EFFECTIVENESS OF DECISION MAKING IN HUMAN RESOURCE FUNCTIONS OF INDIAN ARMY

A Dissertation submitted to the Punjab University, Chandigarh for the award of the degree of Master of Philosophy in Social Sciences, in partial fulfillment of the requirement for the Advanced Professional Programme in Public Administration

by

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CERTIFICATE

I have the pleasure to certify that Brigadier Puneet Kapoor has pursued his research work and prepared the present dissertation titled "Effectiveness of decision making in Human Resource functions of Indian Army", under my guidance and supervision. The dissertation is the result of his own research and to the best of my knowledge, no part of it has earlier comprised any other monograph, dissertation or book. It is being submitted to the Punjab University, Chandigarh for the purpose of Master of Philosophy in Social Sciences, in partial fulfillment of the requirement for the Advanced Professional Program in Public Administration of Indian Institute of Public Administration, New Delhi. I recommend that the dissertation of Brigadier Puneet Kapoor is worthy of consideration for the award of M Phil Degree of Punjab University, Chandigarh.

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(Brig Puneet Kapoor)

Participant

48 APPPA Course

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List of Abbreviations

Abbreviation	Full Form
ACR	Annual Confidential Reports
AE	Adequately Exercised
AMS	Assistant Military Secretary
Brig MS	Brigadier Military Secretary
CG	Compassionate Grounds
Col	Colonel
Col MS	Colonel Military Secretary
CP	Choice Posting
CR	Confidential Report
CDM	College of Defence Management, Secunderabad
DO	Demi Official Letter
DPV	Demonstrated Performance Variables
Edn	Education
HR	Human Resources
Lt Col	Lieutenant Colonel
Maj	Major
Med	Medical
MS	Military Secretary
OAP	Overall Average Point
OLQ	Officer Like Qualities
PPSA	Posting Planning Self-Assessment
PQ	Personal Qualities
QR	Qualitative Requirements

Abbreviation	Full Form
ROI	Return on Investment
SOP	Standard Operating Procedure
SR	Spoken Reputation
UN	United Nations

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EXECUTIVE SUMMARY

Leaders in Indian Army, as in certain other orgs are required and trained, to operate and take critical, life altering decisions under conditions of volatility, uncertainty and high risk. Research has indicated that training, orientation and experience in such domains generates a proclivity towards fast thinking and quick and decisive decision making. Thus the reference point for such decision makers remains an arena of fast paced, variable responses and consequential conditions. As per Prospect Theory, the reference point of a decision maker determines the domain in which they make a decision. Army Officers tend to take decisions under System 1 or fast thinking, which is intuitive, based on heuristics. This is also a Limited Rational Process, as per the Theory of Bounded Rationality.

Research by cognitive psychologists has led to identification of systemic deviations from rationality in human decision making due to presence of biases, framing or priming effects, cognitive disruptions and illusions, and ego depletion. Overcoming these requires cognitive effort and that action is aversive, especially to habituated System 1 thinkers. In addition, people also exhibit a bias blind spot and when faced with large and complex problems, cut them down into bite- sized ones, leading to approximations, means-ends analysis and application of heuristics.

Essentially, leaders are decision makers. The selection of leaders for roles and assignments is a critical function performed regularly, with great diligence and application. Any selection of a leader carries with it a degree of uncertainty of outcome and the consequent risk management necessitated from such selection. For such selection decisions, major portions of the inputs required have been quantified within the HR processes of the Indian Army. However there are still some qualitative judgments required to be taken.

While information may be available in organisation databases, it can be misused accidentally or misinterpreted or even ignored. In some cases, information may not be misused, but those affected may perceive it otherwise, eroding trust in institutions.

Some of the decision makers in the military are occasionally, also involved in the selection and placement of the next generation of leaders. Decision makers for whom the default option is System 1 thinking, the transition to System 2 thinking is effortful. The current process of selection of the right person for the right job, coupled with the conflicting requirements of tenure stability and varied profile, requires examination of a multitude of variables employing significant human effort or System 2 thinking. This also leads to cognitive stress.

The debate on the impact of nature and nurture on leadership qualities is out there. While 'nature sifting' is carried out at the time of entry into service to ascertain OLQ, for 'nurture', Indian Army relies on its formal and informal systems of grooming, training, Professional Military Education and Regimentation. Thus evaluation of leadership qualities, is a continuous process done post commissioning of officers, and is done largely through the ACR.

The Pen Picture is an integral part of this process document. ACR is written by officers with extensive knowledge, experience and seniority. However this aspect of the officer's performance, the Pen Picture, is subjective, not-quantified and at times implicit. It remains, a largely under-evaluated part of the ACR. It has the potential to provide significant inputs for identification of key leadership characteristics which point towards the competency, attitude and performance of the officer, amongst other attributes.

In addition, Indian Army is culturally driven and structured from a paradigm of regimentation. This cultural construct may have the potential to introduce other stereo-

typical errors. Consequently, selection for leadership positions requires a more effortful, objective and unencumbered decision making process.

As a solution to these bounds of rationality, cognitive stresses and perceptions of trust, researchers have suggested use of technology. They have also stressed on the need for training decision makers, in use of tech and the limits and challenges of use of such tools.

There is a significant body of research available on Performance Appraisal in general and the Indian Army in particular especially in the APPPA library and the CDM. However very little of it addresses the aspect of placement/ posting as a product of analysis of the performance appraisal in the Indian Army.

This research is predicated on the need for objective, unbiased and rational selection of personnel especially in leadership roles in the Indian Army, such leaders being critical for the future trajectory of the Army and who are currently selected through a process which is primarily human effort driven.

The research aimed at identifying these typical errors and other inherent biases in decision making in HR functions of Indian Army, specifically related to the posting and placement of officers and to explore whether AI and specifically HR Analytics could assist in overcoming these systemic and human errors/ oversight which are inherent in such human effort based decision making processes.

AI has been proven to have the ability to perform functions that require human intelligence, especially in the field of natural language processing. This ability of AI and specifically Human Resource Analytics needs to be harnessed to achieve the organization aim of right person for the right job. HR Analytics assisted decision making may also be useful in speedier and error-reduced selection of the right person for the right job especially in the leadership positions in Indian Army. If successful, it

could develop into a model for other similarly placed organizations. It could also lead to development of algorithms for creation of generic HR Analytics for Decision Making in HR management.

The research carried out a survey fielded to army officers of all seniorities and Arms/ Services and conducted structured interviews of selected officers who have prior experience of holding HR appointments, in order to understand the current system of decision making. Literature review of the academic papers, official documents and books available on the subject of Decision Theory and AI, specifically (HR Analytics and NLP) was also carried out.

There was also a requirement of analysing Pen Pictures of officers. As this data is confidential, the actual content analysis was carried out on keywords and sample draft available in the open domain and dummy data. Use of HR Analytics as a Business Intelligence framework was also examined to produce a Competency Assessment Framework and a Framework for development of an AI System to execute the envisaged function.

ABSTRACT

Introduction. The need for objective, unbiased and rational selection of officers for leadership roles in the Indian Army, is a given. They are currently selected for postings through largely, a human driven process. This research attempts to ascertain presence of systemic deviations from rationality, like heuristics and biases in this selection process and to harness AI and specifically HR Analytics to develop a Competency Assessment Framework to help overcome. The scope was limited to using Pen Picture of ACR as an additional input to arrive at a Best Fit Model to carry out competency mapping using HR Analytics.

