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### Conceptualising the Measure for Combat Readiness

Kwong Fook Wen <sup>a,\*</sup>, Norazman Mohamad Nor<sup>a</sup>

<sup>a</sup> Universiti Pertahanan Nasional Malaysia, Kem Sungai Besi, 57000, Kuala Lumpur, Malaysia

\*Corresponding author: [fwkwong2000@yahoo.com](mailto:fwkwong2000@yahoo.com)

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**ABSTRACT:** *Mathematical models and formulae for measuring combat readiness are mostly concerned with measuring either the tangible elements or the intangible elements. The absence of the measure of intangible elements in the model that measures the tangible elements of combat power and vice versa, could not provide a comprehensive status of combat readiness. This paper focuses on the conceptualisation of a measure of combat readiness by identification of tangible and intangible factors and variables that affect combat readiness. First, the paper seeks to define combat readiness and its compositions. Then it reviews the literature on measuring combat readiness so as to determine options available to conceptualise the measure of combat readiness. Consequently, the paper offers an approach for the conceptualisation of a measure for combat readiness that incorporates the tangible and intangible elements of combat power. This would allow a military force to have a comprehensive measure of its combat readiness.*

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### 1. Introduction

The general trend seen in mathematical models and formulae for measuring combat readiness are mostly concerned with measuring either the tangible elements or the intangible elements. Consequently, there is a lack in research for a model that measure combat readiness encompassing both the tangible and intangible elements. The absence of the measure of intangible elements in the model that measures the tangible elements of combat power, and *vice versa*, could not provide a comprehensive status of combat readiness. Therefore, there is a need to conceptualise an approach to measure combat readiness that incorporates the tangible elements with the intangible elements by focusing on how best to utilise the knowledge and information of the current practice in measuring the combat readiness of military forces.

The purpose of this paper is to conceptualise a measure for combat readiness by identifying tangible and intangible elements of combat power that affect combat readiness. First, the conceptualisation of the measure of combat readiness is done by defining some key terms related to combat readiness and understanding the components of combat readiness. Then, literature on measuring combat readiness is reviewed to determine options available for conceptualising the measure of combat readiness. Finally, the paper offers an approach for the conceptualisation of a measure for combat readiness that incorporates the tangible and intangible elements of combat power.

## 2. Key Terms Related To Combat Readiness

Combat readiness is a subset of national power. Thus, an inverted triangle approach as advocated by Creswell (2014) is used to describe the key terms that are related to combat readiness. "National power" that lies at the base of the inverted triangle is defined first before providing explanations of "combat readiness" at the apex of the triangle. A clear understanding of these key terms that depict how combat readiness is related to national power is important for the conceptualisation of the measure for combat readiness.

### National Power

There are many elements of national power used by different countries such as demographic factors, in particular, the size of population; geographic factors, in particular, the size, geo-strategic location and terrain; natural resource base; physical infrastructure; level of industrial and commercial development, including international trade and investment; educational, scientific and technical capacity; societal cohesion and culture; political leadership and international relations; and military capabilities. Morgenthau (1978) and Paret (1989) pointed out that the conceptions of national power include military preparedness as a component of national power. The military force as coercive arms is seen to be the eventual measure of power because military capabilities enable countries to act against internal and external threats. At the same time it allows them to pursue their national interests in accordance with their priority based on competing needs. Amongst the many elements of national power, an effective military capability is a crucial element of national power as it provides the other factors such as geography, natural resources and industrial capacity; the actual importance for the power of a nation (Morgenthau, 1978). In this context, a country could determine its national power contributed by military capabilities by measuring the status of its combat readiness. As military capabilities are used as the yardstick of national power, the conceptualisation of a measure for combat readiness is pertinent.

### Combat Power

Combat and combat power are two terms that must be conceptualised and operationalised for the measure of combat readiness. The word "combat" came from a 16<sup>th</sup> Century French word *combattre*, originally indicating a fight between two people or parties. This word is originated from Latin word *combattere*; from the word *com* that denotes 'together with' and the word *battere* which is the variant of Latin *batuere* 'to fight'. The Collins English Dictionary (2013) describes combat as "an action fought between two military forces". While combat is defined in the Macmillan Dictionary (2013) as "fighting during a war". On the other hand, the Cambridge Dictionary (2012) defines combat as "a fight, during a war". Thus, combat relates to fighting during the application of combat power against an opponent.

