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CHAPTER-II
REVIEW OF LITERATURE

2.0 Introduction

This chapter focuses on review of appropriate literature identified by the researcher in consultation with experts in the field. This chapter is composed of discussions on the theories and practices associated with the theme and its constituent realms.

The literature review focused on the research questions posed. For ease of understanding, literature review has been grouped subject wise, as under:-

- Human Resource Nuances in Warfare.
- Military Logistics.
- Military HRM.
- Competency Based HRM.
- Skills Inventory.

The entire idea of Skill Inventory for Logistic echelons during Mobile Warfare occurred to the researcher, way back in 1998, while undergoing a military exercise in Western Deserts of India. The article of Captain Michael P Gilroy (1990) in Army Logistician Magazine was the first seed. The article lucidly illustrates the deployment of technicians in a very systematic way that paves way for more efficiency. It is, at that point of time, the Indian Army was undergoing major transformation in the facets of technology, organisation and equipment profiling. A lot of new
weapon systems and arrays were being inducted, organizational restructuring was undertaken and technology was sweeping across all domains. Thus there was a felt need to reorganize our Repair Philosophy and approach towards deployment procedures for combat engineering support.

Another major source of literature that paved way for understanding the deployment of tank formations and their repair support is by Colonel Moses Payne (1988)\(^2\). The article explains how the resources are synergized to achieve common objectives in a theatre of battle. The Manpower and Personnel integration Programme (MANPRINT) \(^3\) of USAF, to identify skill-technology gap has been amply illustrated therein. It highlights that the competence and capability of manpower, need consideration during requirement – design-development processes associated with equipment sustainment.

2.1. HR Nuances in Warfare

Lt Col Estridge David (2000)\(^4\) points out, that the then Personnel Management System, is a sheer resource allocator and conserves very few personnel. He also highlighted the deficiency associated with organisational design that was based on function rather than processes. He categorically brought out the need of Military Occupational Specialty (MOS) to address the man power needs vs availability for Task Forces. He recommends reorganization of structures in a more process centric manner with well defined objective measures for efficiency.

Aditya Parida, et al (2009)\(^5\) say that measure of Human Resource could not be done but through its manifestations in productivity. Unlike
pure manufacturing organisation, maintenance organisations lack metrics for their productivity and many times subjective assessments are considered.

Colin Shaw (2010)\(^6\) emphasizes another important facet of Asset Visibility needs of an organisation. Maximizing asset visibility without increasing the overall cost, is a critical priority for lean organisations. He further demonstrates the need for production balancing with manpower availability. He also emphasizes the intrinsic need for focusing on skill based approach and highlights the challenges in implementing changes in any military organisation.

Amik Garg and Deshmukh, S.G. (2010)\(^7\) outline a model for multi echelon repair systems. These models are more typical of Armed Forces Repair Systems and their maintenance echelons.

Maintaining Operational Tempo\(^8\) (or Speed of Operations) is one of the major battle winning factors for Armoured Formations\(^9\). United States (US) Armed Forces (AF) Department of Defense (DOD) (2008)\(^{10}\) explains the need and methodology for maintaining op-tempo under various battle conditions and formations.

Literature on Mobile Operations, Repair echelons, Weapon Systems grouping, etc as pertinent were reviewed to concretize a generic template for equipment deployment pattern. Some of the major contributions and references used in the research are highlighted in succeeding paragraphs.
Introduction to Military Units and Ranks: An Unofficial Guide (2009)\textsuperscript{11}, outlines various references used in this study. It acts as a guide to a layman who does not know any of the military terms and functioning. The backdrop is that of Australian Armed Forces, but that is equally relevant to all Armed forces across the world.

Capt Dotzlaf Ross (2009)\textsuperscript{12}, in his thesis on Preventive Maintenance Strategy, identifies the work force pitfalls and measures necessary to adopt. He also outlines few models for work force balancing in maintenance of facilities and infrastructure.