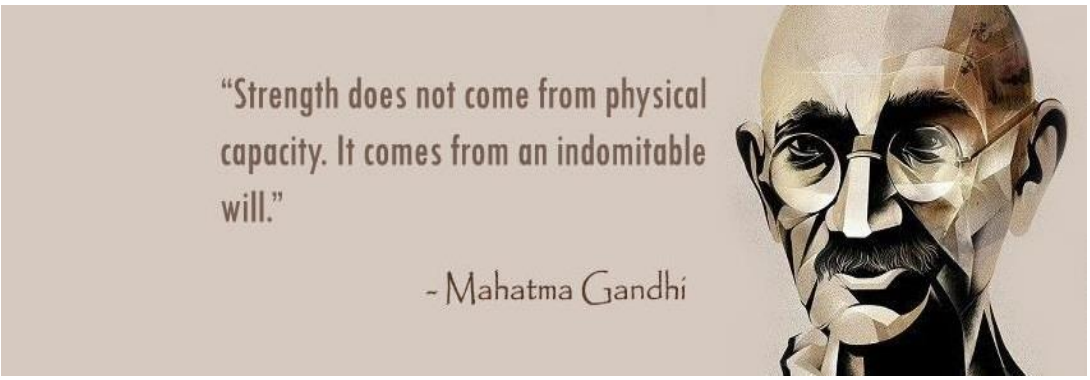
Methods. A cross-sectional survey and "Key Informant" interviews were done to ascertain the views and current system of HR decision making. Literature review was carried out on decision making, AI, HR Analytics and inputs regarding HR policies of Indian Army in the open domain.

Results. Findings indicate that people are generally rational but cognitive errors and biases occur and they employ heuristics and approximations. Military decision making is largely fast thinking (System One), due to reference domain of combat. Lack of deliberation, was not attributed to paucity of information but to presence of biases, stereotypes and application of heuristics.

Discussion. To overcome this, a recommended added percept of Pen Pictures, would lead to better competency assessment. Use of AI as a decision support system has been recommended and a framework for the AI system and for Competency Assessment suggested.

Keywords: heuristics, biases, HR Analytics, AI, Indian Army, Competency Assessment

CHAPTER 1 : INTRODUCTION



1.1 Background

Research by cognitive psychologists has led to identification of systemic deviations from rationality in human decision making. These deviations called **heuristics and biases** form the fundamentals of behavioural decision theory. This theory accurately describes a model for human judgment and choice.

People tend to have a **bias blind spot.** There is less likelihood of detecting bias in themselves than in others. As per research, even an instrument had been reportedly developed and validated, to measure individual differences in this tendency to exhibit a bias blind spot.

As per Prospect Theory, the **reference point** of a **decision maker** determines the **domain** in which they make a decision. If reference point is one of losses, they will be risk averse and vice versa in case of a domain of likely gains. It thus provides a prescriptive way to consider decision making under risk without predicting the decision maker's choice and may reveal their bias towards a risky or overcautious solution.

Large and complex problems are cut down to size by the problem solvers and/or **approximations and heuristics** are applied to them to handle complexity. This is the descriptive approach to theory of problem solving and decision making.

Such heuristics, biases and judgment errors are present in all organisations and domains. Like in other large organisations, this can also affect decision making in Indian Army.

1.2 Selection of Leaders in Indian Army

Essentially, leaders are decision makers. The **selection of leaders for roles** and assignments is a critical function performed regularly with great diligence and application. Any selection of a leader carries with it a degree of uncertainty of outcome and the consequent risk management necessitated from such selection.

Leaders in Indian Army are required to operate and take critical, life altering decisions under conditions of volatility, uncertainty and high risk. They are trained and attuned to take decisions in a domain which largely requires fast thinking – **System 1** thinking.

These same leaders are occasionally, also involved in the selection and placement of the next generation of leaders in the Army. While major portions of the inputs required for such selection decision making have been quantified, there are still **qualitative judgments** to be undertaken. All this is done in a short span of time based on both quantitative and qualitative inputs.

The current process of selection of the right man for the right job, coupled with the conflicting requirements of tenure stability and varied profile, requires examination of a multitude of diverse variables employing **significant human effort**. This information is available in databases, to a large extent. However, parts of it has to be sourced on call, based on the instant requirement of placing an officer in an appointment.

1.3 Possibility of Errors

Unfortunately, information available in organisational databases can also be misused either accidentally or when a decision-maker predicates a decision on a misinterpretation. Other misuses, even if unintended, may directly violate law, morality, or ethical principles. For example, **discrimination** is possible when decisions are consciously or unconsciously made, based on information that incorporates different patterns observed across, say educational background, regimental or gender lines. Information can also be misused when it is ignored. In some cases, information may not actually be misused, but those affected may perceive it otherwise, eroding trust in institutions.

That there are inherent human errors and oversight in any decision making process, has been amply brought out by various researchers in the past. In addition, Indian Army is structured and culturally driven from a paradigm of regimentation. This **cultural** construct may have the potential to introduce other **stereo-typical errors** also. Consequently, selection for leadership positions in Indian Army requires a more effortful, objective and unencumbered decision making process – a different type of thinking is required – **System 2 thinking** or 'slow thinking'. For decision makers for whom the default option is System 1 thinking, the transition to System 2 thinking is **effortful**.

1.4 Trust

A decision regarding posting and placement of an officer has life-affecting impact, both on the professional and personal fronts. It can determine the course of an officer's career as also affect the quality of life of their families. Thus the element of trust required from such a decision making process is centre stage to it. In the context of decision making, this is a high-stakes process.

1.5 Use of AI

For millennia, Homo Sapiens or *Man the Wise* has pondered the **nature of thought** in order to comprehend and exert influence over a world that is much larger and more intricate than ourselves, thanks to human intelligence. AI takes this pursuit to a new level by attempting to understand and create intelligent entities that learns, apply reason and logic to deduce about the world as we know it, including developing an understanding of **natural language** and visuals. In short, systems that perform functions that **require human intelligence**.

1.5.1 AI Enabled Decision Making

Developments in AI have created decision support systems, based on reason and logic and through experiences captured. Its continued usage leads to a better understanding of human intelligence and sensing process. However, the digital revolution has not been fully understood. The pace and volume of communication cause reactions and decisions in digital world without deep reflection. It ascribes greater meaning to immediacy and connectivity while challenging the Enlightenment - **the importance of reason and critical thinking in shaping human consciousness and behaviour** (Kissinger, Schmidt, & Huttenloc, 2021, p. 40)**.** Digitization has thus made human thought less contextual and conceptual, despite its positive impacts (Simon H. , 2019).

Can AI help to overcome the bounds on rationality so placed?

1.5.2 Significance of AI in HR

AI has the ability to help organizations in leveraging talent and create an efficient working environment that enables and empowers an employee, resulting in higher satisfaction levels. It can personalize career development, optimize succession planning, close skills gaps, and steer compensation

strategy. It can develop a model which can unleash Talent Management by **mapping appropriate skill sets with roles**. If required, AI can alert people with the right skill sets to the available jobs, even prior to their posting through predictive analytics. Overall, AI in HR can boost our analytic and decision-making abilities by providing **"Right Person, Right Seat."**

1.6 Likely Result of Research

This research aims to identify typical errors and inherent biases in decision making in HR functions of Indian Army and explore whether HR Analytics could assist in overcoming these. HR Analytics assisted decision making may also be useful in speedier and **error-reduced selection** of the right person for the right job especially for the leadership positions in Indian Army.

If successful, it could develop into a model for other organizations operating under conditions of uncertainty and risk. It could also lead to development of algorithms for creation of generic HR Analytic Solutions for Decision Making in HR management.

1.7 Chapterisation

1.7.1 Chapter 1 : Introduction

It gives a broad aim and rationale for this study on effectiveness of decision making in Human Resource functions of Indian Army, and the major issues arising with specific reference to biases and other systemic errors. It also gives a brief background on the development of AI and HR analytics.

1.7.2 Chapter 2 : Research Methodology and Collection of Data

It includes the Statement of the Problem, Research Objectives, Strategy and Design, Research Questions, Scope/ Limitations/ Delimitations, Research Methods applied, the data sources and the Chapterisation Scheme.

1.7.3 Chapter 3 : Literature Review

This chapter elaborates on the major literature reviewed on the subjects of Decision Theory, AI, HR Analytics and the HR functions of Indian Army pertaining to performance appraisal, postings and placement of officers.

1.7.4 Chapter 4 : Existing System of Competency Assessment in Indian Army

This Chapter commences with the analysis of qualities required for leadership roles in the Indian Army and the process by which they are identified in officers at the time of selection and subsequently in service. It also analyses the existing system of performance evaluation in the Indian Army and summarises the process and data inputs that are utilised for Competency Mapping. This is based on the information available in the open domain and Key Informant Interviews.