The United States Department of Defense (2010) defines combat power as the total means of destructive and/or disruptive force which a military unit/formation can apply against the opponent at a given time. Combat Power is also defined in the Dictionary of Military Science by Shafritz, Shafirtz and Robertson (1989, p.93) as "the total means of destructive or disruptive force that a military unit or formation can apply against an opponent at a given time". The U.S. Department of Army, on the other hand, views combat power as comprising four elements: manoeuvre, firepower, protection and leadership. In this regard, armed forces generate combat power by converting potential into effective action. Thus, the components and elements of combat power form the domains to conceptualise and operationalise the measure of combat readiness.

### Fighting Power

Combat power and fighting power have often been used interchangeably. Countries often relate fighting power as the ability to fight and win wars. Both the Australian Army and Malaysian Army use the same components to describe fighting power. Fighting power is drawn from three inter-related components i.e. intellectual, moral and physical components. Figure 1 below shows the inter-relationship of the three components. Intellectual component represents the knowledge to fight, moral component is for the will to fight while the physical component embodies the means to fight. The intellectual and moral components

characterise the intangible human dimension of war fighting. While the physical component is represented by the tangible elements of the battlefield operating systems.



Figure 1 - The Australian Army's Fighting Power  
Source: *The Fundamental of Land Warfare, LWD1, 2008*

In the fighting power model above, the physical components of fighting power are the means to fight in the battlefield operating systems. The means to fight come from the Army's capability elements such as manoeuvre, fire support, information operations, intelligence, surveillance and reconnaissance, mobility, air defence, command and control, and combat service support. These capability elements influence the battlefield operating systems (BOS) contributing to the overall fighting power. It is the effect and outcomes of the BOS in the operation/war that depicts the characteristics of a particular army. This capability elements of an army could be measured using a mathematical model that provides a score depicting the combat readiness of that army. However, the intellectual and morale components of the fighting power model in Figure 1 above must also be taken into consideration for a more comprehensive measurement of combat power.

### The Elements of Combat Power

Paret (1989) in his research entitled "measuring national power in the post-industrial age" highlighted that the true basis of national power requires detailed measures of tangible military assets and the intangible elements. He pointed out that a country must possess an effective military power which is the ultimate element fundamental to international politics. He elaborated in his reports that the tangible elements comprised of force inventories and logistics capabilities while the intangible elements included readiness, training, doctrine, experience, leadership and integrative skill. He went on to explain that tangible elements alone will not determine a country's national power as seen in the collapse of Soviet Union and Iraq who were ranked as relatively significant powers by most aggregate indicators of capability but failed during the conduct of their wars. Military history has also shown that relying on tangible element such as the number of troops is a misleading determinant of combat power. Knorr (1970) highlighted that the qualitative conditions of combat power could be derived from factors and conditions that are non-economic and non-technological such as morale and skill. Thus, combat power is said to hinge not only on the tangible elements such as combat support elements for logistics and maintenance but the intangible elements such as leadership, training and military tradition that could change the measure of combat power. Thus, both the tangible and intangible elements of combat power possessed by a military force are needed to conceptualise a measure for its combat readiness.

Intangible elements of combat power involve the qualitative aspect of the military forces. As pointed out by Buzan (1983), the Israeli Defence Forces had demonstrated in several battles that the total number of weapons does not determine the outcomes but the qualitative differences in the forces deployed will. The importance of intangible elements for military forces especially that concerning human factor is also appropriately reflected in General George C. Marshall statements below:

"True, physical weapons are indispensable, but in the final analysis, it is the human spirit, the spiritual balance... that wins the victory. It is not enough to fight... It is the spirit we bring to the fight that decides the issue. The Soldier's heart, the Soldier's spirit, the Soldier's soul are everything. Unless the Soldier's soul sustains him, he cannot be relied on and will fail himself, his commander, and his country in the end".

In more recent studies on intangible elements, Britt, Castrol and Adler (2006) pointed out that morale is “a soldier’s level of motivation, commitment, and enthusiasm for accomplishing unit mission objective under stressful conditions”. They considered morale as an individual attribute within the unit. It usually consists of many components such as commitment to the unit’s identity, common purpose, enthusiasm, confidence, and persistence within a military framework. It is described as an intangible and dynamic characteristic which reinforces confidence in oneself, equipment, the unit, and the unit’s leadership. Importantly, morale involves self-sacrifice at many levels to accomplish mission based on an innate belief in unit cohesiveness and purpose of the mission.

