inescapable feature of the international environment.

Furthermore, it is logical to deduce that realist thinking at the international political level influences the grand strategic level of war, and in turn the military strategic level of war.

3.2. MORAL NEUTRALITY

In studying war, the student must be on neutral moral ground. If not, the study might become biased and thus, not a true reflection of war. Like the fact that when doctors study cancer they, in general, are not in favour of the illness, but they remain neutral so as not to bias what they do; likewise the strategist does not have to be in favour of war in order to be a student of it. He also needs to remain neutral so as not to bias the outcome of his study.

This does not imply that moral issues do not play a significant part in the formulation of strategy. However, the degree to which strategy takes cognisance of moral issues, is dependent on the moral fibre of the strategist.

For example, the fact that K'ou Hsün beheads Huang-fu Wen, a messenger under a flag of truce, causes his opponent, Kao Chun to throw open his fortifications and to surrender to K'ou Hsün[23]. K'ou Hsün's strategy was to attack the plans of his adversary. In doing so, the moral base of K'ou Hsün's action is, in today's perspective, not acceptable.

On the other hand, the internationally accepted Law of Armed Conflict would, on moral grounds, not accept K'ou Hsün's action and, in fact, he would be regarded as a war criminal.

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[23] Sun Tzu, *The Art of War*, translated by Griffith, S.B., Oxford: Oxford University, c1963, p. 77.

Garnett[24] summarises the issue of moral neutrality by saying that:

> "Behind most strategic policies lie moral positions on the question of whether, and in what circumstances, it is right to hurt and kill combatants and non-combatants. And if, in certain circumstances, strategic analysts are prepared to risk war, it is not because they are insensitive to moral considerations but because their moral values are so important to them that even war must be risked in their defense."

3.3. PEACE AND SECURITY

Strategy is interspersed with various kinds of value assumptions. Of these the notion that peace and security are desirable goals, is paramount. Furthermore, Garnett[25] has developed an argument that many contemporary strategic doctrines are simply different theories about how a peaceful and secure world is best pursued.

Also, the notion that peace and security are desirable goals has lead to a number of subordinate theories. The following depicts some of these theories:

- Deterrence theory holds that peace and security can be achieved or promoted by the threat of unacceptable retaliatory damage. This theory underpinned the Cold War era where nuclear weapons provided for unacceptable retaliatory damage.

- Disarmament theory holds that the skilful management of weaponry, to make the decision to wage war more remote can achieve peace and security. During the Cold War, this theory was a strong contender to the deterrence theory and led to the so-called Salt Talks.

- Limited war is the theory that peace and security can be obtained by controlling and limiting the amount of military force used in any conflict.

- Crisis management is the theory that peace and security can be promoted by developing techniques, other than war, for handling international crises.

Whether a national grand strategy to maintain peace and security may suffice is also controversial. Such a grand strategy will inevitably lead to the notion that the status quo must be maintained. This may, for example, suit Europe whilst the European status quo might ferment

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[24] Baylis, *op. cit.*, p. 14.
[25] Garnett, J.C., Theories of Peace and Security, *Introduction*, London: Macmillan, 1970.

feelings of frustration within Africa where the status quo is an unacceptable state of affairs.

3.4. RATIONALITY

Rationality may be defined as choosing to act in the manner which gives the best promise of maximising one's value position on the basis of a sober calculation of potential gains and losses, and probabilities of enemy actions[26]. Moreover, it can be said that rationality involves the selection, from among alternative possible strategies, of that which, from the point of an omniscient and objective observer, is most likely to promote the value pursued. We assume the value pursued to have some utility and that to be an omniscient and objective observer means to be an observer who is instrumentally rational.

Rationality is cast in a means-end framework with the task of selecting the most appropriate means for achieving certain ends. For this purpose preference must be coherent in only a weak sense, that is, we must be able to talk about achieving an end or preference more or less. Individuals who are instrumentally rational have preferences over various things, e.g. sea travel over air travel, Mediterranean weather over Highveld weather, etc., and they are deemed rational because they select actions which best satisfy those preferences.

Suppose that a person is choosing between alternatives x_1, x_2, … , x_n, then, $x_i \prec x_j$ denotes that the person either prefers x_j to x_i or is indifferent between x_j to x_i and $x_m = x_n$ denotes that the person is indifferent between x_m and x_n. A person is deemed *instrumentally rational* if he or she has preferences that satisfy the following conditions[27]:

- Reflexivity: For any x_i, $x_i \succ x_i$.
- Completeness: For any x_i, x_j either $x_i \succ x_j$ or $x_i \prec x_j$.
- Transitivity: For any x_i, x_j, x_k, if $x_i \succ x_j$ and $x_j \succ x_k$ then $x_i \succ x_k$.
- Continuity: For any x_i, x_j, x_k, if $x_i \succ x_j \succ x_k$, then there must exist some "composite" of x_i and x_k, say y, which gives the same amount of utility as x_j, that is, $y = x_j$ and our individual is indifferent between them.

[26] Snyder, G.H., *Deterrence and Defense*, Princeton, N.J.: Princeton University Press, 1961, p. 25.
[27] Heap, S.P.H. and Varoufakis, Y., *Game Theory – A Critical Introduction.* London: Routledge, 1995, p. 6.

When the axioms of reflexivity, completeness and transitivity hold, then the individual has a well-defined preference ordering. When the axiom of continuity also holds, this preference ordering can be represented by a utility function denoted $U(x)$. The individual who makes choices with a view to satisfying his or her preference ordering may be conceived as one who is maximising this utility function.

Now, Garnett[28] cautions that not only are people incapable of neatly ordering their priorities, they are, for some of the time, incapable of making rational choices. This weakness lies in the fact that people may to some or other degree be enraged, have feelings of indignation, revenge, pity and altruism. Bull[29] comments furthermore as follows:

> "… as decisions of government on matters of peace and war … do not always reflect a careful weighing of long-range considerations, or a mastery of the course of events … governments appear to … stumble about, groping and half-blind, too preoccupied with surviving from day to day even to perceive the direction in which they are heading, let alone steer away from it."

Although we assume that strategic decision-makers are not always rational in their thinking, strategic analysts do assume rationality in decision making because for the purposes of analysis it is very difficult to make any other assumption[30]. The value of the rationality assumptions lies in their explanatory rather than in their predictive power.

3.5. IMPLICATIONS OF THE ASSUMPTIONS UNDERLYING STRATEGY

If a model is built of strategy at any of the applicable levels of war, then cognisance must be taken of the assumptions underlying strategy. A model that is developed must not inhibit any of the assumptions, nor can it prescribe something that cannot be substantiated by these assumptions. For example, if such a model does not comply with the conditions for transitivity, then rational behaviour cannot be modelled and, as a result, the assumption of rationality has been breached. This would render the model invalid.

We conclude by saying that a valid model of strategy must, *inter alia*,

- at least not inhibit any of the assumptions underlying strategy,
- at best accommodate or enforce the assumptions underlying strategy, and

[28] Baylis, *op. cit.*, p. 18.
[29] Bull, H., *The Control of the Arms Race*, London: Weidenfeld and Nicolson, 1961, p. 49.
[30] Baylis, *op. cit.*, p. 19.

- in order for the model to be requisite, consider, as one of the appropriate factors, at least all of the assumptions underlying strategy[31].

4. MILITARY STRATEGIC THINKING

In order to gain insight into the function and form that present day military strategy has taken it is necessary to investigate exactly what a military strategy's ends, ways and means, signify. First we shall deal with the ends of a military strategy and thereafter we shall, in sequence, consider the ways and means.