1.7.5 Chapter 5 : Biases in Decision Making

This chapter discusses the theoretical background behind the presence of biases and errors in decision making and the coping mechanisms employed by decision makers to overcome these cognitive errors. It is broadly divided into the activities pre-decision making process and during the decision making process. It also discusses System 1 & 2 thinking, dwells on the Military decision making process and how it differs from that of the civilian world.

1.7.6 Chapter 6 : Philosophy and Science of AI

This chapter discusses the theoretical underpinnings of AI to include the philosophy and science behind it and the practical engineering approaches to its implementation. It draws on references to its evolution, its application in the military, the biases emerging due to its application to decision making processes

and the means to manage this technology. It also talks of the approaches that can be followed and the methods available for implementation.

1.7.7 Chapter 7 : Data Analysis and Discussions

The Survey Questionnaire, the responses to it and the analysis there on are discussed in this chapter. It also gives out the sample size requirement, the types of questions asked and the classification of the subjects.

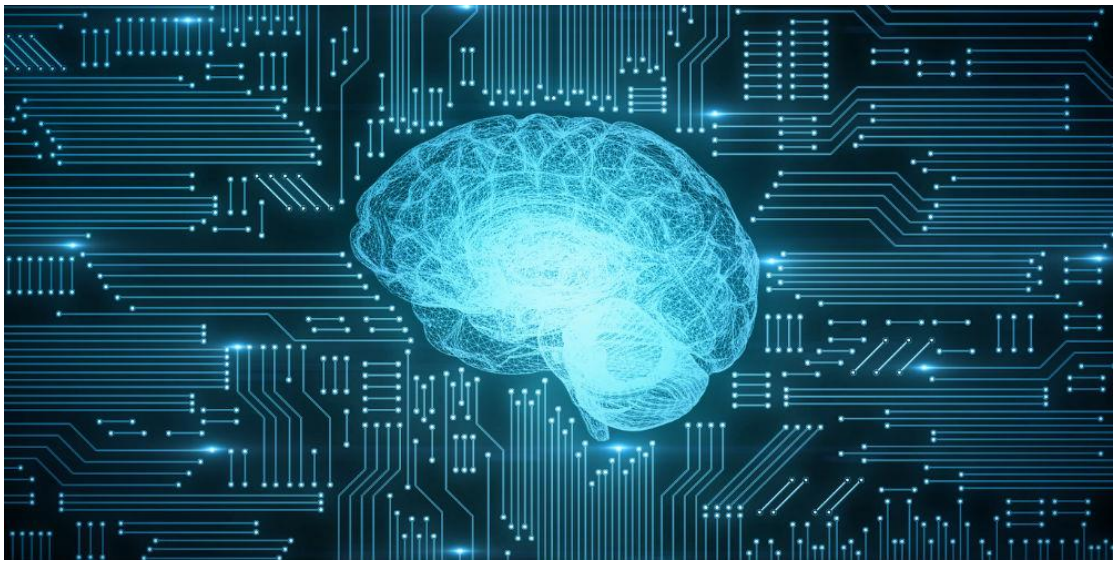
1.7.8 Chapter 8 : Use of HR Analytics to develop Business Intelligence Framework

This chapter discusses the application of AI in the field of HR Analytics and gives out practical solutions to problem solving. It builds on the preceding theoretical discussions and data analysis to suggest development of a framework for an AI system for competency assessment in the Indian Army. It gives out the components of such AI system, the data sources, the AI task environment and the Agent Function. The inputs to Agent Function are detailed and it's functioning elaborated using an example Use-case being analysed. The relevant sample analysis based on NLP is carried out and the results appended.

1.7.9 Chapter 9: Findings, Recommendations and Conclusion

This chapter sums up the findings emerging out of Chapters 3 to 7 and the recommendation given for implementation in the form of specific answers to the three Research Questions asked initially in Chapter 2. In the end, the key recommendations are summarized and the likely way ahead given.

CHAPTER 2 : RESEARCH METHODOLOGY AND COLLECTION OF DATA



2.1 Subject

Decision Theory and AI

2.2 Title

Effectiveness of decision making in Human Resource functions of Indian Army.

2.3 Statement of Problem

There is a need for objective, unbiased and rational selection of personnel especially in leadership roles in the Indian Army. Such leaders are critical for the future trajectory of the Indian Army and they are currently selected through a process which is largely human driven. AI and specifically HR Analytics has the potential to assist in overcoming certain systemic and human errors/ oversight which are inherent in such decision making processes. This ability of HR Analytics needs to be harnessed to achieve organization aim of right person for the right job.

2.4 Objectives

2.4.1 To ascertain presence of heuristics and judgment errors in decision making in Human Resources functions of Indian Army.

2.4.2 To identify the likely effect of heuristics and judgment errors on HR policy in order to ascertain the major issues and competency mapping challenges.

2.4.3 To develop a framework for an AI based Competency Assessment Framework to help identify the relevant competencies with standards and measuring them to develop employees as per roles.

2.5 Research Strategy and Design

The research followed a mixed research strategy. A quantitative strategy and a cross-sectional descriptive design to ascertain presence of heuristics and judgment errors in decision making. A qualitative strategy with an interpretive design was followed, to study the existing system of decision making in HR processes of Indian Army with limitation of scope as indicated later. Then a quantitative strategy was applied to develop a framework for an AI based Competency Assessment Framework to help in identifying the relevant competencies with standards and measuring them to place employees as per roles. The Convergence was in one phase and the results interpreted subsequently.

2.6 Research Questions

2.6.1 What are the heuristics and judgment errors in decision making in Human Resources functions of Indian Army?

2.6.2 What are the effects of heuristics and judgment errors on HR policy and competency mapping in Indian Army?

2.6.3 What kind of AI based Competency Assessment framework can be prepared to identify relevant competencies with standards and measuring them to place employees as per roles?

2.7 Scope/ Limitations/ Delimitations

2.7.1 The scope of the Dissertation is limited to analyse the HR function of MS Branch in selection of officers for appointments.

2.7.2 The Competency Assessment Framework is based on the Pen Picture of Indian Army officers in order to arrive at a Best Fit Model to carry out skill mapping using HR Analytics.

2.7.3 It has been said that an AI system is only as good as the data it accepts. When the data used to train the machine is not sufficiently diverse, biases may arise. However, it can be argued that even when the data is perfect, it actually reflects social bias, such as gender and ethnic differences. This is likely to be a limitation of the model so developed.

2.7.4 Research has indicated that sometimes biased software tools that use AI and ML algorithms to aid in decision making can worsen societal inequities when used in some domains, such as health care and criminal justice. This is also likely to be a limitation of the model so developed.

2.7.5 During a period of uncertainty, it is crucial to ensure that such decision aids—in particular, those used by agencies executing sovereign functions — produce equitable outcomes. For example, the U.S. Department of Homeland Security (DHS) already fields such decision aids e.g., facial recognition for airport screening. These current and planned software implementations need to be examined further for potential bias.

2.8 Research Methods Applied and Data Sources

2.8.1 Primary Data

The research initially carried out a survey to determine environmental view on presence of heuristics and biases in decision making in HR functions of Indian Army. A cross-sectional survey was fielded to army officers of all seniorities and Arms/ Services with branching questions.

Thereafter "Key Informant" interviews were done, of selected officers who have current/ prior experience in tenanting HR appointments related to competency mapping, in order to ascertain the current system of decision making.