Most armed forces place great emphasis on the intangible elements that contribute towards its combat readiness. Quality of life and morale are among the dimensions that must be imbued into a military organisation to achieve their targeted objectives and combat readiness. Military organisation can enhance its human spirit by inculcating individual and unit morale, *esprit de corps* and cohesion in order to persevere against superior enemy to attain victory. Thus, the measure of combat readiness has to take these aspects of the intangible elements into consideration when conceptualising the mathematical model that could provide a comprehensive measure of combat readiness.

### **Combat Readiness**

The importance of readiness was aptly pointed out by Sun Tzu when he said it is a doctrine of war not to assume the enemy will not come, but rather to rely on one’s readiness to meet him (Griffith, 1971). Likewise, the need of readiness was also emphasised by Clausewitz (1874) when he mentioned that the term ‘art of war’ or ‘science of war’ are related to the “pattern and preparation and the mode of using arms, construction of fortifications and entrenchments, organism of an army and the mechanism of its movements, ... the end and aim of them all was the establishment of an armed force fit for use in war”. These older definitions of readiness do not differ much from the contemporary definitions. Readiness in accordance with the definition of Betts (1995) refers to the state of operational status of the assets ready for use at its optimal or designed parameters. The usage of assets implies the immediate capacity for combat of the force that exist and not the capability of the desired size and types of force. Similarly, the United States Department of Defence (2010) defined readiness as “the ability of United States military forces to fight and meet the demand of national military strategy”. Russia places equal emphasis on the maintenance of combat readiness as reported in the Interfax [Russia and CIS Military Daily (Moscow) on 4 February 2011] that the increase in officer’s numbers will raise the army’s combat readiness.

In the context of most armed forces, combat readiness determines the availability of the force elements for application of combat power and fighting power. Most doctrines refers readiness as the time frame to mount a given operations (Malaysian Armed Forces, 2011). The armed forces maintain a given level of readiness at all time that is ascertained by the evaluations of the response needed for national defence contingencies and the reaction time needed. Different force elements in an armed force have different readiness requirements. Similar to definitions used by some other armed forces and armies, the Malaysian Army (2011, p.xii) defines combat readiness as “A condition of the Army and its constituent units and formations, weapon systems or other military technology and equipment to perform during combat military operation, or functions consistent with the purpose for which they are organised or designed, or the managing of resources and training in preparation for combat”. Based on the definitions of combat readiness above, clearly, the measuring of combat readiness has to take into account both the tangible and intangible factors. It indicates the need to conceptualise a comprehensive measure of combat readiness for a military force.

### **3. Literature on The Measure of Combat Readiness**

Literature has indicated that military forces in the world share the same concern of the need to gauge its combat readiness. However, different defence forces measure combat readiness differently. For example, the United States Department of Army Field Manual (FM) 100-11 (n.d) pointed out that measuring of readiness involve many tangible and intangible factors. Some of these factors are quantifiable while others are subjective. The tangible elements for force readiness factors that can be objectively measured are the status of personnel and the status of equipment. While the subjective determination are the factors of morale, cohesion and quality of leadership. The same manual highlighted that force readiness management at all force levels must focus on properly structured, manned, equipped, trained, deployed,

sustained and funded organisation. Hence, this Field Manual is in tandem with other literature that depict measuring readiness as an arduous task that involve both the tangible and intangible elements.

Moore, Stockfish, Golberg, Hydrod and Hildebrandt (1991) undertook a project to determine an integrated assessment framework that could be used in enhancing the measurement of the United States' military readiness and sustainability. The aim of the project was to improve the current methods and integrate the methods into an assessment tool. The project team considered readiness and sustainability as two of the main pillars of military capabilities of the United States Armed Forces. Discussions conducted by the project team with the U.S. Department of Defence, the congressional staff and research community came up with a consensus that suggested readiness and sustainability assessment methods should comprise of eight characteristics:

- It should reflect what forces and units do and not just what they have.
- It should be practical i.e. inexpensive, undisruptive and understandable.
- Assessment method should be objective and verifiable instead of being subjective.
- It should be able to reveal the readiness posture in unpredictable conditions.
- It should provide beneficial feedback.
- Comparisons of status from one period to another should be computable from the assessment tool.
- The measures should be applicable for peace and wartime.
- It should allow evaluations of tradeoffs between the resources contributing towards the combat readiness and sustainability.