4.1. MILITARY STRATEGIC ENDS – FURTHER INVESTIGATED

Clausewitz[32] characterises war as follows:

> *War is … an act of force to compel our enemy to do our will.* … it is no mere joy in daring and winning, no place for irresponsible enthusiasts. It is a serious means to a serious end.… When whole communities go to war – whole peoples, and especially *civilised* peoples – the reason always lies in some political situation, and the occasion is always due to some political object. War, therefore, is an act of policy … a true political instrument, a continuation of political intercourse, carried on with other means.

From the above passages, the dictum that war is the continuance of diplomacy by other means is generally justified. The passages from the Holy Bible that follow below, illustrate that war is a political instrument to gain political goals.

God spoke to Moses and said: "… I also made my covenant with them, promising to give them the land of Canaan, the land in which they have lived as foreigners. … I will make you my own people, and I will be your God. You will know that I am the LORD your God when I set you free from slavery in Egypt. I will bring you to the land that I solemnly promised to Abraham, Isaac, and Jacob; and I will give it to you as your own possession[33]".

The Israelites moved on and set up camp in the plains of Moab east of the Jordan and opposite Jericho[34]. The rest of story of how the children of Israel conquered Canaan is well known. The military strategy's end was the land of Canaan as a state for the Israelites. This end was a political one and in this case, illustrates Clausewitz's view.

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[31] Phillips, *op. cit.*
[32] Von Clausewitz, C., *On War*, edited and translated by Howard, M., and Paret, P., Princeton, NJ: Princeton University, [1832], c1976, p. 75, 86 – 87.
[33] *Holy Bible* [*The*], *Good News Edition*, 2 ed., Goodwood, Cape: Bible Society of South Africa, 1976, Exodus 8: 4-8.
[34] *Ibid*, Numbers 22:1.

In the context of the biblical time, it was normal to have such military strategic ends as the acquisition of land or more land, as the case might be. The strongest or the most daring could challenge nations or cities for their belongings, whether it was land or gold or anything else of sufficient value to warrant the risk. Moreover, from a moral neutral point of view one could observe that neither Jew, nor Christian would think badly of the Israelites' first conquest of Canaan. On the other hand, at the time, the Midianites, Canaanites, Hetites *et cetera* must have resented the conquest and plundering of their land.

Now, Sun Tzu[35] purports that victory is the main object of war. Bearing our definition in mind, we can restate this idea by saying that victory is normally considered to be a prerequisite for achieving the end of a military strategy. Clausewitz[36] supports such a view when he postulates that the aim of disarming the enemy is also the object of the war in the abstract, the ultimate means of accomplishing the war's political purpose. Note that Clausewitz has made the critical assumption that the concepts of achieving the military strategic ends and victory in war are equivalent concepts.

Furthermore, considering Sun Tzu and Clausewitz's views on victory, for a strategy to be feasible, there must be some assurance of victory contained therein. The degree to which such assurance is lacking would constitute the degree to which victory is not assured by a military strategy.

More formally, if for a particular military strategy there is a probability of victory, $P(V) = \upsilon$ where $0 \leq \upsilon \leq 1$, then the probability of the risk associated with a military strategy is the probability of not achieving victory,

$$\begin{aligned} P(V') &= 1 - P(V) \\ &= 1 - \upsilon. \end{aligned}$$

The risk associated with a military strategy will be more fully dealt with in section 6.1.2 of Chapter 3.

The notion that war is the continuance of diplomacy by military means could be interpreted to allow for any military strategic goal. Indeed, our biblical example would suggest it. Beaufre[37] also implies it when he states that the outcome desired is to force the enemy to accept the terms we wish to impose on him. He further implies that victory will be achieved only when, in this dialectic of wills, a decision is achieved when a certain psychological effect has been produced on the enemy: when he

[35] Sun Tzu, *op. cit*, p. 73.
[36] Von Clausewitz, *op. cit*, p. 91.
[37] Beaufre, A., *Introduction to Strategy*, London: Faber & Faber, 1965, p. 23.

becomes convinced that it is useless to start or alternatively to continue the struggle.

Liddel Hart[38] remarks that the object of war is a better state of peace – even if only from one's own point of view… That applies both to aggressor nations who seek expansion and to peaceful nations who only fight for self-preservation.

The notion that all of these references support is that a military strategy's ends are guided by grand strategy of national policy and it may take any form dictated by politics. In other words, a military strategy's ends are not restricted in its aspirations other than by an inability such as a lack of resources to achieve the objective.

This notion, although largely correct at the time of the writings of Clausewitz through to Beaufre and Liddel Hart, was not an absolute concept. During the Middle Ages up to the turn of the nineteenth century, combatants were imbued with ideals relating to chivalrous behaviour and gentlemanly deeds. This had somewhat of a restrictive impact on military strategy. Since the beginning of the twentieth century, international law started to evolve and play a more significant role in the definition of a military strategy's ends. Between the World Wars there was an attempt by the League of Nations to regulate the use of force in international relations. However, the attempt failed and the Second World War erupted on 1 September 1939. On 26 June 1945, the evolving of international law culminated in the Charter of the United Nations[39]. The further evolving of international law regarding the use of force was incorporated in the Charter by amending it on several occasions thereafter.

Today, Article 2 of the Charter prescribes certain behaviour by the member states. The following two prescripts are significant:

- Article 2.3. All members shall settle their international disputes by peaceful means in such a manner that international peace and security, and justice, are not endangered.

- Article 2.3. All members shall refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any state, or in any other manner inconsistent with the Purposes of the United Nations.

[38] Liddel Hart, B.H., *Strategy*, 2 ed., New York: Praeger, 1975, p. 351.
[39] *Peace Support Operations*, Joint Warfare Publication 3-50, Chief of Joint Operations, UK Government, Appendix 2.

The international community considers the Charter to be legitimate International Customary Law and, as a result, the prohibition on war delineated in the quoted article in the Charter is binding on all the member states because of their acceptance of the Charter when they joined the United Nations.

However, the principle of self-defence is also embodied in international law by Article 51 of the Charter that states as follows:

> Nothing in the present Charter shall impair the inherent right of individual or collective self-defence if an armed attack occurs against a member of the United Nations until the Security Council has taken measures necessary to maintain international peace and security.

Therefore, the status quo is that, except for self-defence, war is a crime against humanity and individuals that purport war may be regarded as war criminals.

The Charter also deals with the problem of how to deal with warring parties. Chapter VI deals with the pacific settlement of disputes that may result in peacekeeping operations by the member states. Chapter VII deals with action with respect to threats to the peace, breaches of the peace and acts of aggression. The provisions of this chapter may result in member states being required to conduct peace-enforcement operations.

To sum up, today nations

- have the right to engage in war only if it is in self-defence,
- may be required to participate in UN sanctioned operations to keep the peace (Chapter VI Operations), and
- may be required to participate in UN sanctioned operations to enforce the peace. (Chapter VII Operations).

Therefore, we conclude that a state's military strategy's ends as defined by classical strategic thought are severely curtailed by modern international law. Note that the effect on international law that may result from the US and UK going to war against Iraq during 2003 may still take some time to manifest. On the one hand, the US and UK leadership might simply be regarded as war criminals whilst on the other hand, the war might be instrumental in amending international law to make provision for other criteria that will allow nations to go to war. The impact lies somewhere in between.

In South Africa, the Constitution strengthens international law in that it prescribes under what conditions the internal law must be complied with within the South African context. The following exhaustive list of

provisions in South Africa's Constitution regarding international Law is given[40]:

- Every accused person has a right to a fair trial, which includes the right … not to be convicted for an act or omission that was not an offence under either national or international law at the time it was committed or omitted.

- Any legislation enacted in consequence of a declaration of a state of emergency may derogate from the Bill of Rights only to the extent that … the legislation … is consistent with the Republic's obligations under international law applicable to states of emergency.