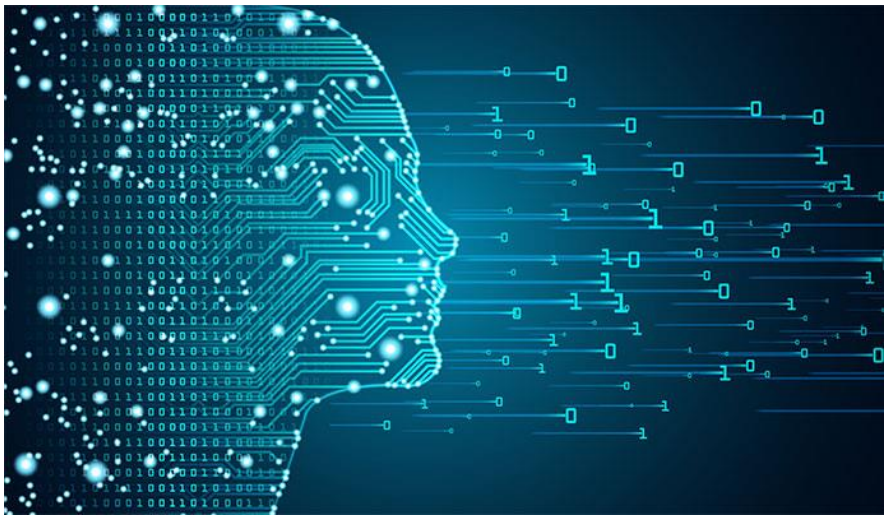
There was a requirement of analysing Pen Pictures of officers. As this data is confidential, the actual content analysis was carried out on keywords and sample drafts available in the open domain. This keyword and sentiment analysis was carried out to determine attributes required for staffing particular appointments and to discern patterns in writing of pen pictures which could be utilized in evaluation of a Best Fit solution for skill mapping of officers.

2.9 Secondary Data.

2.9.1 Literature review was carried out of the academic papers and books available on the subject of decision making, AI and HR Analytics as also, the inputs regarding HR policies of the Indian Army which are available for examination in the open domain.

2.9.2 Finally, use of HR Analytics as a Business Intelligence tool was examined, based on available literature.

CHAPTER 3 : LITERATURE REVIEW



3.1 Scope of Literature Review

The topic and subjects of research, Decision Theory and AI, both have a vast scope, a large body of literature available and have been studied extensively by scholars, scientists and engineers. However, limited literature exists on utilisation of AI in HR Analytics and the connected issue of HR Functions of Indian Army (in the open domain). The available body of literature have been scrutinized and literature review done based on broad research parameters and questions framed.

3.2 Decision Theory

3.2.1 Amor Tversky and Daniel Kahneman in their seminal paper (Judgment under uncertainty: Heuristics and biases. science, 185(4157), pp.1124-1131., 1974) have described three heuristics that are employed in making judgments under uncertainty:-

Representativeness, which is usually employed when people are asked to judge the probability that an object or event A belongs to class or process B. This is explained with the help of an example in the paper which is very relevant to our discussion of competence mapping

being influenced by an existing stereotype/ bias. “Steve is very shy and withdrawn, invariably helpful, but with little interest in people, or in the world of reality. A meek and tidy soul, he has a need for order and structure, and a passion for detail." “In the representativeness heuristic, the probability that Steve is a Librarian, for example, is assessed by the degree to which he is representative of, or similar to, the **stereotype** of a librarian”.

Availability of instances or scenarios in memory, which is often employed when people are asked to assess the frequency of a class or the plausibility of a particular development.

Adjustment from an **anchor**, which is usually employed in numerical prediction when a relevant value is available.

These **heuristics require less resources** and are usually effective but they lead to systematic and predictable errors. The research was supported by DARPA and it investigates human decision-making, specifically what human brains tend to do when we are **forced to deal with uncertainty or complexity**.

Based on experiments carried out with volunteers, the authors discovered that humans make predictable **errors of judgement** when forced to deal with **ambiguous** evidence or make challenging decisions. A better understanding of heuristics and biases will improve judgment and decision making, especially under conditions of uncertainty.

3.2.2 Amor Tversky and Daniel Kahneman in (Prospect Theory: An Analysis of Decision under Risk Daniel Kahneman; Amos Tversky, 1979) have critiqued the existing Expected Utility Theory which models decision making under risk in a descriptive manner. As an alternative, they have developed a

model, called the **Prospect Theory**. Choices taken in risky prospects show several effects that do not conform to the basics of utility theory. As per this theory, people give more weightage to outcomes which seem certain, as compared to the probabilistic ones. This tendency, called **Certainty Effect**, contributes to risk aversion in choices involving sure gains and risk seeking in choices involving sure losses. This is the fundamental reason why people prefer to sell options rather than buy them, in spite of the probability of unlimited losses vis-a-vis assured small gains. People have a tendency to discard commonalities amongst prospects, a tendency called as **Isolation Effect**. This tendency leads to different choices being made when presented in different forms. An alternative choice theory entails **assigning weights to decisions** instead of using probabilities of outcomes. The resultant is concave for gains and convex for losses (losses tend to be steeper than gains). Probabilities assigned in the original theory were generally found to be higher than the decision weights given in the alternative theory. This partly explains the attractiveness of both insurance and gambling. The authors however had stated that the manner in which complex options or compound prospects are reduced is yet to be investigated.

3.2.3 In this paper (Decision Making and Problem Solving, 1987), Herbert Simon converges the two fields of Decision Theory and Computer Science to achieve a more productive society. Domains/ applications include "**expert systems**, conflict resolution, agenda setting, **decision making in an organizational setting**, and empirical studies of individual behaviour". As per him, this was a largely neglected field with little funding and support. He believed that the opportunities in the field justified support.

3.2.4 Bukszar, E., & Connolly, T. (Hindsight Bias and Strategic Choice: Some Problems in Learning From Experience, 1988) have posited that knowing eventual outcomes often distorts later re-evaluation of initial decisions. They have also asked the question **whether training in strategic decision making helps overcome Hindsight Bias**. They have also talked about how descriptive theory of problem solving and decision making is majorly concerned with "**how people reduce problems down to a manageable size"** and how "**heuristic techniques are applied to handle complexity** that cannot be handled exactly". They have demonstrated that people solve problems by selective, "**heuristic search through large problem spaces"** and large data bases, "**using means-ends analysis** as a principal technique for guiding the search". Study One uses case study analysis carried out with 48 subjects with three different versions of the case followed by a Group Discussion. Study Two used two version case studies and 26 participants. The authors have expressed the need to analyse real decision makers and their decisions and to be cautious in extending studies of MBA students to behaviour of seasoned professionals.

3.2.5 In this book (Klahr & Kotovsky, 1989), the contributing authors who are all experts in cognitive science discuss their research programs and how they were influenced by Herbert A. Simon's work. The book covers various topics, including problem-solving, imagery, reading, writing, memory, expertise, instruction, and learning, showing how **Simon's contributions** have delivered **coherence across different disciplines in Cognitive Sciences**.

3.2.6 (Simon H. , 1996) is the autobiography of Herbert A. Simon who was awarded the Nobel Prize in economics for his Theory of Bounded Rationality.

Simon discusses his work in several fields, such as information sciences, psychology, and computer simulation. He explores how his work in these areas helped to explain other aspects of his life and how his **Theory of Bounded Rationality** led to a Nobel Prize in economics. Simon also discusses how his work on building **machines that think, based on the manipulation of symbols,** laid conceptual foundations for the new field of cognitive science.

3.2.7 In his ground-breaking work (Simon H. , 1997), Herbert Simon gives a systematic analysis of the **decision-making process** and the **factors** that influence it in organizations. Simon's theory is that this process is just **satisfying** the necessary constraints and is **sufficient** to **clear the bar rather than giving an optimum and fully rational decision**. This is due to **limitations of human cognition**, the complexity of organizations that make it difficult to gather information necessary and the paucity of time and processing resources/ cognitive capacities to process all the information necessary to make optimal choices. He thus argues that decision-makers use heuristics or "**rules of thumb**" to simplify the decision-making process, and that these heuristics are shaped by organizational norms, values, and culture. He thus had coined the term '**satisficing'** to explain the phenomenon.

3.2.8 (Kahneman, 2012) posits that people have systematic errors in thinking which are due to "**design of the system of cognition rather than an impact of emotion on thought"**. He has talked of two systems of thinking – the fast and the slow. Normally when faced with a problem set, we arrive at a solution, intuitively or through application of a heuristic (System 1 thinking). When this fails, i.e, neither an expert intuition nor a practiced and known heuristic comes to mind, we move to the slow system or System 2 thinking which is more

deliberate and **effortful** form of thinking. During good times, which is usually most of the time, System 2 follows System 1 with little or no modification. The decision maker goes by impressions and acts on desires and it usually comes out fine. However, in certain cases, System 1 results may be incorrect or the domain itself may require System 2 thinking.