All in all, the project team recommended four approaches to the Department of Defence as assessment method. First, to measure unit readiness by stipulating performance measurement scales and standards. Second, to assess force readiness by using performance-based and time-oriented representation of unit readiness. Third, to use all information available on resources in the assessment. Lastly, to systematically develop an integrated framework for assessment that either link existing analytical methods and data and design or build an "ideal" system unimpeded by current methods. The characteristics and suggested options of the above project provided a basis to conceptualise a measure of the combat readiness for both the tangible and intangible elements.

In the body of literature, morale stands out amongst the intangible elements that affect the combat readiness. Gal (1986) pointed out that Lewis Guttman's research in the Israeli Army in 1949 produced examples of one of the earliest unit morale survey. Subsequently, this morale related research developed into research on combat readiness when the Israeli Defence Force became more involved in combat actions. Gal (1986) used a set of questionnaires known as Combat Readiness Morale Questionnaire (CRMQ) to determine personal and unit level morale for troops. The sample of the population used in the questionnaire survey involved 1,200 Israeli Defence Forces troops that were about to be deployed to Lebanon in 1981 for a contingent operation. The key results obtained from factor analysis identified two items that were very much related with personal and perceived morale; First, on perceived unit togetherness and second, on relationships with commander. Additionally, the factor analysis of 30 items in the questionnaires indicated eighth factors that caused 52% of the variance for his sample. The eight factors were: confidence in senior commanders; confidence in one's self, team and weapons; unit cohesion and morale; familiarity with mission and frontage; confidence in immediate commanders; enemy evaluation; the legitimacy of the war and, finally, worries and concerns. In his studies, Gal (1986) concluded that morale and unit climate are the two higher-order factors as predictor to combat readiness. Hence, the factors being considered in this survey and the CRMQ used could be used as an instrument to conceptualise a measure for combat readiness.

Similar to the finding of the studies above, the tangible elements could be incorporated with the intangible elements in conceptualisation of a measure for combat readiness. The domains and sub-domains of previous studies and research could also be used in formulating questionnaires for data collection and analyses. The distinctive steps used to construct questionnaire may be applicable for the conceptualisation of a measuring instrument of combat readiness in the military force. The steps that could be used as advocated by Bester and Stanz (2003) are, first, conceptualise the term combat readiness. Second, define comprehensively the domain of combat readiness within the context of the Malaysian Army. Third, identify the sub-domain of combat readiness from the literature and a study of

existing questionnaires on combat readiness. Fourth, identify behavioural indicators of sub-domains so as to operationalise the abstract construct of combat readiness and to link the theoretical concept with empirical variables. Fifth, minimise the effect of acquiescence and differential skewness during the construction of item format.

Needless to say it is difficult to measure combat readiness and military capabilities. The measures of a few military capabilities are unlikely to represent the key factors for assessing combat readiness because available and operable assets do not depict readiness for combat that involve deployment for fighting. A case in point, military history has shown that numerically the Israel Force was inferior to its opponent. Nevertheless, the smaller Israeli Force was able to defeat larger opponents during the Middle-East wars in the 1960s and 1970s. Similarly, numerically the People’s Liberation Army is the largest military in the world. However, it is doubtful whether it has the ability to deploy its power beyond its border.

#### 4. Conceptualising the Measure of Combat Readiness

Based on the understanding of the component of combat readiness as well as the outcomes of previous research and studies, conceptualising the measure of combat readiness that encompasses both the tangible and intangible elements has to start with the creation of an appropriate literature map to ascertain the gap of information and knowledge available. A proposed literature map for the combat readiness literature review is as shown in Figure 2 below:

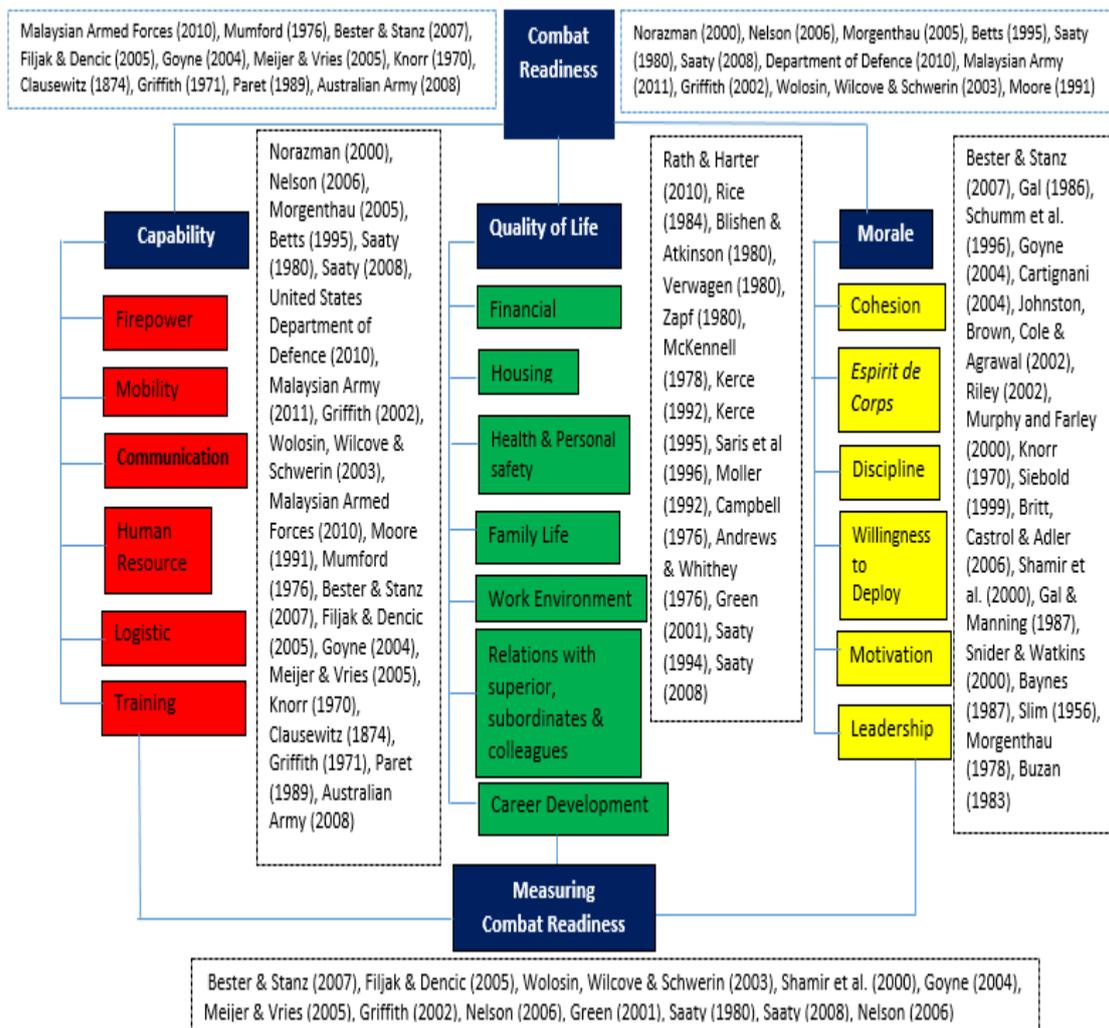


Figure 2 - Literature map of measuring combat readiness

Since combat readiness does not only involve the possession of equipment, logistics, training and capability but also encompasses intangible elements and states of mind of the soldiers; hence, combat readiness can be conceptualised in terms of consisting two interdependent dimensions i.e. the tangible and intangible elements. Details of these elements and variables could be obtained from the research and studies done previously. Table 1 below provides a list of some of the research and studies done on these elements and variables:

Table 1 - Variables and authors of literature review

<b>Variables</b>	<b>Authors</b>
Combat Readiness	Norazman (2000), Nelson (2006), Morgenthau (2005), Betts (1995), Saaty (1980), Saaty (2008), United States Department of Defence (2010), Malaysian Army (2011), Griffith (2002), Wolosin, Wilcove & Schwerin (2003), Malaysian Armed Forces (2010), Moore (1991), Mumford (1976), Bester and Stanz (2007), Filjak and Dencic (2005), Goyne (2004), Meijer and Vries (2005), Knorr (1970), Clausewitz (1874), Griffith (1971), Paret (1989), Australian Army (2008).
Capability	Andrews and Shambo (1980), Norazman (2000), Shafritz et al. (1989), Luman (2000), Voith (2001), Zanella (2012), Australian Army (2008), Malaysian Army (2010), United States Army (2008), Malaysian Army (2011), Malaysian Armed Forces (2010).
Morale	Bester and Stanz (2007), Gal (1986), Schumm et al. (1996), Goyne (2004), Cartignani (2004), Johnston, Brown, Cole & Agrawal (2002), Riley (2002), Murphy and Farley (2000), Knorr (1970), Siebold (1999), Britt, Castrol and Adler (2006), Shamir et al. (2000), Gal and Manning (1987), Snider and Watkins (2000), Baynes (1987), Slim (1956), Morgenthau (1978), Buzan (1983).
Quality of Life	Rath and Harter (2010), Rice (1984), Blishen and Atkinson (1980), Verwagen (1980), Zapf (1980), McKennell (1978), Kerce (1992), Kerce (1995), Saris et al. (1996), Moller (1992), Campbell (1976), Andrews and Withey (1976), Green (2001), Saaty (1994), Saaty (2008).