- When interpreting the Bill of Rights, a court, tribunal or forum … must consider international law.

- National security must be pursued in compliance with the law, including international law.

- The security services must act, and must teach and require their members to act, in accordance with the Constitution and the law, including customary international law and international agreements binding on the Republic.

- The primary object of the defence force is to defend and protect the Republic, its territorial integrity and its people in accordance with the Constitution and the principles of international law regulating the use of force.

- When interpreting any legislation, every court must prefer any reasonable interpretation of the legislation that is consistent with international law over any alternative interpretation that is inconsistent with international law.

From the above list, it is clear that the intent of the Constitution is to bind South Africa into international law. Furthermore, the primary end of South Africa's military strategy is suggested by the provision that the primary object of the defence force is to defend and protect the Republic, its territorial integrity and its people in accordance with the Constitution and the principles of international law regulating the use of force. Furthermore, the military strategic ends are implied by the constitution when it is written that: Only the President, as head of the national executive, may authorise the employment of the defence force

(a) in co-operation with the police service,

[40] South Africa. *Constitution of the Republic of South Africa,* Act 108 of1996, (as amended). Pretoria: Government Printer.

(b) in defence of the Republic; or

(c) in fulfilment of an international obligation.

This passage does not exclude tasks such as Search and Rescue, combating oil pollution at sea, disaster relief or support to other state departments. However, it does not allow the defence force to act in pursuit of the stated military ends without political sanction.

4.2. MILITARY STRATEGIC WAYS – FURTHER INVESTIGATED

The military strategic ways link the military strategic means to the military strategic ends by defining how the military strategic means must be used to achieve the military strategic ends. Thus, for every particular military strategic end and set of military strategic means, there could exist one or more ways to achieve the said end. Now, if that is not true, then one can postulate that the resultant military strategy is not feasible. If it is true, then the chosen way will be precise and valid for that particular circumstance only.

It would be near impossible to investigate every permutation of the set of all the possible military strategic ends and the set of all the possible combinations of military strategic means. However, over the ages, the principles and approaches that may lead to the design of military strategic ways that should lead to feasible military strategies with an acceptable probability of being successful, have been documented.

4.2.1. Principles for the Design of Military Strategic Ways

Dunnigan[41] expounds the principles for the design of military strategic ways, commonly known as the Principles of War, as follows:

- Mass
- Unity of Command
- Maintenance of the Objective
- Economy of Force
- Flexibility
- Initiative
- Manoeuvre
- Security
- Surprise
- Simplicity

Mass or Concentration of Force. Victory goes normally to the side that amasses the most combat power on the battlefield. Liddel Hart[42] uses the

[41] Dunnigan, J.F., *How to Make War*, 3 ed., New York: William Morrow, c1993, pp. 16-18.

battle at Leuctra that took place in about 371 B.C. to expound this principle as follows: "Epaminondas placed not only his best men but the most of his left wing, and then, holding back his weak centre and right, developed a crushing superiority against one wing of the enemy – the wing where their leader stood, and thus the key to their will."

Unity of Command. The importance of a single commander directing the war effort cannot be overemphasised. Where various commanders act to achieve some end collectively, invariably there is often a waste of effort in duplication of effort and commanders that act for their own force's good, but against the collective good. Dunnigan[43] states that this principle is the most difficult to practise.

Maintenance of the Objective. A military strategic end must be chosen and it must remain until it is achieved. History has shown that the army that consistently pursues its original objective is likely to succeed. In the Arab-Israeli wars, the Israeli forces ruthlessly pursued their original goal, despite the temptations to surround and give battle to the Arab formations they bypassed. This led to the destruction of far larger Arab forces. On the other hand, during the Yom-Kippur war the Egyptian forces changed their plan after crossing the Suez Canal. Instead of digging in to receive Israel's counter attack, they launched further attacks of their own. This resulted in heavy losses for themselves and set the stage for a successful Israeli crossing of the canal.

Economy of Force. Economy of force dictates carefully parcelling out one's forces for each phase of the war. However, this does not mean that one will be using small forces. For key operations, one will often need massive forces and they are obtained by maintaining a large reserve. During the Second World War, the German Army maintained a reserve no matter how desperate the situation. According to Dunnigan, this habit may have prolonged the war by as much a year.

Flexibility. The commander's plan must be flexible. Whereas, during the Cold War, NATO's main response to any Warshaw pact aggression would have been a nuclear retaliation, in 1967, their Defence Planning Committee developed the concept of "flexible response" which implied a flexible and balanced range of appropriate responses that included conventional and nuclear options – depending on the level of the aggression or attack[44]. Flexibility is the principle that allows for many plans to achieve a particular objective and the judicious use of the appropriate one when the time comes.

Initiative. Getting there first with the most weaponry and taking advantage of the situation is termed initiative. Defeat is the likely outcome of the commander who waits for something to happen. Victory is

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[42] Liddel Hart, *op. cit.*, p 34.
[43] Dunnigan, *op. cit.*, p 16.
[44] Bayliss, *op. cit.*, p. 280.

the likely outcome of the commander who takes and maintains the initiative. In the words of Oliver Goldsmith in: *She Stoops to Conquer*, written in 1773: "The first blow is half the battle" or as Jomini observed in *Précis de l' Art de la Guerre*, written in 1838: "A general who stands motionless to receive his enemy, keeping strictly to the defensive, may fight ever so bravely, but he must give way when properly attacked"[45].

Manoeuvre. Successfully moving formations around in war is the pinnacle of military art and the usual precursor of victory. The manoeuvring of formations should be aimed at the concentration of force at the decisive moment of the war. Clausewitz[46] observes that … when the decisive stage of the battle has been reached … all forces must be used to achieve it and any idea of reserves … is an absurdity. To this end, manoeuvre is a prerequisite.

Security. Sun Tzu[47] learns that: "The enemy must not know where I intend to give battle. For if he does not know where I intend to give battle he must prepare in a great many places. And when he prepares in a great many places, those that I have to fight in any one place will be few". Thus the need for security is a principle prerequisite for victory.

Surprise. Clausewitz[48] suggests that surprise lies at the root of all operations without exception, though in widely varying degrees depending on the nature and circumstances of the operation. He goes on to say that the two factors that produce surprise are secrecy and speed. Thus, we may make the observation that the need for security is also inherent to surprise. Clausewitz further cautions that at the tactical end surprise is relatively easy to obtain but that it is not the case at the strategic end of the operation.

Simplicity. The fog of war will quickly lead the best plans astray. The more simple the plan, the easier it is to execute, especially under combat conditions when reliable information is scarce and communications with superiors difficult to maintain.

4.2.2. Approaches to the Design of Military Strategic Ways

Within Military Strategic Ways, there are a number of approaches that need to be explored, some of which may remind of the principles of war. Note that it is not possible to make a clear distinction between principles and approaches for the design of military strategic ways. The following approaches are worthy of mentioning:

- Ends – Means Relationship

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[45] *Dictionary of Military and Naval Quotations*, edited by Heinl, R.D., Annapolis, Maryland: Naval Institute, 1966, p. 158.
[46] Von Clausewitz, *op. cit.*, p. 211.
[47] Sun Tzu, *op. cit.*, p. 98.
[48] Von Clausewitz, *op. cit.*, p. 198.

- Defensive versus Offensive
- Direct versus Indirect Approach
- The Centre of Gravity
- Idealism versus Reality

Ends – Means Relationship. Adjust the end to the means[49]. Do not bite off more than you can chew. This holds well in the short term. In the longer term one might be able to adjust one's means to fit the ends. However, in order for a strategy to be feasible, the means, ways and ends must be, at the very least, in equilibrium.