3.2.9 Scopelliti (Bias blind spot: Structure, measurement, and consequences, 2015) found that people tend to exhibit a "**bias blind spot"**. They are less likely to detect bias in themselves than in others. They also created an instrument which measures individual differences in this tendency to exhibit a bias blind spot and **predicts** its extent and people's willingness and ability to ignore the advice of others. It is not like the normal measures of **intelligence**, decisiveness and levels of "self-esteem, self-enhancement, and self-presentation". This bias blind spot has an effect on judgment and behaviour. The study adopted a psychometric approach to the analysis of Bias Blind Spot **based on five studies**. The first two studies developed the measurement scale for assessing the belief of an individual about his level of bias relative to peers. This was based on an initial sample size of 172 and a follow on sample of 83 and a confirmatory factor analysis in the second study. The last three studies report tests of the three judgmental predictions. The study has also identified that the bias blind spot scale may have the ability to predict extent of presence of other traits and biases. This however requires further research.

3.2.10 (Decision Making under Deep Uncertainty: From Theory to Practice, 2019) discusses the seminal work of (Knight, 1921) who had distinguished between "risk (for which probability distributions are known)" and "true uncertainty (for which probability distributions are not known)". The latter

occurs due to an “info-gap” which he defined as lack of knowledge of processes, relationships, strategies or intentions of entities, organisations and events i.e, all actions which affect a system environment. These gaps are quantified and modelled non – probabilistically and is not ignorance. **At the time of decision, these info – gaps are the difference between “what you think you know” and “what you actually need to know” for making a rational decision**.

3.2.11 (Gelder, Lockwood, Roberts, Williams, & Conley, 2021) found **that information available in organisational databases can be misused either accidentally** or when a decision-maker predicates a decision on a **misinterpretation**. Other misuses, even if unintended, may directly violate law, morality, or ethical principles. For example, **discrimination** is possible when decisions are made based on information that incorporates different patterns observed across categories. Information can also be misused when it is ignored. In some cases, information may not actually be misused, but those affected may perceive it otherwise, **eroding trust in institutions**.

3.3 Artificial Intelligence

3.3.1 In his seminal work (Computing Intelligence and Machinery, 1950) Alan Turing considered the questions “**Can Machines Think**?” He went on to define the words ‘machine’ and ‘think’ and came up with a game called “**The Imitation Game**”, with the object being for an interrogator to determine which of his two subjects was a man or a woman. And in order to answer his original question, he replaces the interrogator with a machine. With the help of this game, he defines what would be a Digital Computer, what all types of actions it could take and how it would function. He also examined the philosophical

questions likely against developing such a machine to include the theological, human (both physical and psychological) and mathematical objections. He ends the paper with the proposition of a **Learning Machine** with a 'child' brain programme and an 'educator' training programme for the child, with a reward system and the use of propositional logic. Another very interesting point put forth is that for the 'teacher' the 'child's' brain is a black box. What is of essence in this paper is that all these questions are the ones we are grappling with even today. We shall seek to understand some of these in this dissertation also.

3.3.2 (Barr, Feigenbaum, & Cohen, 1981) is a reference book covering over 200 short articles on the major ideas, techniques, and systems developed in the field of AI, for people without a background in AI. These articles are primarily overviews, guides to programming techniques, and references to the extensive literature of the field. The topics covered include heuristic problem-solving programs, **how computers understand English,** semantic nets or frames, and whether computer programs can outperform human experts.

3.3.3 (Patterson, 1992) gives a comprehensive overview of important aspects of artificial intelligence and expert systems, highlights the importance of knowledge-system approach and the practical use of knowledge in specific systems. One major focus of the text is on knowledge representation, which includes methods for dealing with uncertain, incomplete and vague knowledge. It covers different areas including Knowledge Representation, Organisation and Manipulation, Perception, Communication and Expert Systems and Knowledge Acquisition. The text gives a broad understanding of the field of

AI and expert systems, including their underlying principles and practical applications.

3.3.4 (Russell & Norvig, 2015) discuss how humans or Homo sapiens are called —**man the wise**— due to our intelligence. Humans have tried to develop an understanding of the thinking process, perceptions, understanding, the way humans forecast or tinker with the world which is bigger and more complicated than them. **AI, has the potential to go beyond just understanding to building intelligent entities**. AI is an envelope or umbrella term for number of subjects including **computational linguistics**, machine learning, robotics, **cognitive psychology** and computer vision amongst others which have applications in domains ranging from games, mathematical theorems, writing poetry, autonomous cars and medical diagnosis and now even surgery.

3.3.5 (Antebi, 2021) states that "**an AI system is only as good as the data it accepts**." The Machine Learning data could suffer from two flaws. If it was an accurate reflection of the current dominant world view, it may reflect the existing social biases along gender, ethnic, race etc. If it was not well sampled, it may give rise to new biases.

3.3.6 In (Ferreira & Monteiro, 2021), the authors talk about Explainable AI or XAI, as used in the fields of AI and ML. They posit that XAI is the key to building trust and helps in building Human Centred Computing. This is especially so for decision support systems in which human context is essential and sometimes life critical, like in medical and law enforcement domains.

3.4 Military Competency Assessment

3.4.1 Jason W. Warren (The Centurion Mindset and the Army's Strategic Leader Paradigm, 2015) found that the US Army culture was stuck in the

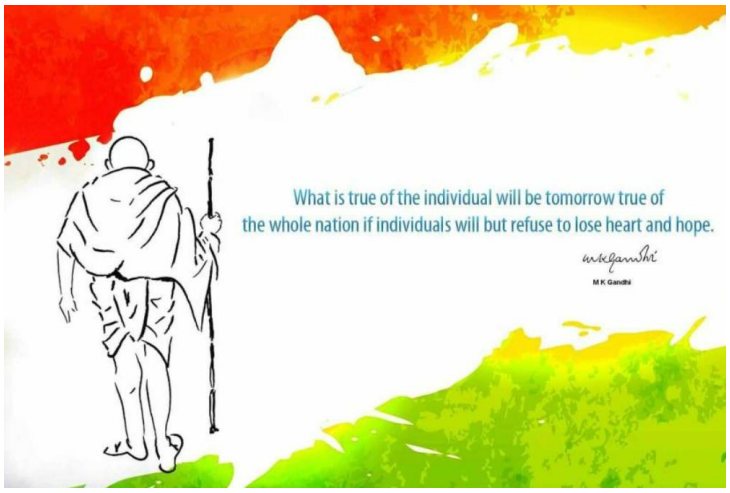
1950's and gives scant importance to latest professional military education. This was due to structural issues like the mammoth bureaucracy and an obsession with operating at the tactical level leaving the strategic performance stuck in the Korean War era. **Bureaucracies work well with simple, well-defined tasks but are unable to recognise the value and contribution of leadership and the initiative & innovation it produces**. The personnel employed in the HR vertical are not HR specialists and operate within the confines of a military bureaucracy which itself is designed for management type efficiencies against adaptive leadership requirements of the VUCA environment of war fighting.

3.4.2 Brig BP Singh, in his Dissertation for APPPA - 42 Course, has talked about the need for making decisions about employees performance appraisals without bias as it will impact their postings, promotions and other attendant benefits. He has given out the essentials of a sound appraisal system with the aim of finding the "Right person for the right job". He has also highlighted the need for selection of the right leadership for the Indian Army. He has dwelt upon the complete appraisal system of the Indian Army, analysed various comparable systems existing in the world . The Study has recommended changes to improve the objectivity and acceptability of the existing appraisal system and to overcome the problem of inflationary trend in reporting. As per the study, the **performance appraisal system** has got linked almost completely with the promotional aspects and thus **lost sight of** the other aspects including **competency assessment and mapping**.

3.4.3 In addition there is a significant body of research available on Performance Appraisal in general and the Indian Army in particular especially

in the APPPA library and the CDM. However I found that while the research addresses promotional aspects, it doesn't address the aspect of placement/ posting as a product of analysis of the performance appraisal in the Indian Army.