John A. Muckstadt & Peter L. Jackson (2011)\textsuperscript{13}, highlight the relationship between strategic and tactical decision making process along with operational considerations in the context of Military Asset management. The article reveals four important emerging aspects in the field, namely; Dynamic Collaboration, Resource Sharing, Asset Visibility and Demand Blurring. All these aspects have equal bearing on Human Resource Management (HRM). It also gives out the “Priorities for Asset Management, Repair, and Logistics Support Systems” that are relevant to Competency/Skill Based HRM. Following are the major areas of applications identified by the author, therein:-

- Dynamic reserve requirements
- Allocation thresholds
- repair priorities

These aspects further established the following aspects, based on uncertainty and mission priorities:-
Allocate critical assets in real-time.
Compare scenario serviceability rapidly.
Optimize repair schedules.
Define asset pools and supply chain channels.
Optimize stock levels and asset acquisition schedules.
Optimize budget allocations for weapons system support.

Skill mismatch or misalignment due to shortage of skills, has been amply highlighted by C R Harz (1981)\textsuperscript{14}. The study indicates the possibility of misuse of skilled personnel in unskilled tasks, if skill requirements are not properly measured and recorded. It also pre-empts the possibility of multi-skilling.

Joint Vision 2020 of USAF (2000)\textsuperscript{15} outlines how the operations in future are expected to be conducted that demands synergy between Armed Forces organic elements i.e. Army, Navy and Air Force. The paper highlights how skill is the binding factor in most or all of its operations. It sees skill as one of the major ingredients that determine the outcome. It claims “Success in countering the threats will require the skilful integration of the core competencies of the Services into a joint force tailored to the specific situation and objectives”. It endeavors giving the combat commanders a wide range of capabilities for quick and independent planning and execution of the tasks. The capabilities in these circumstances are derived from individual and organisation competencies. It also claims that the core of the joint force of 2020 will continue to be an All Volunteer Force composed of individuals of exceptional dedication. While such a vision is highly relevant and realistic, for effective and quick
deployment of such forces, the inventory of skills is vital in the Human Resource Information System (HRIS) that should act as the back bone. Even the interoperability and multi-national operations need common lexicon for skills.

The Operational Concepts\textsuperscript{16} being discussed in Modern Warfare include positioning and re-positioning of tailored units quickly and decisively \textit{with full abilities}. It also talks about dispersal and concentration of forces on need basis. Forces are required to be modular with all assets (including human assets) visible in absolute measurement terms. The joint force commander will be able to take advantage of the potential and actual effects of dominant maneuver to gain the greatest benefit only when he is endowed with complete asset visibility in real time. At the end, the vision document 2020 clearly brings out that such a vision depends upon the skill, experience, and training of the people comprising the Total Force and their leaders.

Roland Ruppenthal\textsuperscript{17} has consolidated the lessons for Logistical Support for the Armies and their evolution since 1941. He brings out the importance of logistic elements and their interplay during warfare over decades. Logistic considerations that are inevitable during every stage of operations are well highlighted in these two volumes. In pre-World War II era, the Corps of EME remained a part of their depot structure (now known as ordnance depots). The networks of forward, intermediate and depot maintenance structures are discussed in every aspects of warfare planning.
Dr Nicholos Anderson(2009)\textsuperscript{18} highlights the importance of Knowledge Management during logistic support in warfare. He also highlights the importance of logistic metrics that are propounded in the US Army Regulation 711–7 (2008)\textsuperscript{19} on Supply Chain Management.

Captain John F. Jacques and others (2008)\textsuperscript{20}, highlight the need for flexibility of support elements in the battle field and their ability to regroup as per mission requirement. This also highlight how other logistic teams like medical, supply etc could interact together to carry forward the functions. The need for optimization through integration is also covered by them. How a cross functional team based more on skills rather than role could successfully support a 115 Brigade in Op Iraqi Freedom effectively is discussed. How multi-skilled teams could be evolved that could later turn into multi-functional teams resulting in high efficiency and redundancy is outlined.

Ms. Christine Brim (2005)\textsuperscript{21} treats the skill sets as one of the major resources and advocates how the supply chain would transform in the future. She also brings out the need of knowledge management factors that have direct ramifications in supply chain efficiency. It is imperative that every decision maker should know where the knowledge lies and how it can be tapped. A simile can be drawn for competency / skill management in our context.

