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CHAPTER-III

CONCEPTUAL FRAMEWORK OF SKILL INVENTORY

3.0 Introduction

Conceptual Framework that outlines the basic design of research and how various underlying concepts were studied, interfaced and applied in the research are covered in this chapter. It lays down the theoretical framework from the perspective of research problem and new knowledge intended. It also amplifies certain military concepts that are essential for understanding the context of the research.

Having outlined the Schema, Abstract Design and the Theoretical Framework, certain key terms used in this research are explained. The chapter also details few basic operational concepts, their relevance in the context of military HRM, need of Skill Inventory and the interplay of three fundamental concepts, namely; Human Resource Accounting, Competency Modeling and Human Resource Information System.

3.1 Abstract Design

As the research is centric about skill based HR Management in Armed Forces, the underlying theories of HR Management remain fundamental. In addition, all standing orders, policies, procedures, regulations, etc of Armed Forces, that set the environment parameters were studied. The related, similar and contributing theories, have also been given due considerations. The conceptual framework of research has been broadly organized as described below.
The basic concepts involved are from HR Management theories and Practices. All Rules and Regulations of Armed Forces along with their guiding principles were considered as such without any modifications. Competency Based HR Management (CB HRM), Human Resource Accounting (HRA) and Human Resource Information Systems (HRIS), are other three fundamental pillars on which the research is based. At the core, there are two fundamental concepts, namely the Skill and the Competency. Both are highly interlinked and differ only in their manifestations. An abstraction of the same is shown in Figure 3.1, that is self explanatory.

**Figure 3.1**

**Skill Competency Interplay**

All concepts, practices and guidelines related to Military Operations formed the underlying concepts and dictated the perspectives and outcome of research. It may be noted that all governing principles evolved for
commercial organisations cannot be applied as such in military environment.

For example, effectiveness is more important than efficiency in certain military operations. Cost considerations are often overlooked for reliability and redundancy requirements.

The new concept or knowledge endeavored are in two folds, as under:-

- Skill Centric Deployment for Logistic Elements of a Tank Squadron during Mobile Operations.
- Evolving a template for military equipment sustainers for Skill Centric Deployment.

3.2 Schema

The schema of conceptual framework is pictorially depicted in Figure 3.2. As can be seen, the conceptual framework stems from the theoretical framework. Literature review under the theoretical framework helped gaining requisite insight about the present status of research area. The requirement analysis and the future scenario that is likely to unfold, in comparison with current status helped identifying the gaps, which could further help refining research questions.

Development of gap bridging strategy warranted development of necessary metrics and references followed by generalization and templating processes.

The strategy so developed was then applied on a battle field sliver with maximum dynamics. A minimum operable brick of a Tank unit being a Tank Squadron, was therefore processed in gap bridging model. Impact
analysis was carried out through a focus interview and experts review. The refined model was then generalized to concretise the findings. Each aspect of the conceptual framework is explained in succeeding paragraphs.

**Figure 3.2**

**Conceptual Framework of Research**
3.3 Theoretical Framework

The theoretical framework of the research is explained through its basis, assumptions and likely testing of theories.

3.3.1 Theoretical Basis

Military Power is one of the vital components of a Nation’s Power. The Military Power is measured by the reach, effectiveness and preparedness of the Standing Armed Forces Unit. Modern Warfare is more centric about Weapons, Systems and Underlying Technologies. Therefore, the effectiveness and preparedness of an Army is critically dependent on its equipment availability.

The equipment availability in turn depends on Reliability of the equipment (which ensures that it does not fail during stipulated life) and Quick Recycling (of an equipment, should it go faulty for any reason including enemy actions).

While reliability is more of a design and manufacture dependent, the recycling is planned and executed by logistic echelons supporting the fighting forces.

Improved effectiveness of logistic elements therefore will increase the availability of the equipment in the hands of fighting forces. This, in turn enhances the effectiveness and preparedness of Standing Armed Forces Unit.
3.3.2 Assumptions

During the research, the following are assumed in the context of military units, operations and conditions.

- All resources other than manpower are adequately available.
- Human dynamics are not treated for their manifestation effects.
- In cases of multi-skill situations, a maximum of only three skills were considered.