Defensive versus Offensive. The two approaches, *viz*, to maintain a defensive posture or to maintain an offensive posture are seemingly in direct conflict. Handel[50] summarises Clausewitzian thinking by stating that as any attack continues to advance and succeed it also diminishes in strength … [and] with all other things being equal, the passage of time favours the defence and enervates the attack. On the other hand, Mahan[51] thought that the assumption of a simple defensive in war is ruin. War, once declared, must be waged offensively, aggressively. The enemy must not be fended off, but smitten down. One may then spare him every exaction, relinquish every gain; but, till down, he must be struck incessantly and remorselessly.

Direct versus Indirect Approach. The indirect approach is generally favoured over the direct approach. Sun Tzu[52] expounds why this is so when he says: "Generally in war the best policy is to take a state intact … For to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the acme of skill … Thus what is of supreme importance in war is to attack the enemy's strategy … Next best is to disrupt his alliances … The next best is to attack his army". Note that Handel[53] warns that too much emphasis on subtlety, the indirect approach … may encourage false hopes in 'miracle' solutions and cause neglect on physical material, and the more direct aspects of war. Beaufre[54] sees a relationship between the direct and the indirect approach. He argues that strategy can be reduced to a universal Einstein-type formula

$$S = KF\psi t \tag{1.1}$$

where K is any specific factor [constant] applicable to the case concerned, F stands for material force [direct approach], ψ for the psychological factor [indirect approach] and t for time. In direct strategy the

[49] Liddel Hart, *op. cit.*, p 348.
[50] Handel, *op. cit.*, p. 114.
[51] Till, G., *Maritime Strategy and the Nuclear Age*, 2 ed., New York: St. Martin's Press, 1984, p. 100.
[52] Sun Tzu, *op. cit.*, p. 77.
[53] Handel, *op. cit.*, p. 218.
[54] Beaufre, *op. cit.*, p 129.

predominant factor is *F* … [whilst] in indirect strategy … the dominant factor being ψ.

The Centre of Gravity. The preferred method of winning is normally considered by strategists to be the maximum concentration of force on the enemy's centre of gravity. Some argue that the centre of gravity is normally to be found at the operational level of war and they regard the enemy's army as the centre of gravity. Rommel[55], when faced with a potentially superior army being launched against him in Western Europe writes: "I therefore consider that an attempt must be made, using every possible expedient, to beat off the enemy landing on the coast and to fight the battle in the more or less strongly fortified coastal strip". On the other hand some argue that the centre of gravity is the enemy's will and the alliance system as proposed by Sun Tzu. Such a centre of gravity is clearly at the military strategic level.

Idealism versus Reality. Handel[56] summarises the ideal way of fighting a war to be the following:

- Winning without bloodshed or the use of force. Otherwise the minimum use of violence necessary.
- Once a war breaks out, it should be brought to an end as quickly as possible.
- Make rational decisions by knowing the enemy's strengths and weaknesses (good intelligence) as well as one's own strengths and weaknesses (introspection).
- Extensive use of deception as a force multiplier.
- Use the enemy's weaknesses and assets against him.

However, the following frequently modifies the ideal situation:

- The reciprocal nature of war.
- Greater recognition of the role of violence and force in war.
- No monopoly on the insights or principles of war.
- The opponent's use of deception and secrecy.
- Friction, uncertainty and chance.

[55] *Rommel Papers* [*The*], edited by Liddell Hart, B.H., London: Collins, 1953, p. 455.
[56] Handel, *op. cit.*, p. 214.

- Subjective perceptions are difficult or impossible to overcome.

Thus we have that in reality, the war's strategic ways are conducted as follows:

- Extensive use of force and violence cannot be avoided.
- Little force cannot achieve much.
- Wars are prolonged and indecisive.
- Intelligence is often unreliable.
- It is extremely difficult to properly perceive, measure or understand one's own weaknesses and strengths.

4.2.3. Legal Restrictions on the Design of Military Strategic Ways

The Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts (Geneva 1974 to 1977) was adopted on 8 June 1977. It is worth noting that, although there are some misgivings by various member states of the United Nations, because of the fact that the Protocols of 1977 were accepted by consensus and not put to a vote, a good part of the provisions in the various Protocols and notably in Protocol I is simply a codification of pre-existing rules of customary international law[57].

The Protocols of 1977 embody most of the applicable Law of Armed Conflict that appertains to the Design of Military Strategic Ways. The first Protocol deals with international armed conflicts whilst the second Protocols deals with non- international armed conflicts. Extracts that demonstrate the spirit of Protocol I are given below[58].

- In cases not covered by this Protocol or by other international agreements, civilians and combatants remain under the protection and authority of the principles of international law derived from established custom, from the principles of humanity and from the dictates of public conscience.
- Protocol I also applies to armed conflicts in which peoples are fighting against colonial domination and alien occupation and against racist régimes in the exercise of their right to self-determination, as enshrined in the Charter of the United

[57] Kalshoven, F., *Constraints on the Waging of War*, Geneva: International Committee of the Red Cross, 1991, p. 71.
[58] *Ibid*, pp. 71 – 155.

Nations and the Declaration on Principles of International Law concerning Friendly Relations and Co-operation amongst states in accordance with the Charter of the United Nations.

- The armed forces of a Party to the conflict consist of all organised armed forces, groups and units which are under a command responsible to the Party for the conduct of its subordinates … shall enforce compliance with the rules of international law applicable in armed conflict.

- … combatants are obliged to distinguish themselves form the civilian population …

- A member of the armed forces … gathers or attempts to gather information of military value … shall not be considered as engaging in espionage unless he does so through an act of false pretences …

- A person who takes part in hostilities and falls into the power of an adverse Party shall be presumed to be a prisoner of war, and therefore be protected by the Third Convention …

- In any armed conflict, the right of the Parties to the conflict to choose methods [ways] or means of warfare is not unlimited.

- It is prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering.

- It is prohibited to employ methods or means of warfare, which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment.

- It is prohibited to make use of the flags or military emblems … of adverse Parties while engaging in attacks or in order to shield, favour, protect or impede military operations.

- It is prohibited to order that there will be no survivors, to threaten an adversary therewith or to conduct hostilities on that basis.

- A person who is recognised or who, in the circumstances, should be recognised to be *hors de combat* shall not be made the object of attack.

- In order to ensure respect for and protection of the civilian populations and civilian objects, the Parties to the conflict shall at all times distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations against military objectives.

- In so far as objects are concerned, military objectives are limited to those objectives … [that] offer a definite military advantage.

- … it is prohibited to launch attacks against the civilian population as such.

- … prohibit … to commit any acts of hostility against historic monuments, works of art … to use such objects in support of the military effort … to make such objects the object of reprisals.

- Starvation of civilians as a method of warfare is prohibited.

- The wounded, sick and shipwrecked … in all circumstances they shall be treated humanely …

4.2.4. Conclusion

All of the principles of war, the approaches to the design of military strategic ways and the impositions of international law must be taken into account when the strategist designs the military strategic ways of his military strategy.

4.3. MILITARY STRATEGIC MEANS – FURTHER INVESTIGATED

4.3.1. Force Design

The military strategic means are normally referred to as the *force design*. The force design comprises the military's fighting instruments. In order to define the military strategic means more fully, we define the concepts of purposive and purposeful systems as follows:

- *Purposive systems* are systems that are built for a specific purpose but such systems cannot, in themselves, pursue goals or objectives. An example of a purposive system is a tank. A tank is built for manoeuvre and direct fire; however, in it self, it cannot manoeuvre or bring direct fire to bear.

- *Purposeful systems* are systems that can pursue goals or objectives. For example, once a tank has been fuelled, ammunitioned and manned, it can manoeuvre and bring

direct fire to bear. Thus, we observe that a purposeful system is build by integrating purposive systems.

