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SUMMARY AND CONCLUSION

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SUMMARY AND CONCLUSION

6.0 Introduction

This chapter summarizes various findings, inferences and impressions gathered during the research and interpret towards meaningful application. It highlights the contributions, limitations and extensions, of the research findings. In the process, it also revisits the Research Questions, Research Objectives and Hypothesis set forth and validates them with the findings of research.

6.1 Summary of the Study

The very existence of Army is dictated by its Combat Readiness and its ability to Sustain its Combat Readiness. Technology centric warfare today has driven the combat readiness almost synonymous to Combat Equipment Readiness.

Managing Army is synonymous to managing its men. Army being a people-based organisation, managing personnel is always of great concern at every level of the organisation. There were very many models for managing men in Army. Presently Armies adopt a role based model, wherein all the role holders are hierarchically assigned and promoted in the chain.

In military environs, the explosive technological growth in recent years has driven the battle fields replete with sophisticated equipment. Success in modern battle fields is thus dependent on availability of crucial war fighting machineries with the forces. Considering the latency
associated with fielding newer equipment in demanding time frame (through acquisition or manufacture), recycling of defective equipment play a major role in sustaining force levels. Unless, amongst other given, we don’t deploy a right man on the right job, quick recycling is just impossible. The rightness (or the aptness) of a man can be decided only based on his skill sets, with respect to the job. Hence, without accurate skill set information, right-man-for-a-right-job cannot be realized.

Given the dynamics of the modern battlefield conditions, equipment sophistication and enabling technological environment, jobs demand more specialized range of skills. In such complex scenarios, staffing decisions invariably demand more accurate information of their skill sets. It is imperative therefore to create and maintain an inventory of skills of all logistics personnel, optimize their deployment and maximize the availability of weapons and critical equipment, during mobile operations.

In order to achieve and maximise the combat potential of the Armed Forces, it is essential that equipment availability is maximised. During war, since acquisition and manufacturing have long lead time, it is quick and efficient recycling of defective weapons and equipment, to maximise availability that assumes primacy. It can be achieved only through effective and efficient deployment of technical manpower amongst other resources in logistic echelons entrusted with such tasks.

The effectiveness of manpower in the war zone depends a great deal on their skill sets. Therefore, deployment of manpower in the war zone based on their skill sets, is a major imperative. Presently, there is no SI or information base of skills, available that can enable such deployment.
Consequently the effectiveness of equipment recycling in the war zone remains sub-optimal.

A new HR management tool i.e SI, will enable close job fit and achieve optimal deployment of technicians in the logistic echelons during mobile warfare. It is therefore proposed to study the feasibility of designing a SI system for the Corps of EME and investigate its accuracy, efficiency and effectiveness in enhancing combat potential of the Army.

The primary objective of this research is to refine the existing deployment model of technicians, during mobile operations by using Skill Inventory (SI) concepts, so as to achieve optimal efficiency and effectiveness in combat force regeneration in battle fields.

Towards the ibid objective a null hypothesis as under was formulated.

*Skill based deployment has no effect on effectiveness of combat engineering support to weapon systems in a Tank Squadron during Mobile Operations.*

As the hypothesis involved many intangibles and not directly measurable parameters, the same was proved transitively. To this effect, two alternate hypotheses covering both the extremes were formulated. One of the alternate hypotheses was then sub-divided into many sub-hypotheses and was validated. Through validation of these sub-hypotheses the alternate hypotheses were proved / disproved.

The scope of this research is limited to Human Resources in Logistic echelons dealing with technical and technical support personnel associated with military equipment in a Tank Squadron of an Armored Formation
conducting Mobile Operations. Towards the ibid objectives and research questions, the methodology for study adopted has been outlined below.

- Skills that are relevant, measurable and verifiable in a battle formation in support of tank squadron was identified through an environment scan followed by verification through an experts choice analysis. Consequently Factor Analysis was carried out and weightings assigned for each skill factor.

- A group of 36 respondents from various trades were chosen through convenience sampling technique method in a non-intrusive manner and their skills as present were estimated with weightings derived above.