3.3.3 Theories to be Tested

Being an exploratory research that needed to be studied non-intrusively, following theories were to be tested:-

- **Skill based Deployment in Armed Forces.** The efforts in the past and present regarding skill based HR Management in Indian Army. The viability of a skill based deployment in select echelons for a quantifiable element(s).

- **Measure of Effectiveness.** The ability to measure the combat engineering support effectiveness in a non-intrusive manner. The information collected but had security implications were not disclosed.

- **Metrics for Skills specific to Logistic Echelons.** The concept of evolving metrics for Skill Inventory which may eventually be graduated to cover the complete range of HR Management functions in the Army. It also has the scope of extending itself to complement the Knowledge Management initiatives.
3.4 Key Definitions

It is essential to define and explain few key terms used in this report and their inter se differences for easy assimilation.

3.4.1 Competency

The word Competency has many definitions as under:-

- A mixture of knowledge, skills, abilities, motivation, beliefs, values and interests (Fleishman, Wetrogen, Uhlman, & Marshall-Mies, 1995)\(^1\)

- A knowledge, skill, ability, or characteristic associated with high performance on a job (Mirabile, 1997)\(^2\).

- A combination of motives, traits, self-concepts, attitudes or values, content knowledge or cognitive behaviour skills; any individual characteristic that can be reliably measured or counted and that can be shown to differentiate superior from average performers (Spencer, McClelland, & Spencer, 1994)\(^3\).

- A written description of measurable work habits and personal skill used to achieve work objectives (Green, 1999)\(^4\).

- Definition by Ethan Sanders’ (2001)\(^5\) is more closer to our context. He defines Competencies as areas of knowledge or skill that are critical for producing key outputs in an Organisation.
• McClelland (1973)\textsuperscript{6} categorizes competencies in two types, namely; Organisational Competencies and Individual Competencies. Individual competencies are further classified as \textit{Differentiating Competencies} and \textit{Essential / Threshold Competencies}. Differentiating Competencies distinguish a superior worker from normal worker within the same context. Essential Competencies are those minimum competencies required for executing a job. Essential Competencies are what is known as \textit{skills} in our context.

• Competency can be seen as \textit{Potential Skill} whereas Skill can be seen as \textit{Manifestation of Knowledge}.

3.4.2 \textbf{Skill}\textsuperscript{7}

Skill too has many loose definitions that are outlined as under. All these definitions mean more or less the same:-

• Proficiency, facility, or dexterity that is acquired or developed through training or experience.\textsuperscript{8}
• The ability, coming from one’s knowledge, practice, aptitude, etc., to do something well.\textsuperscript{9}
• An ability and capacity acquired through deliberate, systematic and sustained effort, to smoothly and adaptively carry out complex activities or job functions involving ideas (cognitive skills), things (technical skills), and/or people (interpersonal skills).\textsuperscript{10}
• A skill is the learned capacity to carry out pre-determined results.\textsuperscript{11}
• A learned ability to bring about the result you want, with maximum certainty and efficiency.\textsuperscript{12}
• Skill in our context can be defined as the outcome of applied knowledge and experience. Skill dictates the accuracy and speed of application of knowledge to a task. Not all knowledge can translate into skills, but knowledge provides the basis for skill development.

  *E.g., a Supervisor may have both education and experience in overhaul of an equipment, but when it comes to employing them effectively in the repair line, his skill level can still be low.*

• Although the terms Skills and Competencies, are used virtually interchangeably they do have subtle differences. In our context, these differences are not significant and hence ignored.

3.4.3 Inventory

Inventory too has many standard definitions. In our context, it can be defined as a “database or information list of tangible goods/property, or intangible attributes/qualities”. It is also considered as an asset that is owned by a business that has the express purpose of being sold to a customer (anyone in the supply chain). It includes raw material, work in process and finished goods and services.

3.4.4 Skill Inventory

Skill Inventory (SI) may be defined as a comprehensive infobase of an organization’s workforce focusing on, among other aspects, employee’s skills, abilities, knowledge, work preference and other relevant job specific information. These essentially indicate the value of the employee to the organisation and thereby its human capital assessment.
SI can also be defined as the Infobase of complete skill sets possessed by each individual for their skill based deployment in consonance with equipment centric and role specific operational requirement.

SI is a Human Resource Accounting (HRA) tool that aims at creating an information database of skill sets, everyone in an organization owns and uses for effective and efficient HR deployment.