Although the nation's hardware, or purposive systems, such as the number of tanks, ships and aircraft is often considered to be the nation's fighting instruments or strategic means, at the tactical level of war they must not be viewed as purposive systems but rather as purposeful systems.

The military normally groups its military strategic means in units. Thus, we have that tanks are normally organised in regiments, aircraft in squadrons whereas individual ships are normally regarded as individual units. Such units can also be regarded as the elements of the force design.

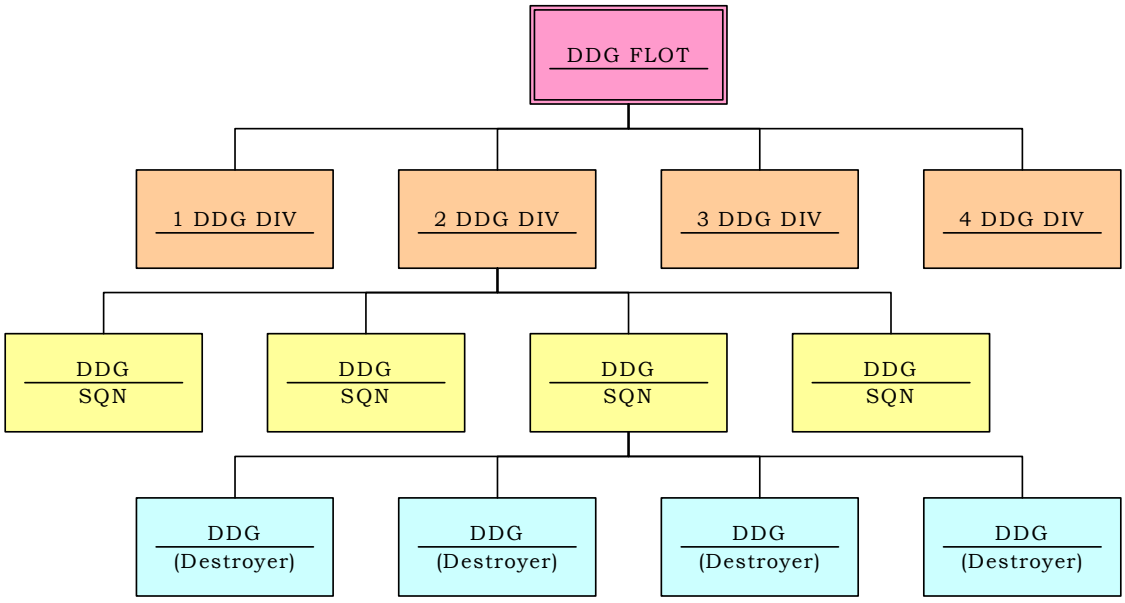

Figure 1.1: A Destroyer Flotilla made up from ships, squadrons and divisions.

In order for the force design to be organised for war, its elements are placed in a command and control structure. *Command and control* is the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. In this case, the word "mission" refers to the military strategic ways of a military strategy.

A command and control structure can be either type or task based. A type organisation normally comprises units of similar characteristics whilst a task organisation comprises units that work together to achieve a common military objective. The organisation chart in Figure 1.1 depicts a typical navy type organisation for guided missile destroyers whilst the organisation chart in Figure 1.2 depicts a typical joint task force organisation.

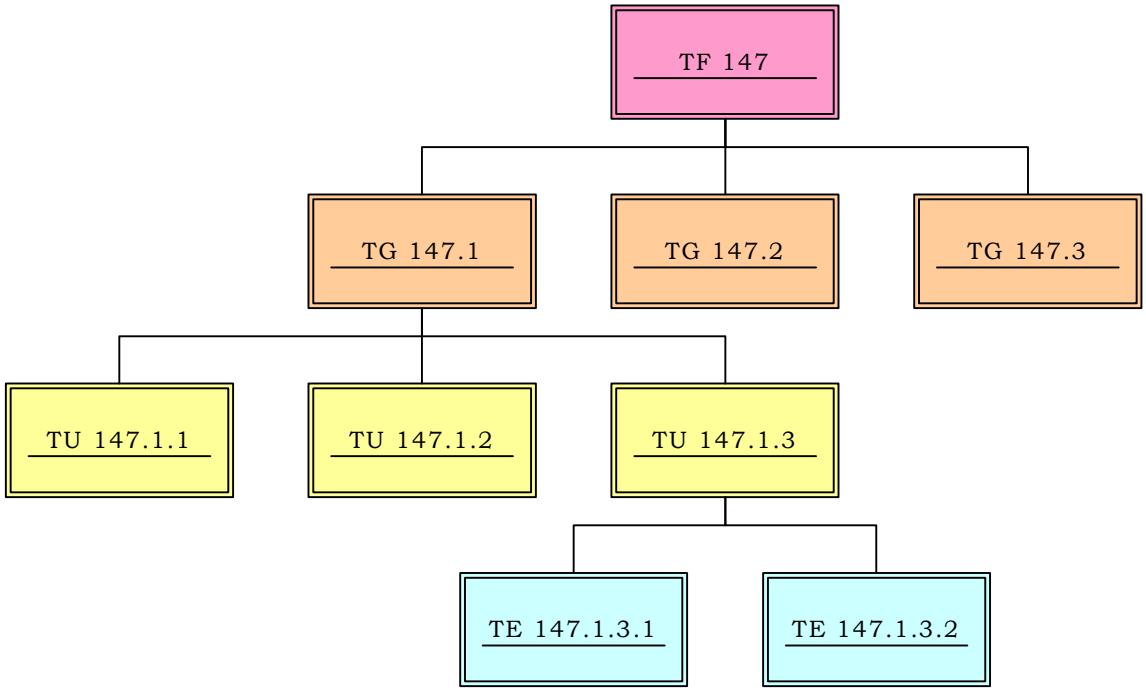

Figure 1.2: Task Force made up from task elements, units and groups.

4.3.2. Operating Systems

Capability[59] is the ability to execute a specified course of action. We extend this definition by defining *defence capability* as the ability allowed by the force structure to pursue specific courses of action. To illustrate this point, consider the force design element: advanced light fighter aircraft. Such an aircraft will give the commander the ability to intercept and destroy enemy aircraft and the ability to give ground support to the army. Thus, by having an advance light fighter aircraft the commander will have an air intercept capability as well as a ground support capability.

Moreover, we may regard defence capability as a link between strategic means and strategic ways in that defence capability provides for a grouping of force design elements that can be associated with a particular course of action. For example, the artillery, ships fitted with indirect weapon systems and fighter aircraft in the ground support role all allow for an indirect firepower capability. Therefore, if indirect firepower is necessary for a particular course of action, then any or all of the three force design elements may be used to that effect.

The military the world over has defined sets of defence capabilities to guide them in planning for operations, campaigns or wars. For example, the United States Army uses the concept of operating systems to describe

[59] *Department of Defense Dictionary of Military and Associated Terms. op cit.*, p. 84.

the various capabilities that the commander will require executing the required courses of action at the operational level[60]. The United States Army then distinguishes between the following six operating systems at the operational level of war:

- *Movement and Manoeuvre*. Operational movement and manoeuvre is the disposition of forces to create a decisive impact on the conduct of a campaign or major operation.

- *Fires*. Operational fires refer to a commander's application of non-lethal and lethal firepower to achieve a decisive impact on the conduct of a campaign or major operation.

- *Protection*. Operational protection conserves the fighting potential of a force so that it can be applied at the decisive time and place.

- *Command*. Operational Battle Command is the exercise of authority and direction by a commander to accomplish operational objectives.

- *Intelligence*. Operational Intelligence is that intelligence required for the planning and conduct of campaigns and major operations.

- *Logistics*. Operational logistics consists of logistical and other support activities required to support the force during campaigns and major operations within a theatre of operations.