CHAPTER 4 : EXISTING SYSTEM OF COMPETENCY ASSESSMENT IN INDIAN ARMY



4.1 Background

The ultimate objective of the Army is to have a superior decision-making power over the enemy. Decision superiority can be defined as the degree of **domination of the cognitive domain** an organization achieves through its decision-making process.

Decision-making is a crucial attribute of leadership. The selection of the right leader at all levels is therefore the key.

A lot has been said and written on leadership in general and military leaders in particular. However a summation of the requirements of the military from its leadership, especially in the Indian Army, is germane to this dissertation.

In his book, ***Leading Change***, **John Kotter** uses the following definitions :-

4.1.1 "**Management** is a set of processes that can keep a complicated system of people and technology running smoothly…important aspects include planning, budgeting, organizing, staffing, controlling, and problem solving…".

4.1.2 "**Leadership**… creates organizations in the first place or adapts them to significantly changing circumstances. Leadership defines what the future

should look like, aligns people with that vision, and inspires them to make it happen."

4.2 Requirement of Indian Army

The Indian army requires inspirational leaders who can integrate different teams and lead them towards achieving organizational objectives, particularly in times of war and war-like situations that may affect the physical and mental well-being of the leader and the led, while making them the best they can be. The Indian Army achieves it through a combination of nature and nurture – '**nature sifting**' is done at the time of selection in the **Services Selection Board** or SSB by selecting only the candidates with the right '**Officer Like Qualities'**. For 'nurture', the army relies on its formal and informal systems of training, **Professional Military Education** and **Regimentation**, to groom an officer to achieve higher organisational aims through exertion of leadership.

4.3 Military Leadership

4.3.1 Military history is replete with examples of effective leaders such as Field Martials KM Cariappa, SHFJ Manekshaw, and Lt Gen Sagat Singh, amongst others, who rose to the occasion and the pinnacle of their organisations because of their abilities, both strategic and personal. These were inspirational leaders who achieved military success (Sinh, 2021).

4.3.2 Military officers need both leadership abilities and managerial skills. In addition, they are required to possess certain domain specialisation professional/ technical skills like Legal and Medical. However the selection at the SSB level is primarily for the qualities reflecting leadership abilities which are defined as '**Officer Like Qualities**' (OLQ) (Leadership Principles, Officer Like Qualities and the Selection System, 2016).

4.3.3 OLQ

There are certain innate characteristics that are essential for effective leadership while other qualities and skills of a military leader can be developed over time through experience and training. These include qualities such as integrity, decisiveness, and the ability to inspire and motivate others. A strong leader must also be able to communicate clearly and effectively, and listen to the concerns and ideas of subordinates. Additionally, successful military leaders must be adaptable and able to think creatively and strategically in a rapidly changing environment. They must be able to analyse complex situations, make sound judgments, and take calculated risks. A good leader must also be able to build and maintain strong relationships with allies, subordinates, and superiors. (Mehra, 2022)

4.3.4 Development of Leadership

Ultimately, the qualities and skills required for effective military leadership are multifaceted and complex, and they can only be developed through a combination of natural aptitude, training, and experience. The most successful military leaders are those who are able to draw on all of these resources to make **wise decisions** and inspire their troops to achieve their objectives (Leadership Principles, Officer Like Qualities and the Selection System, 2016).

4.4 Nature Sifting

The Indian Army carries out an **assessment of leadership qualities** during selection of candidates for officer ranks at the SSB. The assessment is based on four factors with fifteen sub factors. These are a summation of the innate characteristics required to be present at the time of selection, to be sharpened through training and

regimentation. These are self-explanatory and are listed as under (Leadership Principles, Officer Like Qualities and the Selection System, 2016) :-

4.4.1 Factor – I (Planning and Organising)

Effective Intelligence, Reasoning Ability, Organising Ability and Power of Expression.

4.4.2 Factor – II (Social Adjustment)

Social Adaptability, Co-operation and Sense of Responsibility.

4.4.3 Factor – III (Social Effectiveness)

Initiative, Self Confidence, Speed of Decision, Ability to Influence the Group and Liveliness.

4.4.4 Factor – IV (Dynamic)

Determination, Courage and Stamina.

4.5 Nurture : **Personnel Management in the Military**

4.5.1 Large armies are institutionalised with huge bureaucracies, especially when they are undergoing transformations. They evolve slowly. During peacetime, the focus is on optimisation of resources and thus there is an emphasis shift away from leadership towards management, where process takes precedence over the person. “An emphasis on techno-bureaucracy—where efficiency and better processes are paramount” overlooks the strategic while encouraging efficient management (Bureaucracy and Mission Command: Reform the Army Personnel System to Embrace Mission Command, 2016).

4.5.2 Personal management follows rigid, formalised career paths. Bureaucracies have a tendency to develop and promote individuals who are able to identify and navigate the enlightened routes which enable personal

progression. What is required is **a system which identifies and takes into account, an officer's unique skills** (which may not be special, simply unique)**, attributes, abilities and qualifications** and then offer assignments. (Bureaucracy and Mission Command: Reform the Army Personnel System to Embrace Mission Command, 2016).

4.6 Selection of Leaders in the Indian Army

4.6.1 Some of military leaders are occasionally, involved in the selection and placement of the next generation of leaders in the Army.

4.6.2 For such selection decisions, major portions of the inputs required have been quantified. However there are still some qualitative judgments required to be taken (Singh, 2017).

4.6.3 While major portions of the selection process is based on the Annual Confidential Reports which by themselves are largely quantified and amenable to statistical evaluation, **there are a significant proportion of the inputs for the selection process which are not quantified**. These include the spoken reputation of the officer and the Pen Picture which contains tacit and implicit knowledge. Knowledge of his discipline, medical and other key performance areas is explicit[1].

4.7 Annual Confidential Report

4.7.1 Performance Report

The ACR is the annual performance analysis of officers graded by the Initiating Officer (IO), who is the immediate superior officer of the Ratee (the officer reported upon) after a minimum of 90 days of service under them. The ACR ranks officers on 22 qualities such as situation response, problem solving

[1] Appendix C – Responses to Key Informant Interviews

capabilities etc. Officers can see their grades in 17 of the 22 qualities listed under two heads of PQ (Personal Qualities) and DPV (Demonstrated Performance Variables). They can also view their Pen Picture which describes their conduct and other performances (Budhwar, 2018).

4.7.2 Period Under Review

Besides the mandatory stipulation of 90 days physical service, between the Ratee and the IO, there is a minimum stipulation of concurrent service of 75 and 30 days with the Reviewing Officer (RO) and the Senior Reviewing Officer (SRO) respectively (Singh, 2017).

4.7.3 Technical Reporting

In addition, to the normal channel of reporting by the IO, RO and SRO, there is the Special to Corps Reporting by senior officers of the same Arm/ Service as the Ratee. This is provided for in case of officers other than of Combat Arms (Infantry, Armoured Corps and the Mechanised Infantry). In this technical chain of reporting, the reporting officers are First Technical Officer, Higher Technical Officer and Head of Arm/ Service (Casemine, 2017).

4.7.4 Pen Picture

Of these six who report on the Ratee (three in case of the Combat Arms), four officers write a Pen Picture about the Ratee (IO, RO, FTO and HTO). All these officers are senior in rank and have considerable experience. For e.g, in the case of a Lieutenant Colonel as a Ratee, the IO and FTO would be Colonels and the RO and HTO, Brigadiers. However this aspect of the officer's performance which is subjective and at times tacit, remains a largely under-evaluated part of the Annual Confidential Report. As it emerged in the Key Informants Interviews carried out as a part of this research, the Pen Picture has

the potential to provide significant inputs for identification of key leadership characteristics which point towards the competency, attitude and performance of the officer, amongst other attributes (Singh, 2017).

4.8 Posting of an Officer : Current System of Competency Assessment[2]

4.8.1 Decision Makers

Officers involved in the posting process are as under :-

AMS, Col MS and Brig MS of the line MS Section in all cases up-to the rank of Lt Col[3]. Routinely it is a three-officer approval process.

All postings of Cols and certain sensitive/quasi-sensitive postings of Lt Cols and below would also require the next level approval, that of the Additional MS i.e, the fourth level.