The US Marine Corps publication(1998)\textsuperscript{22}, outlines the requirement of maintaining the capability of deploying forces as integral units duly augmented with maintenance support personnel. It also warrants the
maintenance support battalions to be capable of providing detachments for supported units as and when required. The document also outlines the echelons of repairs that are to be customised and be capable of Organizational (1st echelon) maintenance on all assigned equipment and intermediate (Direct support) (2nd echelon) maintenance on organic personnel weapons, platform weapons and other equipment. It highlights how each of its organic fighting elements would require a specific type and extent of maintenance support. Maintenance Battalions for Aviation Wing, Motorised Equipment, Infantry Personnel Weapons, Mechanical Equipment, Electronics Systems, etc are also dealt with, in detail.

General George W. Casey Jr.(2008)\textsuperscript{23}, in US Army Posture Statement 2008, clearly brings out two major aspects essential for future operations, namely; the Modularity of forces and the Strategy for Force Regeneration. In both the cases, he brings out the need for having greater focus on competency and ability, for integration and flexibility.

Stephen Biddle (1999)\textsuperscript{24} brings out the close integration required between Skill and Technology in the Modern Warfare. He poses highly relevant questions that rig the minds of every military planner, facing the challenges of explosive technological growth and questions raised by financial planners. The need of requiring high levels of skills required for handling higher and higher technologies are also emphasized. The need of building in redundancy in forward echelons is another major conflicting requirement. Understanding the interaction between skill and technology always remained a tough question to answer but has today become an unavoidable and critical question. He also emphasizes that any tool that
ignores the effects skill cannot help much. It is also the time for us to determine the effects and effectiveness of skill technology marriage. Most of the combat models developed over a period of time has assumed constant skills with no objective measures. The skill enablers were also not being given adequate emphasis.

Following articles were also referred to gain insight regarding Modern Warfare and its challenges:-

- Joint Vision 2010 (1996)\textsuperscript{25}.
- Concept for Future Joint Operations (1997)\textsuperscript{26}.
- 21st Century Challenges and Desired Operational Capabilities (1997)\textsuperscript{27}.
- Joint War fighting Experimentation Program established, USACOM (JFCOM) as Executive Agent (1998)\textsuperscript{28}.
- Joint Vision Implementation Master Plan (1998)\textsuperscript{29}.
- CJCSI 3170, Requirements Generation System (1999)\textsuperscript{30}.
- JFCOM Joint Experimentation Campaign Plans (1999 and 2000)\textsuperscript{31}.

2.2. Military Logistics

Gluck Fred (2005)\textsuperscript{32} brings out the essential close knit relationship between the logistics and the war fighter capabilities. He highlights the old proverb that brings out the relationship between the horse shoe nail \textsuperscript{33} and a battle that is worth comparing with the essential skill requirements in battle field.
The maintenance of Army equipment are done at typically four levels (also known as repair echelons). For each equipment or weapon system, it will differ and is interwoven at design stage itself. Level of Repair Analysis (LORA)\textsuperscript{34} is a process by which it is analysed and generally frozen at the time of induction. It provides the optimum maintenance plan for minimum cost and effort. It also considers the criticality of equipment with references to the battlefield.

Typically, there are three maintenance levels as under:-

- **O Level**: Organizational / Operator Level.
- **I Level**: Intermediate Level.
- **D Level**: Depot Level.

The O Level maintenance is carried out at organizational unit level. It generally includes minor adjustment, replacement of external items, etc. It is typically carried out by the operator himself. Maintenance at this level typically consists of immediate remove and replace (R&R) operations that replace failed Weapon Replaceable Units with a serviceable one. Repair-in-place (RIP) procedures are also common in O Level.

The I Level maintenance is carried out in workshops / workshop detachments in field, that typically handle multiple user units located in the same area of operation. It has more repair facilities and because it is more specialized, cater for more thorough and time-consuming diagnostic testing and maintenance activities. The deployment varies and is dependent on desired operating conditions.
The D Level maintenance is typically carried out in highly specialized repair depots or factories or at Original Equipment Manufacturer (OEM) premises, that are located well near some industrial bases. These sites, are typically not at operating locations, and extensive diagnostic equipment and possibly even manufacturing capabilities exist with them. Equipment resets / remanufacture and modifications are typically executed at D level Workshops.