Note that we have discussed a military strategy's means in terms of operating systems at the operational level of war. This must be so in order to link the force design that is stated as elements at the tactical level with a military strategy's ways that are stated as actions at the operational level of war.

4.3.3. Restrictions on the Use of Certain Weapons

Consider the Cold War. On the one side was the United States (USA) with its NATO allies and on the other was the Union of Socialist Soviet Republics (USSR) and the Warschau Pact. These alliances formed after the Second World War and from the start they both pursued strategies of arming themselves to react in case of a war.

For simplicity's sake, we shall refer to the two opposing camps as the USA and the USSR respectively. Also, for our argument, we assume that

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[60] *Decisive Force: The Army in Theater Operations*. FM 100-7, Washington: Department of the Army, 1995, p. 5-0.

the USA has a free enterprise national value that they wish to protect against the USSR's national value of communism and vice versa. Now, suppose the USA pursues a strategy of nuclear armament and the USSR does not. If war between the two sides ensues, then the USA, assuming that it will use nuclear arms in a war against the USSR, will win such a war. This would lead to greater protection for the USA's free enterprise model and the probable demise of communism in the USSR. In this case we assign an arbitrary payoff to the USA of 10 and an arbitrary payoff to the USSR of zero. By this we mean that the USA, by winning the war, gains most and the USSR, by losing the war, gains nothing.

Likewise, should the USSR pursue a strategy of nuclear armament and the USA does not, the USSR would win an ensuing war by using nuclear weapons whilst the USA would lose the war. In turn, this would result in the demise of the free enterprise model in the USA and the establishment of communism in the USA. This, in turn, would lead to a payoff assignment of 10 to the USSR and zero to the USA. Thus, the USSR gains by winning the war whilst the USA, by losing, gains nothing.

Now, if both sides decide on a strategy of nuclear armament and a war between them ensues, both sides stand to lose. Furthermore, we can assume a war of much higher intensity and as a result, both would lose substantially. Thus we assign an arbitrary payoff of –5 to both sides. Now, if both sides decide not to arm themselves with nuclear weapons and we assume that, as a result, a war does not occur, then neither side won outright. We assume that both countries were spared the ordeal of war, then we assign an arbitrary payoff of 5 to both.

If we assign the USA to be the row player with payoff matrix $M(x)$ and we assign the USSR to be the column player with payoff matrix $M(y)$, then we can represent the four situations in the bimatrix

$$M(x,y) = \begin{bmatrix} (5,5) & (0,10) \\ (10,0) & (-5,-5) \end{bmatrix} \tag{1.2}$$

Note that both players are obliged to have pure strategies in (1.2). It is a single move game where both players are able to decide on a strategy to arm themselves with nuclear weapons or not.

Furthermore, in any matrix $M(x,y)$, we say that for the row player, the ith row *dominates* the kth row if

$$x_{ij} \geq x_{kj} \text{ for all } j$$

and

$$x_{ij} > x_{kj} \text{ for at least one } j.$$

Likewise, for the column player, we say the *j*th column dominates the *l*th column if

$$y_{ij} \leq y_{il} \text{ for all } i$$

and

$$y_{ij} < y_{il} \text{ for at least one } i.$$

Now, it is easy to see that in (1.2) the second row dominates the first row for the row player and the second column dominates the first column for the column player. Therefore, the only equilibrium pair, (the bimatrix entry in any *M (x,y)* such that none of the two players have any positive reason for changing their strategy) in (1.2) is given by the second pure strategy for both players. This would result in a payoff of –5 to both players. However, should both players play the wrong strategy it would result in a much better payoff of 5 to both players.

Let us consider this apparent contradiction. If both players decide to *co-operate* and as a result, none of them arm themselves with nuclear weapons, both can achieve the better payoff of 5. However, should, for example, the USSR embark on the first pure strategy, the USA might double-cross him by playing his second pure strategy, that is, to arm himself with nuclear weapons, it would result in an outcome of zero to the USSR and the much better outcome of 10 to the USA. Thus, if both players agree to co-operate, they leave themselves open to a double-cross situation. In the absence of mutual trust, the game puts pressure on both players to become *non co-operative* in choosing their strategies.

This logic underlies the various treaties that seek to rid the international community with so-called weapons of mass destruction. Of note are the various treaties on the proliferation of nuclear, chemical and biological weapons.

Not only is the international community seeking to rid itself of weapons of mass destruction, it also, by means of the Weapon Convention of 1980[61], prohibits the

- use of any weapon the primary effect of which is to injure by fragments which in the human body escape detection by X-rays;
- mines, booby-traps and other devices; as well as
- incendiary weapons.

[61] Kalshoven, *op. cit.*, pp. 147 – 156.

5. RELATIONSHIPS BETWEEN A MILITARY STRATEGY'S ENDS, WAYS AND MEANS

Recall that we have defined a military strategy as follows:

> *Military Strategy* is a plan at the military strategic level of war that consists of a set of military strategic ends, ways and means and the relationships between them.

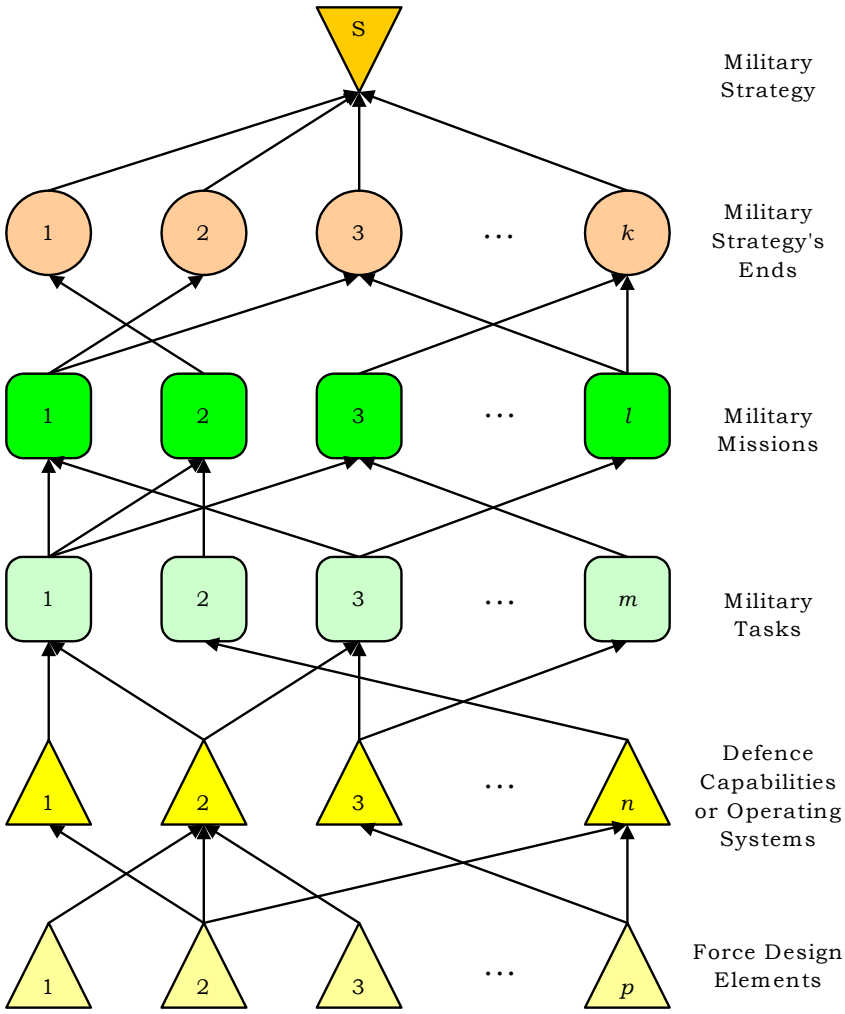

Figure 1.3: Relationships between a military strategy's Ends, Ways and Means

In order to build a requisite model of a military strategy, its components and the relationships between them, we define the following:

- A military strategy's *ends* are a set of objectives to be achieved by the strategy.
- A military strategy's *ways* are a set of military missions that should lead to the achievement of a military strategy's ends.