- On the other hand, skill requirements in a forward logistic echelons in support of a tank squadron, were identified through a survey and was again validated through experts choice. In consistencies were removed through a pair wise comparison method.

- The respondents were subjected to a test for Skill Presence in terms of skill requirements so identified.

- Correlation and Regression analysis of these two major domains, namely : (a) Skill Factors and Estimated Skill and (b) Skill Requirements in Forward Echelons and Skill Presence, were carried out.
Consistencies within these factors, their relevance and interdependencies were studied and addressed as required. Based on the findings the hypothesis was validated transitively through validation of sub-hypotheses.

6.2 Major Research Findings

The important research findings are summarized in succeeding paras.

6.2.1 Environment Scan

The research began with positively validating the felt need in the environment for a skill based model for deployment of technicians in the forward logistic echelons towards enhancing their effectiveness and efficiency, thereby improving the combat readiness of the Army.

The environment scan brought out certain contextual information about skill inventory and its potential in forward echelons.

6.2.2 Skill Factors

The research could identify the following factors as predominant in defining and developing skills that are relevant in forward echelons.

- Continuous Equipment Association
- Length of Service with Equipment
- Training with OEM
- Involvement in Special Projects
6.2.2 Skill Indices

Objective measure of skill is the fundamental aspect of this research. Towards this, tentative skill indices were formulated and validated.

- For Continuous Equipment Association, two credit points per year was assigned and for different equipment in successive tenure, no credits were given.

- Length of Service with Equipment was proportionately awarded with 2 point per year with same equipment.

- Training with OEM, was credited with two points per course and one point for additional training for every 15 days abroad.

- Involvement in Special Projects was awarded with a maximum of two points.

- Additional Domain Knowledge was credited with maximum two points. This included multi-skilling and domain specialization in related technologies.
Instructional Tenure was proportionately awarded with two credit points per year.

Structured Training Courses in India was awarded with one credit point for short term training, three points for courses more than three months.

Total Service was compensated with 0.5 points per year of completed service.

These tentative indices were validated through correlation and regression analysis and found to be within acceptable limits.

6.2.3 Skill Requirements in Forward Echelons

The requirements of skill in the forward logistic echelons were identified, studied and validated during the research. The details of skill requirement in the forward logistic echelons along with their interse priorities were identified as given below:-

- Systems Knowledge (15.35)
- Allied Knowledge of domain equipment(11.50)
- Quick Diagnosis Capability(11.03)
- Trouble Shooting Skills(9.89)
- Multi-Skilling(9.56)
- Communication Skills(9.00)
- Repair Techniques(8.93)
6.2.3 Skill Development w.r.t Deployment

Various types of deployment considerations were studied and it was found that Skill Based Role Specific Training is the most preferred option. The interse weightings between various other options are as under:-

- Skill Based Role Specific (0.4096)
- Equipment Skill Based (0.3705)
- Trade and Grade Based (0.1418)
- Geographical Location Based (0.0781)

6.2.4 Skill Development w.r.t Training

Various types of training considerations were studied and it was found that Equipment Association is found to be predominant in enhancing skill levels. The interse weightings between various other options are as under:-

- Equipment Association (0.4275)
- On the Job Training (0.1978)
- Structured Courses (0.1939)
- Special Assignments (0.1808)
6.2.5 Correlation and Regression Analysis of Factors

- Skill Factors identified during the research displayed minimal interdependencies but for service length and opportunities for training. Further, these skill factors had strong relationship with the skill presence as obtained in forward echelons, proving the credentials of skill factors so identified. In the process, the weightings derived could also be validated as affirmative.

- Skill Requirements in Forward Logistic Echelons, identified during the research, displayed maximum interdependencies. Further, these skill requirements also indicated had strong relationship with the Estimated Skill Levels as measured in the sample respondents, proving the credentials of skill requirements so identified. In the process, the weightings derived for skill requirements could also be validated as affirmative.