This research primarily explores the SI concepts and their applicability in modern battle fields in logistic echelons.

Skill Inventories, may thus be defined as a comprehensive database of information of the company’s workforce focusing on, among other aspects, employee’s skills, abilities, knowledge, work preference, etc. These essentially indicate the value of the employee to the company.

3.4.5 Military Logistics

It can be defined as the discipline of planning and carrying out the movement and maintenance of military forces. It deals with design, development, acquisition, storage, distribution, maintenance, evacuation and disposition of Equipment, Material, Personnel, Facilities and allied Services.

3.4.6 Logistics

USAF Dictionary for Military Terms defines Logistics as the Planning and executing the movement and support of forces. RAND Corporation of USAF defines logistics as the transfer of personnel and
materiel from one location to another, as well as the maintenance of that materiel that is essential for a military to be able to support an ongoing deployment or respond effectively to emergent threats.

3.4.7 Combat Power\textsuperscript{17}

It can be defined as Power of a Nation State, derived of its military instruments. It can be measured as Absolute Combat Power based on its ability to protect the interests of a nation as well as its ability to attack and degrade other nations. It can also be measured as relative power, often known as Combat (Power) Potential. As Peter Paret (1989)\textsuperscript{18} summarized it, “military power expresses and implements the power of the state in variety of ways within and beyond the state borders, and is also one of the instruments with which political power is originally created and made permanent.”

3.4.8 Maneuver warfare\textsuperscript{19} or Mobile warfare\textsuperscript{20}

Maneuver warfare or Mobile warfare, is the term used by military theorists for a concept of warfare that advocates attempting to defeat the enemy by incapacitating their decision-making through shock and disruption.

3.4.9 Operational Tempo\textsuperscript{21}

Also known as Operations Tempo or OpTempo, it is a measure of the pace of operation(s) in terms of equipment usage, like aircraft "flying hours," ship "steaming days" or "tank driving miles." The op tempo increases with the intensity and number of operations.
3.4.10 Job Fit

Pamella Holloway (2010) in her web article on *The Right Person for the Job*, defines the Job fit as the degree to which a person’s cognitive abilities, interests and personal dynamics fit those required by the job.

3.4.11 Latent Skills and Demonstrated Skills

Latent skills, as compared to the demonstrated skills, are generally dormant and exhibit only when atmosphere conducive occurs. Good organisations do keep track of such rare occurrences and also monitor the latent skills persistent among employees.

3.5 Human Resource Management in Armed Forces

Correct and Prompt decisions about people always and invariably translate into improved organizational performance. It protects and extends a company’s competitive edge. Definition of “Human Resource Management” (HRM) by Lt Gen John Leymone (2010) has been accepted by the Army leadership. Over the time, it has also been integrated into policies and doctrines formerly. It is used to describe the functions of “Personnel Management” and “Personnel Administration.” Military HRM is a complex, dynamic and multifaceted process, with many interacting subsystems, that interact in variety of ways with all other systems. It plays a vital role in overall Army Transformation Initiatives (ATI) and should accordingly keep pace with it. It is a major change management route and should be properly supported. Implementing agency should have prompt, relevant and accurate information to base their operational decisions. The processes are designed to structure, acquire,
train, educate, distribute, sustain, professionally develop, deploy and separate soldiers, in a continuous manner, in support of all current and future Army endeavors.

US Armed Forces are possibly the first one to propagate competency based HR management practices. The doctrine of Military HRM is propagated in Army Regulation 600-8(2010)\textsuperscript{25} that gives the guidelines for planning and directing HR functions for home station support, mobilization operations and deployed support.

### 3.5.1 Management of Enlisted Personnel

The HR management of Enlisted Personnel(2014)\textsuperscript{26}, primarily focuses on four essential aspects as under:-

- Provides a centralized promotion selection process in peace time for promotion to various ranks (sergeant first class and above);
- Provides a semi-centralized promotion selection process in peacetime for promotion to sergeant and staff sergeant;
- Authorizes commanders to advance soldiers to specialists and below; and
- Retains Army wide equity during hostilities as long as the supporting systems (for example, the centralized and semi-centralized processes) are practical and affordable.