The document on US AF on Depot Maintenance Enterprise is another major literature that brings out the futuristic plans of Life Cycle Sustainment of Armoured Fighting Vehicles. The mission of the US Army’s Depot Maintenance Enterprise (DME)\textsuperscript{35} is to provide the resources, skills and capabilities to sustain the life cycle readiness of the War fighter’s weapon Systems and equipment worldwide in a reliable and efficient manner.

Rob Basten (2009)\textsuperscript{36}, in his thesis discuss designing of LORA for various equipment / systems. He also brings out the inter-connect amongst various elements of LORA. He emphasizes the need of spare parts management to be in harmony with LORA design.


Australian Army’s Future Land Operating Concept (2009)\textsuperscript{38}, emphasises the skill focus in every activity of Armed Forces planning and operations. It specially highlights that skill has to be managed as a
resource (Rule 10, page 67). It also highlights the skill based approach to seek a modular structure of forces (Page 67).

Steve Weatherbe (2005)³⁹, outlines the skill and technology fit required to be maintained all throughout. He highlights the incidences during Normandy Operations (1944)⁴⁰, when a highly trained gunner could not be efficiently employed in a particular type of tank due to skill mismatch. In other words, not all skills translate into effective outcome. It is the match between the skill and task that calls the shot of the day.

Future Combat System (FCS)⁴¹, the principal modernisation programme for US Army formally released in 2003, in its white paper named 18 + 1 + 1 systems, indicate how the repair echelons of the future would look like. It calls for small but comprehensively skilled teams specifically tailored for the job and equipment profile. The paper also talks about the very design of war fighting machines being aligned in this direction.

Chapter I of Whitepaper on FCS highlights the agility requirement of the Brigade Combat Teams⁴² (BCT) and how various basic missions will be templated in future. It presupposes the requirement spelt in previous para, i.e a small, flexible and agile combat support teams for logistics.

Army Regulations Chapter 3⁴³ on Offensive Operations defines all types of operations along with various examples. This framework is used extensively in the study so that practices used are standardised. Para 167 to
175 of ibid chapter lays down the guiding factors for service support for logistics.

The organisation of various Military Units\textsuperscript{44}, is available in Global Security Web Page. In this study we have considered a Tank Battalion in an Armoured Division. The skill matrix (weapon available) of a tank battalion is also given therein.

2.3. Military HRM

Lt Gen John Le Moyne (2009)\textsuperscript{45}, comprehensively outlines the complete details as to how the Army runs its HR Management vertical. It also talks about Military Occupational Specialty Classification (MOSC) System that has close parallels with the current research.

Lieutenant Colonel Aaron M. Zook, Jr. (2006)\textsuperscript{46} brings out lucidly a comprehensive paper on Competency Based HRM model for US Armed Forces. He also highlights the need of competency pyramids and meta-competencies. He validates the risk and cost and also proposes an implementation model. He also emphasizes the need of competency based HR model to be dovetailed in Personnel Life Cycle Models.

Honorable R. Allen Pittman (2005)\textsuperscript{47}, Assistant Secretary for Human Resources and Administration, US AF DOD, talks about the competency based models for HRM for serving and retired military personnel.

Dhruv C Katoch (2013)\textsuperscript{48}, lucidly brings out the Human Resource Management in Indian Army and emerging trends and challenges.
Lt Gen Mukesh Sabharwal (2013)\textsuperscript{49}, also brings out the Officers Recruitment strategy in the same seminar. The article also includes, in-service and post retirement employment of officers of Indian Army. The aspects pertaining to knowledge and competency management referred in these articles are note worthy in current research.

Mohit Kabra (2009)\textsuperscript{50}, in his unverified open source article on Human Resource Management an Indian Armed Forces Perspective talks about the current challenges being faced by the Indian Armed Forces.

Ralph Masi (2011)\textsuperscript{51}, gives his research findings on Human Resource Command as under:

- Competency and proficiency demands will hold constant.
- It will be difficult to meet workforce demands in importance select battle field areas.
- Ensuring a fully staffed and competent HRC workforce beyond 2010 will require long-term recruiting, development, and management strategies.

He further recommends Personnel Competency Requirement Analysis and integration with Human Capital management Strategic Planning.