The descriptions of the tangible and intangible elements that form the independent variables for measuring combat readiness could then be itemised for the questionnaires to obtain data for analysis. Table 2 below provides the descriptions of the variables and constructs involved.

Table 2 - Descriptions of variables and constructs for combat readiness.

<b>Domain</b>	<b>Sub-domain</b>	<b>Description</b>
Capability	Human resource	The number of individuals who make up the workforce of an organisation.
	Firepower	The amount of power which may be delivered by a position, units or weapons.
	Mobility	A quantity or capability of military forces which permits them to move from place to place while retaining the ability to fulfil their primary function.

Domain	Sub-domain	Description
	Communication	The total number of equipment for transmission of information of any kind from one person or place to another.
	Logistics	The availability of logistics support (ammunition, fuel, food, spare parts) for maintenance of forces.
	Training	The frequency of instruction of personnel to enhance their capacity to perform specific military functions and tasks as well as the exercise of one or more military units conducted to enhance their combat readiness.
Morale	Cohesion	The person-to-person bonding within the primary groups of soldiers in a particular unit.
	Willingness to deploy	A soldier's willingness or motivation to participate in military operations.
	Confidence in leadership	The degree to which subordinates have confidence and trusts in their leaders.
	<i>Espirit de corps</i>	The feeling of pride that goes along with the sense of belonging, fellowship and loyalty between comrades, units, formations and Corps in times of peace and war. The bonding between soldiers and their secondary groups beyond their primary group bonding that relates the soldiers to the institutions of the unit.
	Discipline	A controlled behaviour to obey orders as issued by a legitimate authority. The degree to which soldiers comply with military rules and regulations.
	Motivation	Motivation for combat can be understood as "the impulse that compels the soldier to face the enemy on the battlefield" or "the determination that induces soldiers to fight, in spite of the adversities and the inherent dangers of war".
Quality of Life	Work	Safe and conducive working environment that result in high work satisfaction.
	Neighbourhood and Shelter	High quality and standard housing facilities and infrastructure, encompassing the necessary maintenance services.
	Education	The systematic instruction of individuals in subjects that will enhance their knowledge of the science and art of war. Provide access to tertiary education.
	Community	The interaction between military installations and their surrounding or nearby civilian communities. The provision of community facilities in bases that are of quality and standard.
	Health	High quality and readily available medical and health services to needy servicemen.

Domain	Sub-domain	Description
	Spiritual	“Spiritual fitness” is about core values, beliefs, and the source of one’s meaning in life. Provide psychological and counselling services.
	Family and friends	Family unity and support from friends.

The data obtained should then be keyed into the proposed model for the measurement of combat readiness shown in Figure 3 below. The formulation concept for the model for measuring combat readiness should encompass the measure of capability reflecting its assets and resources, the morale reflecting the human dimension of operations and quality of life reflecting the soldiers’ state of satisfaction in life. The proposed mathematical model considers combat readiness as a function of capability, morale and quality of life as reflected in the equation below:

$$\text{Combat Readiness} = f(\text{Capability}, \text{Morale}, \text{Quality of life})$$