### 3.5.2 Strength Management

Strength management(2014)\textsuperscript{27} is another major HR activity in Armed Forces that aims at the following:-
• Assesses an organization’s combat power and plans for future operations and assigns replacements on the battlefield;

• Predicts the need and provides a mixture of individuals and small units, as replacements, to sustain the combat power on the battlefield; and

• Includes the technique and the decision process used to allocate replacements to the fighting force, and to assess the combat capabilities of units from an HR perspective.

The ibid findings in our context can translate as “Providing an optimum mix of tradesmen with right skill balance in fighting forces”. The US Army Regulation FM 1-0(2007)\(^{28}\) has also spelt out following Enduring Principles for Military HRM:-

- Integration
- Anticipation
- Responsiveness
- Synchronization
- Timeliness
- Accuracy

General Dennis Reimer(2010)\(^{29}\) claims that HR support aims at placing a competency-based performance-oriented strategy for higher quality, more diverse, comprehensive and effective HR systems and agile
policies. It focuses on the HR management based on Core competencies which are essential and enduring capabilities that translate into major work requirements involving one or more key HR functions. Job requirements in terms of competency are derived through HR functions. For example, the Man – Job fit is a consolidation of the key functions of personnel readiness management, personnel accountability, strength reporting, retention operations, and personnel information management.

US Army started the Military Occupational Specialty Classification (MOSC) system for recruitment, training and deployment of its soldiers around Second World War. It was refined twice in 1965 and 1983. The detailed instructions for the same have been published in US AF Army Pamphlet 611-21(2014). British Army on the contrary has stuck to its job based or role based approach and tried to build in the competency requirement thereto. Indian Army has an HR model that can be more closely identified with the job based role based model of British Army.

However, in all the cases discussed above, competency based classifications are limited to only major roles / technologies and have not as yet penetrated till equipment deployment.

In other Armies too, competency or skills are not as yet considered as a major factor for deployment. Indian Army has adopted the British model of role based deployment with some changes to meet the requirement of various theatres of operations. Since Armies are huge and complex organizations, it is prudent to restrict the analysis to manageable segments with adequate complexities that are dealing with equipment maintenance.
Corps of Electronics and Mechanical Engineers (EME)\textsuperscript{31}, is possibly one of the largest and critical logistic support agency for any Army. It provides integrated engineering support to the entire spectrum of war fighting machineries, support elements and administrative systems. All weapons, vehicles, tanks, telecommunication systems, radars and every other conceivable equipment of the Army, are maintained by EME, right from induction till discard i.e. from 'womb to tomb'.

Warfare involves employment of a host of modern and sophisticated equipment and EME plays a major role in ensuring the Army's operational preparedness status and combat effectiveness to win any war at any time.

Every Army in the world has a Corps of EME or equivalent that takes care of the important logistic function of maintaining Army’s Equipment. They ensure the operational fitness of the entire range of Army equipment and also spearhead the management of technology transition for advancing the force modernization programme. If combat arms are the teeth of the Army then EME has a vital function of keeping them sharp\textsuperscript{32}.

HR Management of Technicians and Technical Support personnel are broadly based on their roles like Tank Mechanic, Electrician, Machinists, etc. Their skill levels are assumed to be proportionate to their service length and exposure to equipment. The deployment of these personnel is based on their suitability determined from their posting profile and equipment training. If there are ten vacancies of Tank Mechanics in place A, any Tank Mechanic who is not serving in that sector can be a potential candidate to fill these vacancies.
3.6 Concept of Logistics in Army

Logistics is the art of managing the supply chain of various resources from its point of origin to point of consumption. It involves high degree of coordination of information and physical movement of resources.

In Military Logistics, the importance of troops / echelons (*Echelons are the terms used for Military Hierarchical Levels*) start from battle field and continue rear wards. Accordingly, the priority of resource ranges from ammunition, weapons, vehicles, food, water, etc.

Supply chain of these resources should be maintained at maximum velocity, security and accuracy. Military Logistics ensure that all required resources are always made available to the troops at various levels (echelons).

World over, the logistic echelons of Armed Forces are divided into following heads:-

- Medical Services.
- Equipment Maintenance.
- Supply of Arms, Ammunition, etc.
- Supply of Food, Fuel, etc.