Farazmand Ali (2004)\textsuperscript{52}, in his article on HRM in globalization era, talks about 22 innovative methods for improving HRM strategies. All his innovative methods have skills as the base metric for implementation.

Michael Schiefer (2007)\textsuperscript{54}, in his article on Manpower Management for Enlisted personnel, discusses the need for strength management based on competencies.

Lt Gen Mukesh Sabharwal (2011)\textsuperscript{55}, gives his all-encompassing perspectives on Human Capital Management in Indian Armed Forces and the current challenges and opportunities.

2.4. Competency Based HRM

Competencies have many definitions as outlined by Lucia & Lespinger (1999)\textsuperscript{56}. A frequently used definition of competency is “A descriptive tool that identifies the skills, knowledge, personal characteristics, and behaviors needed to effectively perform a role in the organization and help the business meet its strategic objectives”.

Edward Lawler III and Others (1992)\textsuperscript{57} is possibly one of the pioneers in propounding the theory of skill based approach for Human Resource Management. He also indicates that Skill Based HRM has its roots to Skill Based payment systems. He advocates that skill should be fundamental to HR practices as an organising principle. He also brings out the widespread ramifications in skill based approach and its advantages. The competitive advantage accruing out of skill based model is compelling for every organisation to pursue such models.
Vichita Vathanophas and Jintawee Thai Ngam (2007)\textsuperscript{58}, while discussing the Thai Public Sector and Job Performance highlight the need for competency based models.

Richard S. Mansfield(1996)\textsuperscript{59}, in his article dealing with Competency Models for HR professionals highlights the need of common set of building blocks. In our terms, we call it vocabulary and metrics for recording skills.

Kankana Mukhopadhyay, et al (2011)\textsuperscript{60}, in their article dealing with competency management systems for innovative organisations, spell out the models abridging the technology and people. The article also brings out a software simulation for a people centric model for competency based organisation.

Jaideep Kaur and others (2012)\textsuperscript{61}, in their research article, spell out a broad plan for managerial level skills and competencies and the ways to manage them.

Ritva Laakso-Manninen and others (2007)\textsuperscript{62}, outline the need for competence management and Strategic Human Resource Management. The article also discusses about knowledge mapping and knowledge management that has close parallels with skill and competency management in our research. It defines the capital to be a product of Competencies, Motivation and Physical Conditions. It also identifies the knowledge base as fundamental for HR development. It advocates the need
for competency management right across personal levels till organisations vision evolution.

Arieh Bonder and others (2011)⁶³, portray a competency based model for Canadian Public Sector organisations and bring out the nuances, advantages and challenges. The focus of the article is on service delivery and associated challenges that are relevant in the current research. It also claims that an organisation stands to gain the moment it integrates all its processes including HR around a common language and metrics, to achieve greater efficiencies.

Noordeen T. Gangani (2004)⁶⁴, in his web published article states the basic need, advantages and implementation techniques for a competency based HR models. It lucidly brings out, through case studies, the relevance and application of competency as an organizing factor, right across all HR processes. This article gives the basic framework for a competency based model.

Farah Naqvi (2009)⁶⁵, talks about managing talent within an organisation by resorting to competency based HR models. His article gives a basic framework with numerous citations relevant for current research.

McClelland (1973)⁶⁶, gives an interesting insight on HRM in 1973 and earlier. The aspects brought out in his article are still relevant. It talks about Skill-Intelligence connect, their manifestations, how effectively it can be measured, recorded and harnessed. Skill being what it is, metrics for skill will continue to behold many intangibles thereby bringing in
inconsistencies. McClelland advises the need for careful and measured approaches in selective domain in a progressive manner for skill measurement.

Radha Sharma (2002)\textsuperscript{67} outlines the competency and emotional intelligence connect, while demonstrating the need for 360 degree feedback system for effective HR management practices.

Douglas A Ready and others (2007)\textsuperscript{68}, bring out another important facet that deals with functionality and vitality of skills. It also talks about ensuring accountability and building engagements while implementing competency based models.

R K Sahu (2009)\textsuperscript{69} brings out the Concept of Competency, Competency Mapping Process, Developing Competency Models, Competency Identification, Competency Assessment, 360° Feedback, Assessment Centres and Application in Competency Assessment and Applications of Competency Mapping. The book acted as a ready reckoner during initial stages of research in identification of various dimensions of competency modeling.