- The estimated Skill Levels of the sample respondents indicated direct and strong relationship with the skill presence as measured objectively by the panel of experts. It could prove that the skill factors and skill requirements, as identified during the research can act as the basis for forming an objective skill inventory for skill based deployment in forward echelons.

- The self assessment carried out by the respondents also indicated a positive and linear relationship with actual skill presence.
Similarly, the assessment carried out by the supervisors on respondents also indicated a positive and linear relationship with actual skill presence.

These two measures can thus be used as skill measures that are transparent, relevant and objective. It further proved the credentials of skill indices assigned during the research.

6.3 Summary of Contributions

The contributions consequent to research can be seen from the perspective of research questions and objectives, set forth in the beginning of the research. While the targeted aspects have been well achieved, they also bestowed some secondary findings that are worth pursuing in future research.

The Research questions and Research Objectives are revisited and enriched with research findings, in succeeding paras.

6.3.1 Revisiting Research Questions

The overarching research question was “Will Skill Based Deployment of Technicians in the warzone enhance the Combat Potential of the Army?”. In the light of research findings, it indicates that the effectiveness of combat engineering support will increase if skill based training and deployment was resorted to. In turn, combat engineering support will enhance weapons availability, thereby increasing the combat potential in the war zone.
Specific research questions defined earlier and research findings are summarised below:-

- **Can a systematic approach to personnel management and organisational design be based on identification of critical organisation skills?**

  While proving affirmative, the research indicates that such system be skill centric. The research during the course has identified key skills required for combat zone and also the factor that contributes towards skill development that are measurable.

- **Will skill based deployment of technicians enhance their efficiency and effectiveness?**

  Survey during research indicates that skill based deployment is the most preferred option amongst all stake holders. The skill estimation and skill requirement congruence, also indicates that such deployment will enhance effectiveness and efficiency.

- **Does skill-based-deployment enhance overall combat engineering support and increase the equipment availability through quick recycling?**

  The answer remains affirmative and in harmony with answer to previous question.
Will skill-based-deployment enhance skill development of the personnel?

Survey during research indicates that skill based deployment enhances skill development. The skill indices developed on this premise stood proved with high confidence level.

Is it time to move from Man-Job fit to Responsibilities /Task Lists – Skill fit?

It can be inferred from research findings and other subjective analysis that Man – Job fit does not ensure correct and complete information for more accurate and effective employment. This issue more pronounced in battle fields, where presence of each man counts. Rather than simply placing a man based on his trade association defined at the time of recruitment, it is essential to monitor his skills right through his career and deployment should be based on his skill sets vis a vis skill sets expected in job context.

Will skill based deployment of technicians be more effective in Mobile operations?

In continuation with the answer to previous question, it can be seen that in the context of mobile operations where the number and size of repair elements are supposed to be minimum, skill based deployment remains the inevitable option.

What are the likely challenges in implementation of skill-based-deployment?

Developing a skill inventory initially will be time consuming, especially for removal of bugs and inconsistencies. However, it can be
automated in due course. Policies on deployment may have to be reviewed. Quantification of soft skills and conversion of equipment expertise that are not contained in metrics will introduce subjective anomalies that can be smoothened over a period of time.

- **Will skill-based-deployment lead to any major strategic advantage or limitation in future war scenarios?**

  This area warrants more in-depth study. Quick recycling of battlefield casualties is the need of the hour. In future where battles are likely to be swift and fought in short durations, immediate fixes are more important than detailed fixes that require more time and resources. Such immediate fixes can be provided only by a skilled technician available at the right place. Thus it is imperative that right skilled man is ensured in every forward zone to harness this strategic advantage. Skill based deployment enables such right man-job fit.

### 6.3.2 Revisiting Research Objectives

As has been discussed earlier, it is essential to revisit the research objectives as well, at the end of the result, to validate the extent to which the research objectives have been met. To this effect, the research objectives have been revisited and findings are indicated thereto.

#### 6.3.2.1 General Objective

The primary objective of the research was to refine the existing deployment model of technicians, during mobile operations by using Skill
Inventory concept so as to achieve optimal efficiency and effectiveness in combat force regeneration in battle fields. These aspects have been addressed as under:-

- Skill Inventory as a concept tool for use in HR deployment in Logistic echelon of Armed Forces during Mobile Operations was positively validated during research.