In addition, there are many less known but equally important logistic agencies like Animal Transport, Pioneers, Border Roads, Military Police, etc exist.
3.7 Skill Inventory (SI) Concepts in Army

SI, in its simplest form, is a list of names, characteristics and skills of people working in an organisation. It provided a way to acquire these data and makes them available where needed in an efficient manner. (The term SI is not as yet widely popular but few have attempted to define and model the SI for HR related applications).

A typical definition of SI can be “Listing of abilities, qualities, capacities, etc to be used for internal recruitment / promotion/ employment”.

In our context SI can be treated Inventory of Skills in an organization. It is a qualitative tool for military HRM for an efficient and effective deployment of human resource. It also acts as an internal tool for HRA to assess the value /potential of the organisation that can be harnessed / worked upon towards strategic goals.

SI may be defined as a comprehensive information base of the organisations work force focusing on their knowledge, experience, attitude, capabilities, capacity and preferences with respect to the job and its context.

HR is the vital resource for Armed Forces. Today the effectiveness of any Army is defined by the array of its military systems (weapons and equipment). Availability of systems are based on their Survivability (ability to withstand enemy actions), Reliability (minimum or no failure) and Quick Recycling of equipment ( if at all, they go defective ). Each
system has seamless merger of multiple technologies. Maintenance of these systems therefore warrants multiple skills that can be either in the form of many technicians or technicians with many skills or combination of both.

Current battle field deployment of technicians is thus a major challenge and a complex process. It does not consider the skills perspective and all technicians are considered as interchangeable commodities. Consequently, a novice technician with a front line force can typically cripple the fighting efficiency of supported unit. On the other hand, deployment of two high skilled technicians together at a same location, can also lead to wastage of critical resource.

The problem is much more compounded in mobile operations, where the logistic teams are supposed to be with minimum number of personnel with maximum and comprehensive skill sets and redundancy.

Skill Based deployment during mobile operations thus has potential positive spin offs and will pay rich dividends when implemented systematically. It will also cut down the training cost, give visibility to skill pattern of the organisation and enable a focused recruitment and promotion strategy.

3.8 Operational Imperatives

As explained earlier, for any standing Army, its combat readiness is of utmost importance, at all times. Combat readiness in turn depends on equipment availability and reliability. Logistic teams whose primary job is to ensure high equipment availability with due reliability are thus vital.
Further, the effectiveness of these logistic teams depends on the facets described below.

3.8.1 Optimum Number of Support Points

More the number of support points, more intimate and specialized support would be possible. However, the resource requirement will be more. Further, larger the distance or extent of deployment, more will be the number of support points required. Thus, it is essential to keep minimum number of support points with maximum extent of intimate combat engineering support.

3.8.2 Small Logistic Foot Print

Larger the logistic elements size / numbers, slower will be overall movement of the formation. Further, the visibility and vulnerability of the forces will also be high. Therefore it will always be endeavored that the logistic foot print remains as small as possible.

3.8.3 More Equipment with Multiple Technologies

Modern battle fields have vast number of equipment arrays. Each of them, contains a wide range of technologies. Each technology (or set of technologies) demands specialization in terms of manpower, process equipment, tools and spares. Thus more the equipment implies, more the number of technicians. However, the endeavor will be for minimum number of technicians, offering maximum extent and effectiveness of combat engineering support.
3.8.4 Vast Terrain

Terrain also plays a vital role in deciding the number of support points. While deserts increase distances, mountains make it a challenge for easy movement. In either case, number of support points will increase.

3.8.5 Need for Flexibility

As explained earlier, for the formation to be flexible, its logistical tail should be shorter / minimum or in other words, number of personnel in logistic elements should be as low as possible.

If ibid deployment considerations ought to be suitably dovetailed with the changing technological scenario, it is imperative that the very approach of military HR management needs a paradigm shift. To make such deployments comprehensively effective and efficient, skill based deployment is proposed.

Spin offs expected from application of such contemporary HR concepts in military HR management is a vital need. Further, in battlefields, effectiveness is for more important than efficiency. In either cases stated above, SI remains relevant and potent.

3.9 Military HRM in Logistic Echelons

It is essential to understand the basic frame work of Armed Forces operations and their underlying considerations. Although it is impossible to cover all the aspects of warfare in the report, it is essential to highlight few critical aspects that are given in succeeding paragraphs.
A tank brigade along with its constituent elements is shown at Figure 3.3. The integral and attached logistic elements for maintenance are as shown. There will be a Light Repair Detachment (LRD), Field Repair Detachment (FRD) and a Armoured Recovery Vehicle (ARV) teams.