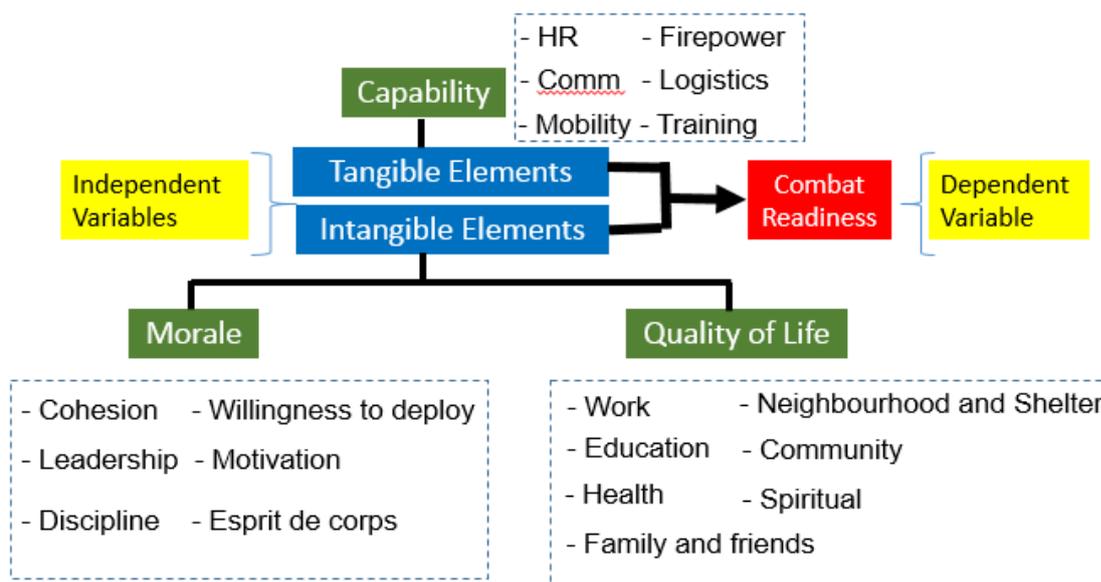


Figure 3 - Model for Measuring Combat Readiness

The proposed conceptual framework is an integrated model depicting a linear relationship between the dependent variable (combat readiness) and independent variables (capability, morale and quality of life). Therefore, a multiple regression analysis could be used to establish the relationship between the dependent variable and the independent variables. This analysis would provide the degree of accuracy of variation achieved by the regression equation using the mathematical equation stated above. The multiple regression would also indicate how significant the independent variables are in explaining the dependent variables. It would also establish which independent variable is able to contribute the most and least to combat readiness. Last but not least, it would determine how much of the total variance in the dependent variable (combat readiness) is explained by a particular independent variable.

#### 4. Conclusion

There are many measures of combat readiness adopted by different military forces in the world. Significant research and studies on measuring combat readiness have been conducted by many military forces that involve different variables, domains and factors in their measures. There was no standard measure used by military forces from different countries that hinge on different criteria; some on tangible military capabilities, while others focus on measuring the intangible elements of combat power. It is difficult to compare and measure the combat power and combat readiness of military forces from different countries due to conceptual and statistical difficulties. This difficulty is compounded by the fact that the evaluation of non-quantitative factors, such as morale, depends on judgments and information

that is often unclear and ambiguous. Thus, there is a need to conceptualise the structure of combat readiness and identify appropriate indicators that have to be measured.

The reviewed mathematical models and constructs indicated that the tangible factors are simpler to be measured based on available assets and serviceability or availability of the assets. However, measuring the intangible elements of combat power poses huge challenges as the measures are subjective to the assessor. Making it more difficult is the selection of appropriate intangible factors, domains and sub-domains that contribute towards combat readiness. The outcomes of the literature review indicated a viable approach to identify suitable independent variables, involving the following steps: conceptualising combat readiness, define comprehensively the domains of combat readiness, identify the sub-domains and a study of existing research on combat readiness and identify behavioural indicators of sub-domains so as to operationalise the abstract construct of combat readiness and to link the theoretical concept with empirical variables. From the numerous research and studies done to measure combat readiness, the intangible factors could be generally grouped under two main dimensions, namely, morale and quality of life in order to provide a more comprehensive determination of its combat readiness. The mathematical model is conceptualised as an integrated model of a linear relationship between dependent variable (combat readiness) and independent variables (capability, motivation and quality of life). The relationships of these variables could be determined using multiple regression analysis.

In conclusion, the conceptualisation of a measure for combat readiness should provide solutions to address the following questions: First, what are the intangible elements that are relevant to measure combat readiness? Second, how to formulate a mathematical model that incorporate intangible elements with the existing tangible model? Third, what is the relationship between the determined intangible elements with combat readiness? Fourth, how to formulate the correlation between the tangible and intangible elements to combat readiness? Finally, the conceptualisation of the measure for combat readiness should answer the hypothesis that tangible and intangible elements have a direct relationship with combat readiness in a military force.

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