- Indicated enhancements in efficiency and effectiveness in combat force regeneration are positive and served to conclude the research in through non-intrusive study.

- To find specifics, it is essential to actually apply this model on a set of Armed Forces segment, which is beyond the scope of this research. Further, Armed Forces would not permit such study in public domain. Therefore, the research findings can be made available to Armed Forces for their internal deliberations and applications.

### 6.3.2.2 Specific Objectives

Other specific objectives set forth in the beginning and the results are summarized below:-

- *Identifying the skills that matter in a specific domain, task, time and space.* Skills that matter in Tank Squadron and its support elements were studied and finalized.
Evolving metrics with which these skills can be measured and recorded. Skill indices were evolved and validated during the course of study.

Comparing skill development / loss due to equipment association or lack of it. Data analysis validated the skill development / loss due to equipment association. In the light of skill indices standing proved, it can be inferred that there is a positive correlation between skill development and equipment association.

Measuring change in effectiveness of technicians when resorted to skill based deployment. This aspect is yet to be validated at individual level, as the study is non-obtrusive. However, the group of people studied indicates broadly that effectiveness will improve. This was further corroborated during discussions with experts. However, in future specific cases may be studied by Armed Forces through their in-house study.

Evolving a deployment template for logistic echelons involved in equipment maintenance during mobile operations. An implementation model can be prescribed to Army if requested as it would involve specifics and may be considered exclusive.

6.4 Limitations and Extensions

The current research has certain inherent limitations owing to its defence background. On the other hand, it also comes with tremendous
potential for extension into other non-defence sectors and primarily in the service sector. The limitations and extension viabilities are discussed in succeeding paragraphs.

### 6.4.1 Limitations

- This study was carried out in an explorative and non-intrusive manner due to security reasons. Specifics of Indian Army were not used at all in any form. As such, the findings can be used only after careful adaptation.

- The research information used is primarily from open source and pertaining to that of US Army, Canadian Army and Australian Army. These Armies can be considered as fore-runners in the fields of technology as well as HR management of military personnel. However, their templates may not suit our context fully, but essentials can always be learnt and adopted in our systems.

- Being an explorative study, not all objectives set forth in the beginning could be reached as such. The research was progressed iteratively and the hypotheses and research objectives had to be re-aligned with interim findings. Notwithstanding, towards the end, the objectives could well firm up and yield desired results.

- Since the study deals with Armed Forces, that have security ramifications, the research was pursued in non-obtrusive manner
without intervening in any of the functioning of Armed Forces agencies. Thus, no active empirical study was carried out.

- For verification of research, current research may be extended as an Applied Research in the select domains of Armed Forces by them internally.

6.4.2 Extensions

- An implementation model based on the findings was worked out and shared with Indian Army authorities for their necessary pursuit, if deemed fit.

- Current research shall be pursued further by Army authorities towards making a deployment template and study its effectiveness.

- Skill Inventory Models can be explored for feasibility in Industrial and Service Sectors. Such models are very easy to implement in Virtual Educational Institutions.

- Skill Inventory concepts should be explored for automatic generation of templates, based on stated requirement. This should have due complementary efforts from Knowledge Management domain.
Skill Inventory models can be subjected for a comparative analysis with Configuration Management techniques to develop common system attributes.

6.5 Conclusion

Skill Inventory is a pioneering research in Indian Armed Forces context being carried out for the first time. It is also possibly the first defence related research carried out in Madurai Kamaraj University by a serving officer. It is a multi-disciplinary research that warrants comprehensive knowledge of Armed Forces, Technology and Management. But for the co-operation of the University, its staff, Guides and Armed Forces Officers, this would have been an impossible task. Despite of its complexities and extent, the research could beat the track and give first level findings and way ahead for skill inventory concepts in Indian Armed forces that have even more potential in industrial and service sectors.

Jai Hind.