**Figure 3.3**

Organizational Structure of a Tank Brigade

![Organizational Structure of a Tank Brigade](http://www.wargamesillustrated.net/)

Each Tank Squadron (10 to 16 Tanks) will have one LRD, One FRD and One ARV team in support of its operation all the time. Typically the mobile operations are prosecuted in Armed Forces through their Tanks and Infantry Combat Vehicle (ICV) battalions. This research focuses on Tank Battalions in Mobile Operations. A Tank Battalion and its constituent elements (of British Royal Army) is shown in Figure 3.4.
As can be seen from the organisational tree, the basic building block of a tank formation is its squadron, from the perspective of logistic support. The repair process during battle field is pictorially depicted in Figure 3.4. The Light Aid Detachment (LAD)\textsuperscript{36}, is one of the forward repair echelons providing maintenance cover to a tank unit. Typically a Tank Division covers a terrain of 24000 square kilometres with approx 22,000 personnel. It portrays around 500 to 600 Tanks and ICVs. General William W. Hartzog (1998)\textsuperscript{37} indicates the above statistics and also emphasises the importance of synergy and high degree of coordination in
the battlefields in 21st Century. He also emphasises the need for focussed and distributed logistics.

3.9.1 Operational Requirement

The requirement preset for any operations are termed as Operational Requirement. They are further prioritised based on the degree of inherent flexibility required in operations. The tactical requirements are interwoven within technological possibilities and the technical requirements of logistic elements. These requirements are often conflicting and are decided right in the beginning based on mission priorities.

Mobile Operations are typically characterised by Speed and Flexibility. The fighting elements should be able to manoeuvre and out-manoeuvre the enemy forces in time and space. The fighting elements and supporting elements will therefore necessarily have to be light, self contained and be capable of independent operations for prolonged durations. In other words, each and every element in mobile operations ought to be \textit{unavoidably essential and critical}, For the same reason, they also should have adequate redundancies despite of inherent penalties like weight, space, volume, cost, complexity, etc.

In view, following requirements are considered essential for any mobile operation:-

- \textbf{Thin Logistics Tail.} Minimum number of logistic personnel along with fighting units.
- \textbf{Minimal Logistic Foot Print.} Minimum size of equipment carried to support main fighting force.
- **Quick Recycling.** Ability to recycle the casualties (defective equipment) back to the war front in shortest possible time.

### 3.9.2 Operating Conditions

The operating conditions are the environment under which the battle is fought. It can be due to any or all of the following:

- **Enemy Action.** These are broadly known as battle effects, like enemy shelling, air attack, sabotage, etc.
- **Physical Conditions.** These include terrain, climatic conditions, need for prolonged operations, need for carrying on operations without required logistic pauses, etc.

### 3.9.3 Military HR Policies and Regulations

The management of personnel in Armed Forces are governed by various Guidelines, Rules, Regulations and Policies. The USAF Regulations are available in their official website. Similarly, Indian Army has its own set of Rules and Regulations but for security reasons they are not discussed here. These rules and regulations give due consideration to operational and operating requirements and work towards realising overall HR plan of the organisation.

### 3.9.4 Human Resource Management Trends

In the Armed Forces the fundamental Principle guiding the HR management is the way the organisation is structured. That is, fighting formations are first defined and thereafter; the supporting elements are planned based on statistical deductions duly validated by other considerations. In our context, where the personnel involved in
maintenance of tank units are concerned, the structure of support mechanics is based on various types of trade affiliation. Each trade personnel are assigned to a set of technologies. For example, a Light Vehicle Mechanic is trained to maintain all types of Light vehicles. Thus, multi-disciplinary equipment are maintained by more than one technician depending on the number of technologies associated. Maintenance of a battle tank requires a Tank Automobile Mechanic, Tank Electronics Mechanic, Tank Gun Mechanic, Tank Instrumentation Mechanic, etc.