Peter Leisink (2010)\textsuperscript{70} brings out various facets the Dutch government was facing while attempting to implement a competency based model in their governance. In this article, he brings out various HR processes with viability for competency models and expected pay offs. Strategic Career Planning and Management Learning Lines are the two major aspects that are of relevance to current research that are identified in the ibid article.
Ricardo Rejas-Muslera and others (2011)\textsuperscript{71}, bring out the applications of IT in competency based modeling in any organisation.

William C. Byham (2010)\textsuperscript{72} prefers “Dimension”, as a term more closer than “Competencies” when it comes to aligning HR processes based on other specific attributes.

US GAO publication on Human Capital (2013)\textsuperscript{73} describes the possibility of a competency based HR model for Civilian Defence Employees of US Navy and US Air Force. Although it is closest to Indian Armed Forces Model, the current research do not consider civilian work force that is part of Defence Establishments.

Terry Wireman (2005)\textsuperscript{74} has outlined the nuances of a competency model in a Maintenance Centric Organisation. It has very close situations that the current research expected to handle. It brings out the importance of competency centric approach for Asset Management Strategy. It draws up performance indicators for maintenance agencies that can be further aligned with metrics related to competencies and skills.

Erin Grogan and Peter Youngs (2011)\textsuperscript{75} bring out competency based fit, not only for job but also “with organisation, within organisation and within groups”. The article also highlights the need of mapping soft skills and group dynamics. Present research does not deal with group dynamics and soft skills. Notwithstanding, the spin offs of current research indicate potential avenues.
Arva Shikari (2011)\textsuperscript{76} brings out the dynamics related to assessors and assessment centres involved in competency assessment for competency management. This is one of the most important factors that dictate the success of any Competency Modeling approach. It outlines the models for effective assessment approach and methodology.

Saidas Ranade and Others (2010)\textsuperscript{77} have brought out certain valuable options of visual representation of competency mapping and their efficiency as a business management tool.

US AF document (1999)\textsuperscript{78}, on Strategic Human Resources, outlines the need for integrating HRM objectives in strategic considerations. While doing so, it emphasizes the need for skill centric metrics for aligning major organisational objectives.

Sunil J. Ramlall (2006)\textsuperscript{79} outlines the basic strategy for implementation of HR practices with competency modeling. He identifies critical HR activities and associated competencies. This is one of the basic references that came handy during initial part of research.

Khalida Rauf (2011)\textsuperscript{80}, in her research article, explores the relationship between the personality trait and job satisfaction. While this aspect is not directly related to current research, it is essential consider them for measuring job fit effectiveness.

Parks, Garry L (2003)\textsuperscript{81} highlights the shaping of future battle fields and their allied requirement. The manpower needs and how they will play
a key role in shaping the battle field is also highlighted in this article. The need for multi-skilling and skill tracking, the quintessence of this article.

Anne F. Marrelli and others (2005) discuss the competency based models for health care organisations. While it has little direct relevance to the research, the complexity of skill extent and range required, is akin to a battle field. Hence the article was referred selectively for subjective views.

Fanny Klett (2010) discusses the knowledge management facets and a competency based HRM model. The article discusses the applicability of competency models in all three levels of HR processes. It also discusses the advantages in performance management, learning management, assessment and quality management.

Werawat Punnitamail (2007) reviews applications of Competency Modelling across all business environments including public organisations, private enterprises, military, etc.

Sethela Jun and Others (2011) discusses the important linkages between the Job –Person fit and further linkages with their performances. It is one of the most important aspects that demanded deliberations in the research while formulating metrics for job effectiveness using skill inventory. The article discusses the issues in the context of SMEs in Malaysian Service Sector.

Mohammad Javad Dehghan Ashkezari and Others (2012) discuss typical competency models that can improve HR processes in standard ways.
Report by Treasury Board of Canada (1994)\(^{87}\) by their Secretariat on Employee Skills Inventories for the Federal Public Service, outlines the implementation nuances of skills inventories in the public sector enterprises. Although, it has limited relevance for the military logistic echelons, the group dynamic aspects brought out in the article are relevant for the current research in qualitative treatment.