In turn, every military mission may consist of a set of military tasks.

- A military strategy's *means* comprises a set of defence capabilities that, in turn, is produced by a sub-set of the force design.

The relationships between a military strategy, its ends, ways and means, are depicted in Figure 1.3. Suppose we have k military strategic ends, l military missions, m military tasks, n defence capabilities and p force design elements, then a military strategy is fully described by the k military strategic ends and, in turn,

- every military strategic end is fully enabled by a set of military missions;
- every military mission is fully enabled by a set of military tasks;
- every military task is fully enabled by a set of defence capabilities; and
- every defence capability is fully enabled by a set of force design elements.

Furthermore, a many to one relationship exists between the military strategic ends and the remainder of a military strategy whilst many to many relationships exist between the other entities at different levels as depicted in Figure 1.3.

Also note that the arrows in Figure 1.3 indicates that a set of bottom-up relationships exists. In Chapter 2 we shall show that not only are there bottom-up relationships, but also, there are some top-down relationships inherent to Figure 1.3.

6. THESIS CONTEXT

6.1. BUSINESS STRATEGY VERSUS MILITARY STRATEGY

In general, the business community has a similar approach to strategy as the military. However, the languages that the two environments use, are distinctly different. In the business community, business strategy is, *inter alia*, referred to as a plan to achieve the objective or goals of the company by means of its processes and structure. If we read ways for processes and means for structure we note that this particular notion of business strategy coincides with our definition of military strategy.

The major difference between the business community and the military is that whilst the business community puts their strategies into action

immediately so as to achieve their goals, a military strategy is put into action only when it becomes necessary for the state's military instrument to be used to achieve the grand strategy. Thus, whether the business strategy is going to produce the required output is known at an early stage whereas whether military strategy is going to produce the required output is known only after war is declared.

The use of operations research methodologies to formulate business strategy and determine its probable outcome is well documented. For example, one such an important methodology is the use of Linear Programming to decide on a business strategy for producing a variety of products and to estimate the probable profit that will be derived from the particular product mix in advance[62]. Furthermore, business strategy is mostly aimed at optimising profit over a specified time period. Forecasting methods such as linear regression, ARIMA models *et cetera* can be used to forecast aspects such as expected profit, market share and stock price[63].

6.2. SHORTCOMINGS INHERENT IN MILITARY STRATEGY

In the case of the military, a military strategy is used as the plan for the military instrument to accomplish the grand strategy. Thus, we have that a military strategy is executed at some future time. No data or information about this "business" is known, as it will only start to generate data when war commences. Information about previous wars is to be handled with circumspection, as the next war invariably does not follow the patterns of a previous war. To that end, for example, the U.S. Army's Training and Doctrine Command has initiated the "Army After Next" project[64]. The project name says it all. The next war is going to be significantly different from the previous one.

In the mean time the military strategist must formulate a military strategy that is not only feasible, but also must have some acceptable probability of success. Once that is achieved, he must manage the military to ensure a military strategy remains feasible with the same probability of success.

6.3. ON DETERMINING FEASIBLE MILITARY STRATEGIES

Operations Researchers have focussed on establishing the degree to which the military ways and means will guarantee the attainment of the military strategic ends. Several distinct quantitative methodologies have been developed to aid them into answering this question, viz., static and dynamic analysis, simulation techniques and war gaming.

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[62] Chvátal, Vašek, *Linear Programming*, New York: W.H. Freeman, 1983, pp. 177-182.
[63] Makridakis, S., Wheelwright, S.C., McGee, V.E., *Forecasting: Methods and Applications*, 2 ed., New York: John Wiley, 1983, pp. 412-455.
[64] *Strategy and Force Planning*, *op. cit.*, p. 590.

6.3.1. Static Analysis

Static analysis, in its simplest form, compares threats on the basis of the number of weapons and personnel in the friendly and enemy forces. More advance models allow for a more realistic comparison by taking into account the quality of the weapons and personnel as well. Furthermore, some subjective methods based on the Delphi method have been developed that take into account a Weapons Effectiveness Index or Weapon Unit Value[65]. In this approach, weapon systems are classified into several categories. A list of important or dominant attributes of each category is made and assigned relative weights by various experts. The major components of each dominant attribute can also be identified and weighted. The various categories are then compared with each other to find the likelihood that one or the other side will be triumphant.

Another popular method of static analysis is the Potential Anti-potential Method[66]. The force potential, P_F, of own forces is given by

$$P_F = \sum_{i=1}^{n} N_i S_i \tag{1.3}$$

where there are n types of weapons, N_i weapons of the ith type and each weapon of type i has firepower S_i. Note that firepower is normally expressed as a score. Now, the potential associated with own forces is compared with the anti-potential, P_A, of enemy forces in order to deduce something about the likelihood of the strategy being successful. Note that P_A is derived by an equation similar to (1.3).

Other methods include Operational Lethality Indices and the Situationally Modified Strength Method. Both these methods are similar to the methods resulting in (1.3)[67].

Given our definition of military strategy, we note that these models take into account only the strategic means to decide whether the strategic ends will be met. Thus, although these models provide significant insight into the problem, they fail to address the strategic ways in any way. For example, these models do not consider the impact of strategic surprise on the outcome of the campaign or war.

6.3.2. Dynamic Analysis

Dynamic analysis uses force strength or potential in a simulated scenario to obtain casualties suffered or terrain gained. These models include methodologies such as the Quantitative Judgement Method of Assessment, Situational Force Scoring and the Adaptive Dynamic

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[65] Jaiswal, N.K., *Military Operations Research*, Boston, Ma: Kluwer c1997, p. 313.
[66] *Ibid*, pp. 315–328.
[67] *Ibid*.

Model[68]. The Quantitative Judgement Method of Assessment is based on three comparisons. The first comparison compares the combat power potentials, P_f or combat power potential for friendly forces and the combat power potentials, P_e or combat power potential for enemy forces. The comparison is made by finding the ratio

$$r = \frac{P_f}{P_e}. \tag{1.4}$$

The following decision rules are proposed:

- If $r > 1.1$, then the friendly forces should win.
- If $r < 0.9$, then the enemy forces should win.
- If $0.9 \leq r \leq 1.1$ then the outcome is inconclusive (unpredictable).

The second comparison is made by means of the result model. The result criterion, R_f or R_e for own forces and enemy forces are based on historical evidence regarding

- the extent to which each side has accomplished its assigned or perceived mission,
- effectiveness in holding or gaining ground in terms of kilometres gained or withdrawn per day during an engagement, and
- casualty effectiveness based on the number of casualties inflicted on the opposing force.

Now, R_f and R_e are scaled so that if $-0.5 \leq R_f - R_e \leq 0.5$, then the engagement is inconclusive, else, the side with the larger R is deemed to be successful.

The third comparison is between the calculated values of the Ps and the Rs. If $r > 1$, then $R_f - R_e > 0$ and if $r < 1$, then $R_f - R_e < 0$. Under these conditions, the two first comparisons can be regarded as being consistent. If not, Dupuy claims that one can be certain that the inconsistency is due to some exceptional combat phenomenon. For example, the weaker force uses surprise as a force multiplier.