3.9.5 Technological Growth

The technological growth in the recent past needs no emphasis. Defence sector too has seen, equal if not more, exponential growth. As per Open Source\textsuperscript{38}, the defence budget that stood at US $11.8 billion in 2001, is now at $36.3 billion. Consequently the range and sophistication of weapons and equipment present in the Armed Forces are also guessable. The Army Equipment Profile as available in open source\textsuperscript{39} indicates a conservative estimate of approximately 3200 tanks from vintage T-55s to state of the art MBT Arjuns and Tank T-90s. All these tanks will be deployed in preset compositions to achieve required effectiveness in a particular mission. These equipment are handled by nearly 1.1 million defence personnel organised in more than 36 Army Divisions. More specific unclassified details are available in Indian Army’s official web site\textsuperscript{40}. The organisation and function of Armoured Corps and Corps of EME are referred to from this website, as they form the basis of this research.
3.9.6 Changing Equipment Profile

In line with the technological growth in the environment, the defence systems profile too changes. Modern Systems are characterised by sophistication, convergence of technologies, multi-technology modules, modularity, reliability, in built test facility etc. While these trends better the user experience, the technicians maintaining these systems have to keep pace with technological growth to ensure desired levels of availability. There are also system of systems, with high levels of standardisation and miniaturisation. Computer and embedded systems act as big enablers of these systems, both in operations as well as maintenance.

3.9.7 Maintenance Philosophy

The Maintenance Philosophy of every Military System is decided as early as its design stage, few equipment can be use-and-throw variety, whereas many equipment like tanks etc, have to used over and over again. The levels of repairs are decided, based on design considerations, during induction of the equipment. A specific activity called Levels of Repairs Analysis (LORA) is used to design the levels or echelons of repairs. Defence Acquisition Council of US AF, lays down the guidelines in its official note and in its Military Standard Specification MIL-STD-1390 Rev. D, the standards for analysis. These levels are classified as Organisational, Intermediate (Direct Support), Intermediate (General Support) and Depot Level maintenance world over. The details can be found in open source. For research purposes, it is assumed that Indian Army also follows similar levels of repairs concept.
3.9.8 Change Management in Armed Forces

Army being a huge and complex organisation, each and every activity of it, is governed by stringent Rules and Regulations that are strictly followed by one and all. Such procedural rigidities are essential for operating in any battle field melee. These drills once set become quite rigid. Incorporating changes in such rigid contexts are done through pilot implementation. Once successful, organisation wide implementations are attempted. Al Wilson and Rod Tozzi (2002)\textsuperscript{44} claim that changes made in one area has third – order effects in other areas as well. The human aspects that need considerations have been highlighted as he cautions “in our zeal to restructure the system or do things faster, better, and cheaper, we often overlook people and the impact of change on them”. It is essential therefore to attempt changes in small test beds and then extrapolate best practices to other areas. It may also be noted that no two Army organization are expected to be the same. They will vary in composition, context and objectives. Hence, it will not be correct to generalise all army units in single template.

3.10 Enabling Factors

Factors that enable the research and proposed implementation models are described in succeeding paras.

3.10.1 Technology

The biggest change factor in recent times, is the explosive growth of technology. Modern systems are ab-initio designed to support lean maintenance, focussed logistics, high reliability index, high rework capacity, fail-safe & safe-design, et al. These, in turn, enable concepts like
system mechanics, multi-skilling, skill inventory, etc. Consequently, the need for skill based HR Management increases in one end due to technology growth, while the same technology enables implementation of such innovative management models.

### 3.10.2 Automation

The growth in computing and communication has bestowed immense possibilities for real time tracking of information from multiple sources and make it easily available for all stakeholders for efficient decision making. Current levels of automation available within armed forces are many times more than the levels required for Skill Based HR implementation.

### 3.10.3 Success Stories in Western Armies

Skill based HR is not new to Western Armies. McCleland (1990)\(^45\) indicated the possibility and requirement of competency based systems as early as in 1990s. Even the current study was originally seeded in Indian Army in 1998. The limited success felt in Western Armies indicate high potential for success for current study. In addition the environment variables have drastically changed in favour of skill based model in last two decades. In a land mark study, Ralph Masi (2011)\(^46\) recommends USAF Human Resource Command (HRC), the need for Competency Based Model for Training, Job requirement definition and Performance Appraisal.
3.11 System Challenges

The challenges that are inherent and anticipated in the research both during pursuit as well as post research implementation scheme are discussed below.