Green Paul (1999)\(^{88}\) discusses the methodologies viable, at that point of time, about using robust competencies as the common factor for linking HR processes and business systems.

Parry Scott (1998)\(^{89}\) in his scholarly article on the subject discusses the processes involved in identification of relevant competencies in an organisation.

Patricia McLagan (1997)\(^{90}\) defines competencies and discusses manifestation of competencies in industrial environment in various facets. The article also talks about the use of competencies as a referential factor in training and development duly aligned with organisation performance in future.

### 2.5. Skills Inventory in HRM

James H. Bigelow et al (2011)\(^{91}\) outline the basic requirement of meeting manpower needs of Armed Forces and through competency balancing and strength balancing. They outline the shortage measurement in numerical terms. In our research, the skill gap identification is contrasted by such conventional number gap methods.
The article on “A better Measure of Skill Gaps” published by ACT.ORG/ Work Force(2001)\textsuperscript{92} is another noteworthy effort that captures contemporary concepts of skill gap measurement for strategic skill research. It outlines models for various types of industry wherein skill analysis can be constructively employed.

Thought Leadership Report (2002)\textsuperscript{93} is another useful article that clarifies the factors and constituent elements of skill inventory. It is possibly one of the few early reports that outlines skill inventory concepts.

Edge Nowlin (2001)\textsuperscript{94} has defined certain basic approaches to Skill Inventory and objective measurement of skills.

Sally Louis (2006)\textsuperscript{95} has also given out a basic skill inventory model that primarily deals with soft skills.

Francesca Sgobbi, et al (2009)\textsuperscript{96} account a brief summary in their lecture of the skill measurement techniques and effectiveness. They try to evolve an objective method of measurement of skill mismatch with the job, thereby the presence of skills.

Jojan V. Jose (2010)\textsuperscript{97} in his project report, outlines and summarises the state of the art of skill inventory and competency mapping efforts in HRM.

Linda W Hawthorne, et al(2001)\textsuperscript{98} talk about the use of skill inventory as applied to person with learning disorders and emphasize on basic school skills.
Sharon Pande, et al (2012)\(^9\) highlight the importance of Human Resource Information System (HRIS) in HR processes. One of the metrics discussed in the article, is the knowledge and competence of employees.

Zhang Weimei (2013)\(^1\) gives out a HRIS model for Chinese Private organization.

Jose Bersin (2004)\(^1\) discusses management of training organizations and the use of HRIS in various personnel administrative processes.

Minna Haapasilta (2010)\(^1\) outlines some relevant facets of strategic HRM and competence management using HRIS.

### 2.6 Past Research Findings

Past research findings indicate the status of the few major aspects that are relevant to our current research that are described in succeeding paras.

#### 2.6.1 Military Occupational Specialty Classification (MOSC) System\(^1\)

This concept is in vogue since World War II. It caters for categorizing manpower based on their job/occupation. It could work effectively till about last three decades, when technological growth was relatively minimal. Indian Army too had similar models. The MOSC is known as trade grouping in Indian context. Although Americans and Australians have already turned towards more specific skill approaches, Indian Army has not as yet brought out a comprehensive strategy in this direction.
2.6.2 Man-power balancing in terms of Competency

Competency measurement should be promptly supported by competency development, enhancement and retention strategy. The competency model propounded by David McCleland (1991)\textsuperscript{104} is now taking shape for implementation. For optimizing the manpower, it is essential to balance the competency spread within the organization. While corporate houses have already embarked on competency based models, Armies are in the process of restructuring and re-optimising the organizations based on evolving mission requirements.

2.6.3 Generic Templates

The very characteristics of military missions and human asset are so dynamic that neither of them can be contained in any single universal template. It is essential therefore to evolve templates focusing on various sets of requirements that can be later, integrated. Skill based job fit, is thus, one of the critical requirements that is being currently dealt with. The implementation warrants due consideration of other factors as well. In this research, we are attempting only for a slice of an army operations scenario. However, for final implementation, multiple models may have to be co-opted.

2.7 Gap Analysis

In the management literature, gap analysis is the comparison of actual performance with potential or desired performance. If a company or organization does not make the best use of current resources, or forgoes
investment in capital or technology, it may produce or perform below its potential.