The Situational Force Scoring methodology differs from the Quantitative Judgement Method of Assessment in that it is more detailed and takes into account several more aspects of combat such as capability of the forces, frontage, density, battle intensity and time for preparation of the

[68] Dupuy, T.N., *Numbers, Predictions and War*, Rev. Ed., Fairfax, Va: HERO Books, 1985, pp. 55-56.

battle[69]. As a result, it is also more data intensive. Jaiswal proposes that the analyst can choose to use either of the two methods depending on the availability of data and understanding of the combat dynamics to evaluate the outcome of a battle.

The Adaptive Dynamic Model is based on the Lancaster equations as modified by Epstein[70]. The process comprises the following six steps:

- Define the battle scenario including mobilisation plans and initial deployments.
- Calculate the Force Strengths of both the forces considering the weapons authorised using any of the static methodologies.
- Specify the input parameters to be used as well as the thresholds for battle termination.
- For each scenario, calculate the day-to-day force strength losses and surviving force strengths for both sides.
- Evaluate thresholds for withdrawal and battle termination.
- Compare surviving force strength with thresholds to evaluate the outcome.

The dynamic analysis methods attempt to take into account, not only the strategic means, but to some degree, also the strategic ways. However, these models become so complex that it is difficult to model at the campaign or war level. In the main, they have been used to predict the outcome of battles. Although it might be feasible to extend these models to the campaign or war level, it has not yet been done successfully.

6.3.3. Simulation

With the advent of modern computer technology, the use of simulation to decide on whether a particular set of military strategic ways and means guarantee the attainment of the military strategic ends has become feasible. Hoover and Perry[71] define *simulation* as the process of designing a mathematical or logical model of a real system and then conducting computer-based experiments with the model to describe, explain and predict the behaviour of the real system.

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[69] Jaiswal, N.K., *op. cit.*, p. 341.
[70] Epstein, J.M., *Conventional Force Reductions – A Dynamic Assessment*, Washington DC: The Brookings Institution, 1990.
[71] Hoover, S.V. and Perry, R.F., *Simulation – A Problem-solving Approach*. Reading, Ma: Addison-Wesley, 1989, p. 5.

Simulation of the lower order systems such as the use of weaponry at the tactical level can be abstracted to the next higher level or operational level of war[72]. Likewise, the simulation of systems at the operational war can be abstracted as modules of the simulation at the strategic level of war. For example, a model for combating oncoming missiles for a ship at the tactical level, together with the models for propulsion, power generation, navigation, sensors, own gunnery and missiles may be abstracted at the operational level in a single unit with its own outputs. Now, the model for a single ship might be simulated together with models of other ships to enable abstraction as a task force at the operational level of war. Abstraction is thus the key to simulation at the higher levels of war.

The strength of simulation as a technique to decide on whether a particular set of military strategic ways and means guarantee the attainment of the military strategic ends, has been demonstrated adequately in the military. The weakness of simulation as a tool lies in the fact that it will not find optimal strategies for the strategist. It will merely quantify how well a strategy designed by the strategist could work under given assumptions. Thus, it will quantify how changes in the input parameters affect output measures of performance[73]. The choice of values for the input parameters to ensure optimal measures of performance remains the task of the model builder.

6.3.4. War Games

It is purported that war gaming can be used to decide on whether a particular set of military strategic ways and means guarantee the attainment of the military strategic ends. The reasoning is that, by playing a war game, the players make similar decisions to that which the various commanders will be required to make and playing the war game serves as confirmation that their military strategy is feasible.

In the narrow Game Theory sense, the playing of a war game complete with the set of decisions made by the player can be considered a strategy. In a multi-stage game such as a war game, the number of pure strategies available to the player becomes extremely large. The definition of a pure strategy in Game Theory is that it is a function defined on the collection of a particular player's information sets, assigning to each information set a number between 1 and k where k is the number of choices at the given information set. Therefore, if a player has N information sets and k choices at each one, he has k^N the pure strategies to choose from[74].

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[72] Bell, D., Morrey, I. and Pugh, J., *Software Engineering – A Programming Approach*, London: Prentice Hall, 1987, p. 20.
[73] Law, A.M. and Kelton, W.D., *Simulation Modeling & Analysis*. 2 ed., New York: McGraw-Hill, 1991, p. 689.
[74] Owen, G., *op. cit.*, p. 90.

Thus, by playing one war game, only one instance of the k^N payoffs are quantified. Furthermore, this one instance is a biased experiment in that the decisions at the various decision points associated with the various information sets are made in order to optimise the outcome. In order to find an estimator for the value of all the strategies, that is the value of a military strategy, a large number of experiments based on random choice at the various decision points should be made.

We conclude that the use of war games to quantify whether a particular set of military strategic ways and means guarantee the attainment of the military strategic ends should be approached with circumspection.

6.4. PREPARING FOR WAR

In preparing for war, not only must a feasible military strategy that guarantees some measure of success exist, but also the force design must be maintained at the necessary level of combat readiness to ensure the feasibility of the associated military strategy.

The methodologies discussed under the previous heading can, to some degree, be used to decide whether a particular military strategy is feasible and to what degree it might be considered to guarantee some measure of success. However, the inputs to these models would, as a matter of course, assume that the force design is, to an acceptable standard or norm, combat ready. Therefore, in order for the strategy to remain feasible, we must keep the force design combat ready.

In real life, the various elements of the force design are normally at different levels of combat readiness; the decision-makers need to know to what extent this force design is effective in allowing for a military strategy to be executed. In managing the combat readiness of the force design elements, it might, due to financial or other constraints, be necessary to address problems regarding combat readiness in a certain sequence. The manager needs to prioritise work on the force design elements so as to optimise the force design's inherent capability to allow for the execution of a military strategy. Presently, a coherent framework of information that might aid the manager in his task does not exist.

6.5. THESIS RATIONALE

The given definition of military strategy contains all the elements necessary to develop a management information system that will enable fact-based decision-making in the military strategic environment. Such an undertaking will lead to new applications being developed to support the manager in executing his function and as a result, to the broadening of the knowledge appertaining to the subject of Operations Research.

Furthermore, as a military strategy embodies the *raison d'être* for a defence force, it is necessary to gauge whatever the military does to

prepare for war against the military strategy. In conclusion of this argument; an approach that allows for quantified facts to be considered in managing the *preparing for war* strategy against the degree to which the *war proper* or military strategy would be achieved would enable superior decision-making.

Therefore, the aim of this thesis is to expound the findings of the research conducted by the author in order to develop a model or framework that allows for quantified facts to be considered in executing the *preparing for war* strategy in order to enable the *war proper* or military strategy.

6.6. RESEARCH QUESTIONS

Bearing the thesis aim in mind and after having carefully considered the antecedent definition of, and discourse on, military strategy, the following research questions about the quantification of certain aspects of military strategy are posed:

1. How can the extent of the many-to-many relationships that exist between a military strategy, its ends, ways and means be quantified?

2. If the relationships between a military strategy, its ends, ways and means are quantified and if the effectiveness of the force design elements is known, how shall that enable the quantification of the state's ability to execute its military strategy?

3. If the relationships between a military strategy, its ends, ways and means are quantified and if the effectiveness of the force design elements is known, how will it aid decision-making about the acquisition of the future force design?

The three research questions are aimed at aiding the research on the quantification of a decision-making model that allows for quantified facts to be considered in managing the preparing for war strategy so as to ensure a high probability that a military strategy proper is feasible.

6.7. PRESENTATION OF RESEARCH RESULTS

The thesis will address the decision-making model in the following manner:

- The first research question will be dealt with in Chapter 2, the second research question in Chapter 3 and the third research question in Chapter 4.

- Chapter 5 will deal with the requirement for quantified facts to be considered in managing the preparing for war strategy with a military strategy proper as the decision-making benchmark, the validity of the proposed model or framework and the necessity for further research.

- In Chapter 6, we shall describe how the model might be integrated into the decision-making processes within the military environment.