3.11.1 Measurement of Skills

Skill being as it is, a latent, inherent and contextual attribute that manifests and evolve in many different ways, it is not easy to contain the skill sets in an absolute objective manner. Hence the presence and measure of skills need to be always done transitively, with unavoidable subjective assessment. Consequently, the bias, complacency and other human factors, that shall potentially creep into the system and undermine the integrity of skill inventory database, need to be safeguarded against.

3.11.2 Organisation wide Implementation

Army being such a huge human centric organisation with strict respect for the procedures, policies and regulations, organisation wide implementation is relatively easier and faster. However, a wrong implementation will potentially undermine the entire organisational effectiveness. Further, Army units at battle field levels are more mission oriented and dynamic. Hence, no single template will fit all sub-units. Multiple templates have to be adopted and coordinated for each sub-unit through automation. Such implementation demand detailed study of each unit and its operating environment. Hence skill inventory model can be used to demonstrate its potential and organisation wide implementation can only be done after due deliberations.
3.11.3 Military Logistics and its Nuances

Military Logistics are multifarious and highly interconnected. The fundamental elements of Military Logistics are Medical, Supply, Maintenance and Transport. Each of these elements have its own dynamics and inter-dependencies. Hence it is not possible to apply a single HR model for all logistic echelons. Current study therefore focuses only on Maintenance Logistics.

3.12 Conceptual Linkages of Skill Inventory

Skill Inventory (SI) is a Qualitative Tool that aims at measuring finer details of human capital attributes of an organisation thereby enabling an optimized deployment (employment) for increased efficiency. It has very close connection with Human Resource Accounting (HRA), Human Resource Information Systems (HRIS), and Competency Modeling (CM). It provides the centric information base on which other applications can derive their decision support. This aspect is pictorially shown in Figure 3.5 below.
As can be seen, SI stems from two fundamental concepts, namely; the HRA and the HRIS. Although highly synonymous with CM, SI can be considered as a refined and detailed form of CM with an objective focus. SI also imbibes certain strong fundamentals of Supply Chain Management.
(SCM) Skills are treated as a resource as in SCM and its deployment accuracy and velocity are primary performance considerations.

3.12.1 Relationship with CM

CM is defined as the process of competency identification and the level of proficiency towards intended role. SI is similar to CM, except for the following:-

- Comprehensive identification, listing, measurement and recording of skills that matter in an environment, rather than the competency.
- Evolved and defined contextual metrics aligned to job requirement in the same reference.
- Evolve a common vocabulary between SI and CM.
- Effectively, CM is a higher but abstract form of SI Model. While CM gives an approximate assessment of competency levels in the organisation, SI provides the exact information for job fit in dynamic technological environments.
- SI forms the basis for a more comprehensive CM design and implementation.

3.12.2 Relationship with HRA

SI is a qualitative tool that can refine the inputs required for HRA. It provides a combination of replacement cost and opportunity cost model for human resource in the organisation. On the other hand, SI is based on evolving metrics for HRA. HRA and SI need necessarily a common
vocabulary, reference scales and standards. Such convergence has a potentially strong outcome. SI is a tool that furthers the effectiveness of HRA.

3.12.3 Relationship with HRIS

Like its contribution towards HRA, SI allows a more detailed information base that is drilled down further to finer skill set level data of each personnel in the organisation. The inter se dynamics of person-to-person, equipment-to-equipment, skill-to-skill, context-to-context and their cross effects are also highly important for manpower centric organisations like Army. In addition, the intra-influence and inter-influence of these aspects can be best handled only by a robust HRIS. The complete potential of SI warrants a comprehensive and robust HRIS to harness maximum benefits. Thus, it can be seen that HRA, HRIS and CM are the three fundamental concepts, on which SI is based.

3.13 Chapter Summary

This chapter outlines the conceptual framework of the research. During its course, it outlined various concepts associated with military operations, tank formation, personnel management in Armed Forces, nuances of military HRM. It also outlines various other concepts related to military HRM and their trends. It describes the relationship of Skill Inventory with three fundamental and emerging HR concepts, namely HRA, CM and HRIS.
REFERENCES


24. LeMoyne, John., Deputy Chief of Staff, *US AF Army Regulation 600-8*, HQ Department of the Army, 2010


27. Ibid

28. Ibid