The past research findings and the current status of military HRM in Indian Armed Forces indicate the need of exploring possible skill based training and deployment of its manpower especially in forward areas. The requirement is more pronounced in logistic echelons that deal with variety of military hardware and associated technicians. This issue gets further complicated when the forces engage in mobile operations where the logistic elements are expected to agile, effective and efficient.

Towards implementing such model, the first and foremost requirement is a set of objective metrics for measurement and recording of skills. After evolving these metrics, the present and proposed models of deployment can be validated. Current skill availability in a Tank Logistic Platform needs to be measured and compared with the skill requirement estimated through Job Analysis using the same set of metrics. The gaps found can then there processed for evaluating combat engineering effectiveness and also the gap bridging measures.

2.8 Problem Areas of Research

The research has to face certain constraints during its pursuit while bridging the gap. The anticipated issues are outlined in succeeding paras.

2.8.1 Metrics for Skills

Major issue is the non-availability of metrics for skills as it cannot be objectively evaluated. Further, it is highly context dependent, which in turn has many subjective variables. It is thus essential to fix few significant
factors and cater for generic corrections for insignificant many, although their summative effects are likely to be significant.

2.8.2 Job Analysis

A military organization seldom re-organizes due to widespread efforts associated. Job analysis is therefore not a regular affair. Even when it is done, it generally reviews the changes in parameters holistically. Evolutionary changes like ‘Skill based job analysis’ face huge organizational inertia.

2.8.3 Specialization Vs Comprehensive Skills

Each echelon requires a balanced mix of skills and NOT just the quantum. For example, an LRD/FRD would require a specialist supervisor who can diagnose quickly and not-so-specialised / semi-skilled technicians who can help the former. Both quantitative requirements are, in a way limiting when it comes to organisation wide deployment based on such skill requirements.

2.8.4 Job Rotation And Job Enrichment

Job rotation and consequent job enrichment will be a natural consequence of skill based deployment. However, such activities have to be relegated to secondary preference during critical stages. It, otherwise, will seriously undermine the system effectiveness being attempted.

2.8.5 System Challenges

Typically, there are seven to eight specific trades that support a tank Squadron in battle, irrespective of the number of trades. It is therefore
essential to re-organize the trade structure and/or multi skill the main trades. Such re-organisation has organisation wide effects and implications that are equally applicable for other equipment, formations terrains etc.

2.8.6 Multiple Technologies

New generation equipment inherits large number of technologies. Few technologies like embedded systems, communication technology, polymer, etc are taken as given for almost all types of equipment. In addition, there is a large scale convergence of technologies in the back end as well. All these warrant a huge array of technicians to support. However, the need for minimum number of persons, with maximum skill sets remains important.

2.8.7 System Complexities

More the technologies in a system warrant more trades to support. In single skill situations, it will lead to more number of personnel to support each equipment. For redundancy, the option will further compound the requirements. Problem will further aggravate, if number of support points are more, as each one of them have to be manned with equal effectiveness. For more types of equipment, the manpower requirement will be further more. In other word, variety in equipment, configuration, technology, support points etc have mutually compounding effects in net manpower requirements. Optimisation in such situations, can realized only through Skill Optimisation and Multi Skilling.

2.9 New Knowledge Endeavoured

During the course of research new knowledge is explored in two distinct areas as under:-
- Skill centric deployment of logistic elements to support a tank squadron during mobile operation.
- Template for skill based human resource management in armed forces.

In addition to the above, based on the findings, a viable Implementation model for SI in Armed Forces is also attempted and presented to Indian Army authorities and the details are reserved.

2.10 Chapter Summary

Review of Literature is fundamental to any research and its importance more pronounced in cases of exploratory research. Being a defence related research, not much literature are easy to come by. Many literature available in the open source, are generally contextual and needed to be verified from our context for possible applications.

In this chapter, the host of literature studied have been grouped and analyzed to bring out the current status of research domain. While it could indicate that Skill inventory or similar concepts are still in nascent stages in Indian Industries, Indian Armed Forces are yet to endeavor such models.

The review of literature could also indicate possible challenges the research is likely encounter during its course, as has been the experience with other related studies in the past.

The Review of Literature could also bring out clearly the gap between the current status and the endeavoured end state of the concept.
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