Sensitive postings of Cols and command planning (or placing officers in command of Units) would also require approval of the Military Secretary i.e, the fifth level or the Department/ HR Head.

4.8.2 Essential Inputs Required

Inputs are taken in both, digital and physical formats. These include but are not limited to the last five years ACR grades, past posting profile, education and training qualifications of the officer, personal and family profile.

Special or Adverse Comments

Any special mentions or adverse comments endorsed by reporting officers, particularly with respect to personal qualities and suitability for

[2] Appendix C – Responses to Key Informant Interviews
[3] Please refer section on abbreviations.

sensitive appointments are endorsed in the system. This becomes an added input for promotion boards/ panel postings etc.

For sensitive appointments, there is an institutionalised process of obtaining feedback and carrying out a Spoken Reputation check.

4.8.3 Additional Inputs Available (Pen Picture, Spoken Reputation and Self Appraisal)

Pen picture is not being utilised at all for posting planning. Only adverse inputs are being captured by the library section in database and utilised for screening for panel selection.

Spoken Reputation check is carried out at designated levels while officers come up in the panel for certain designated appointments only. **These inputs are not readily available** and have to be obtained. Takes about upto 2 hours per instance.

Self-Appraisal is not utilised at all.

4.8.4 Other Factors Affecting Competency Assessment.

Framing

The frame of reference under which a decision is being taken, plays a role in shaping perceptions and attitudes (Further reflections on the elimination of framing bias in strategic decision making, 2002). In the posting decision making process, it was felt by the Key Informants that up-to 50% of the proportion of decision, could be subjective and hence affected by framing.

Load on Cognition

Carrying out postings of an officer is a stressful job ranging from optimum to heightened stress. Approximately up to one to two hours is spent by an AMS for posting of one officer (not counting the move of units and

detailing of officers for courses. While some postings may just take five minutes, say an officer on completion of a staff appointment going back to parent unit on AE on being relieved by MS-1, there are others that would involve deep selection and carrying out IO/ RO, regimental, regional and spoken reputation check. Posting planning also requires a lot of background work and data updating.

SOP

Large organizations run on SOP and programs. These tend to narrow range of decision options (Bureaucracy and Mission Command: Reform the Army Personnel System to Embrace Mission Command, 2016). This is also the case in Indian Army. However there is scope for deviating from these under certain conditions such as when there is shortage of officers meeting the QR, or for compassionate ground postings, or when 'organisational interest' so demands.

4.8.5 Miscellaneous

Qualifications/ suitability of an officer is mapped to the QR of an appointment before posting. Only OAP, medical category, course grades etc are used. For certain appointments, there are basic QRs and desirable QRs given by Line Directorates. Key Informants expressed the need to incorporate officers' strengths and weaknesses.

4.9 Competency Assessment Frameworks

4.9.1 Certain qualities/ attributes/ inputs utilised for competency assessment framework are given below. Some of these or their equivalent, which are utilised in posting planning and the sources of these inputs are given in Table 1 below.

Table 1

Inputs for Posting Planning

Qualities/ Attributes/ Inputs	**Utilised (Yes/ No/ Partially)**	**Data Source**
Skill	Partially	OAP, Course grades
Behaviour (Personal Qualities)	Partially	SR Check when applicable
Education (formal)	Yes	Courses
Knowledge (informal/ demonstrated)	Partially	OAP, Course grades, Spoken Reputation Check, if done
Activities in the role assigned	No	
Use of time (for task execution/ org development)	No	
Inter personal Relationships	Partially	Spoken Reputation Check when applicable
Contributions/ accomplishments (Beyond assigned role)	Partially	If intimated by the reporting officers
Experiences (other than role assigned)	No	
Benefits/ wellness (CG/ CP/ Med/ Edn grounds)	Yes	Through documents specifically sought for the purpose and verbal feedback from chain of command
Passion/ purpose (or inclination)	No	Except in rare cases when officers themselves volunteer for certain assignments.

Note. Source : Key Informant Interviews

4.9.2 **Non-financial Compensation.** These are used as employee retention/ encouragement tools. UN Missions/ Foreign assignments and Career Courses etc may be seen as analogous to this form of compensation. Certain other

factors such as field service, gallantry awards etc have been quantified to evolve a matrix. In addition minimum physical standards and power of expression are checked through formal interview. The recommendations for these and other such non-financial compensations are available in the form of CR grades, and course performances only to the section dealing with these and not to the posting planning officers. **One view expressed is that this aspect, may be kept out of the purview of the Competency Assessment Framework**.

4.10 Increasing the Info Pool for Competency Assessment

Extreme outcomes are most likely to be found in sparsely populated domains and hence decisions taken with lesser information may be sub-optimal (Kahneman, 2012). It was also felt that there is need for enhancing info pool available for posting planning without impacting cognitive abilities of the officers dealing with it.

4.10.1 Structure Pen Picture

In order to increase data capture for the above mentioned process, one of the views expressed by the subjects of the Questionnaire was that is there a need to structure the pen picture a bit more rigidly and/ or quantify certain parameters while leaving space for subjective inputs. This was not agreed to by some of the Key Informants on the grounds that the pen picture should be lucid, descriptive and unbound. A Pen Picture rigid one would degenerate into something akin to the quantified portion of CR and then there would be no need of AI.

4.10.2 Other Suggestions for Increasing Inputs

There are three basic factors that need to be considered while carrying out posting planning. These, in the order of priority are Right man for the Right

Job, Tenure Stability (quantifiable) and Varied Exposure (quantifiable). While the latter two lie in the quantitative domain and can clearly be laid out in numbers, the **1st and the most important is the one on which least input is available**.

Ideally the **Strengths, Inclinations and the Skill Sets** of an officer **can accurately describe be described by the reporting officers** based on his or her demonstrated performance. Naturally, this input ought to become the most important factor for posting planning.

Artificial intelligence can play a major role in overcoming the current lacunae in selection of the right man for the right job by **capturing pen picture** of officers.

4.11 Use of AI in Competency Assessment

AI can assist in helping generate a coherent picture about the skillsets, inclinations and strengths of an officer based on his/her demonstrated performance, which would have been reflected in the pen picture by the reporting officers. Field/peace profile, course grades, CR points, employment restrictions and tenure stipulations are the basic parameters utilised for posting planning. There could also be certain QRs given by the concerned line Directorates. Vacancy accrual, batch strength etc add another dimension. Naturally, when there are multiple factors under consideration, **the inherent biases of the MS Branch Staff (whether field/peace should be given higher priority of CR grades) will invariably decide the outcome of a decision dilemma.** The natural way to wriggle out of this situation is to evolve norms or to quantify these parameters. However, the quantified models are usually devoid of sound logic since the Officer's natural skills and innate capabilities find no mention in them. Hence there are possibilities of

error and misjudgement. **The end result is that under identical circumstance at different points of time there could be divergent outcomes**.

CHAPTER 5 : BIASES IN DECISION MAKING

"We documented systematic errors in the thinking of normal people, and we traced these errors to the design of the machinery of cognition rather than to the corruption of thought by emotion. It's a cognitive error and not an emotional one."

- ***Daniel Kahneman in Thinking Fast and Slow***

5.1 Background

Cognitive errors occur in all humans. We find it easier to identify and label mistakes of others than our own. Determining own beliefs, wants and motivations which underlie a decision requires introspective self-awareness, which is difficult at the best of times. Under conditions of cognitive overload, we need high introspection levels but are unable to achieve it. That's when we can benefit from the informed opinions of others as we are mostly confident even when we are wrong and an accurate pre-emptory analysis may suggest a way to limit the likely damage caused by poor judgement or choice. Frequent such interventions would increase own ability to identify and understand these errors, both in others and ourselves.

5.2 Pre-decision Mental Activities

5.2.1 Biases

Systematic errors in decision making, known as biases, occur in predictable circumstances. For example, the **halo** effect, where an audience tends to judge a confident and attractive speaker more favourably than warranted, is a common bias (Kahneman, 2012). In a discussion, opinions of those who **speak early and assertively**, are given more weight.

Experts may show these biases to a lesser extent, but their risk judgments and preferences may still differ from those of others.

When mental resources are depleted, people tend to adjust less and remain closer to their original position, or "**anchor**". Our biology and pre-dispositions also plays a role in decision making, as we are predisposed to reject candidates who lack **attributes we value**.

The impact of messages and associations can also be significant, as they can spread as if they were true unless immediately negated. **Association** is an endemic bias especially an association of ideas. There are three basic principles of association - **resemblance**, **contiguity** in time and place, and **causality**. All cause bias in decision making.

Law of small numbers operates where small data samples exist and is defined as a mistaken belief that the inference drawn from such a sample would reflect the larger population parameter. One can read patterns in small data sets, where none exist. Practically, it shows itself as a general "**bias that favours certainty over doubt**".

Being **decisive** gives one an air or aura of leadership. Participants of various studies done, who saw one-sided evidence were more confident of their judgments than those who saw both sides. Leaders who display a tendency for being 'decisive' may be taking decisions, with depleted data (The Centurion Mindset and the Army's Strategic Leader Paradigm, 2015). A positive outcome of a **random** event triggered by a decision would make a decision maker appear decisive.

5.2.2 Framing Effects

Framing effects refer to how information presentation impacts emotions. A positive spin leads to a positive emotional response, while a negative spin elicits a negative reaction. Framing plays a role in shaping perceptions and attitudes. **The same information can be framed differently, leading to differing emotional responses.** Understanding framing effects can aid communication and decision-making by recognizing the impact of information presentation on emotions and opinions (Further reflections on the elimination of framing bias in strategic decision making, 2002).

5.2.3 Cognitive Disruptions

This refer to factors such as emotions, effort, cognitive illusions, and limitations in intelligence and memory, which can interfere with or alter a person's ability to think and make decisions effectively. Understanding these disruptions is important as they can impact our thinking and decision-making processes. To minimize consequent mistakes and biases, it is important to be aware of their existence and to engage in effortful thinking, to manage emotions, and to critically evaluate information (Stanovich, 2010). So what affects cognition?

First, **people are generally rational**, and their thinking is normally sound. Rational thinking requires effort. With effort, we learn to recognize situations in which mistakes are likely. When the stakes are high, we tend to be more careful and take more time to consider our actions and decisions. This is because we understand the potential consequences of making a mistake, and we want to minimize the risks involved. We may also seek out additional information or consult with others who may have more expertise in the matter.

For effortful thinking, there is a need to be reluctant to invest more effort than is strictly necessary; **laziness is essential** (Kahneman, 2012).

Second, people move away from rationality when they are affected by emotions like fear, affection and hatred. Mistakes occur when our capacity for **effortful control** had been **disrupted** (for example, if one is drunk).

Illusions of thought are called **cognitive illusions**. The 'hot hand' in gambling is a massive and widespread cognitive illusion. Another cognitive illusion—what is being said is given more weight than the authenticity of the conetent. The Müller-Lyer Illusion is a classic optical illusion which highlights the role that context and perception play in how we interpret the world around us. As humans, we have a tendency to disregard the notion that chance plays a significant role in our lives. Illusions are not solely limited to the realm of visual perception, but can also occur in our memory and thought processes (Kahneman, 2012).

Finally, there are various factors that can disrupt our cognitive processes and lead to mistakes or biases in our thinking. Some of these factors include **stress, lack of sleep, fatigue, hunger, and multitasking**. These can all lead to a reduction in our ability to think clearly and process information effectively, potentially leading to poor decision-making.

5.2.4 **Intelligence** encompasses not only our reasoning skills but also our capacity to retrieve relevant information from our memory and direct our attention when necessary. This cognitive ability makes us more attentive, intellectually engaged, and less inclined to accept superficially appealing solutions. As a result, we become more discerning about our intuitions and more sceptical about the reliability of our initial impressions.

5.3 Rationality

In the Dunedin study, a 40 year longitudinal study carried out starting 1972, the children who had shown more self-control as four-year-olds (Moffitt, Poulton, & Caspi, 2013) had substantially higher scores on tests of **intelligence**, establishing a relationship between the **ability to control attention and one's emotions**.

5.3.1 However, in Rationality and the Reflective Mind, (Stanovich, 2010), states that biases exist even in intelligent people. Another ability is involved, which he labels **rationality as distinct from intelligence**. He discusses the Great Rationality Debate as to how much irrationality to ascribe to human cognition and why humans are sometimes irrational even though they possess remarkably adaptive cognitive machinery.

5.3.2 He further divides the System 2 (or slow thinking) of Dual-Process Theory into the **Reflective Mind** and the **Algorithmic Mind**.

The Reflective Mind stops intuitive or fast thinking and begins iterating likely solutions while the algorithmic mind provides endurance to process abstract or complex information.

The cognitive errors being heuristics and biases, the tendency to make these thinking errors is not highly related to intelligence. He summarises by saying that reflective thinking is critical for improving decision-making and rationality, and that it can be taught and developed through the cultivation of critical thinking skills.

Reflective thinking is an essential component of rationality, and efforts to promote rationality should focus not only on improving intelligence, but also reflective thinking skills.

5.4 Priming Effect

Priming effects are changes in behaviour or perception resulting from exposure to certain stimuli, such as words, images or behaviours. They can influence how information is processed and interpreted, leading to both positive and negative outcomes.

5.4.1 There are several types, including semantic priming (exposure to a word affects subsequent processing of semantically related words), perceptual priming (exposure to an image affects subsequent perception), and behavioral priming. This can help us understand **implicit biases** and **stereotypes**. Some types of priming effects are discussed below (Kahneman, 2012).

"**Florida effect**", influencing of an action by the idea—is known as the ideomotor effect and refers to the impact of thoughts and beliefs on behaviour. Focusing on a certain idea can unconsciously influence actions and reinforce the thoughts. The technique "**fake it until you make it**" uses this effect.

Money-primed people become more independent than they would be without the associative trigger. Money-primed undergraduates also showed a greater preference for being alone. Idea of money primes individualism, reluctance to be involved with others, to depend on others, or to accept demands from others.

"**Big Brother Is Watching**" this will lead to an actual reduction in spontaneous thought and independent action. Reminding people of their mortality increases the appeal of authoritarian ideas.

Feeling that one's soul is stained appears to trigger a desire to cleanse one's body, an impulse that has been dubbed the "**Lady Macbeth effect**." The cleansing is highly specific to the body parts involved in a sin.

5.5 Cognitive Ease

5.5.1 When experiencing physical or mental strain, an individual may become more careful and suspicious, apply greater effort in the task at hand, feel uncomfortable, and be less errors prone. At the same time one loses intuition and creativity. If an answer felt familiar, one assumes it to be true, due to cognitive ease (Kahneman, 2012).

5.5.2 Cognitive ease is both a cause and a consequence of a pleasant feeling. Anything you can do to reduce cognitive strain will help. Maximize legibility - bright blue or red text is more believable than green, yellow, or pale blue. Frowning normally accompanies cognitive strain and the effect is symmetric. **As Ayn Rand says, "Man's first frown is the first touch of God on his forehead. The touch of thought".**

5.5.3 **Moses Illusion** is another instance of bias due to cognitive ease. People have difficulty in detecting the misrepresentation caused when a term in a sentence or a question is replaced with a semantically similar but incorrect term. That is why "**couching familiar ideas in pretentious language** is taken as a sign of poor intelligence and low credibility". Violations of normality are detected with astonishing speed and subtlety. Survival prospects are poor for an animal that is not suspicious of novelty. That is why scientists recommend hypotheses testing by trying to negate it while people with lower intelligence seek data which confirms their beliefs.

5.6 Arriving at Decisions

5.6.1 Heuristics

A heuristic is defined technically as a straightforward method that assists in discovering satisfactory but not necessarily optimal answers to complex

queries (in essence, a rule of thumb). They serve as an alternative to deliberate reasoning, which can sometimes be effective, while at other times, it can result in significant inaccuracies. However, relying on a heuristic can cause predictable biases or systematic errors in forecasting outcomes. This has significant implications for decision-makers to consider. (Models of bounded rationality: Emperically Grounded Economic Reason, 1997).

George Pólya included **substitution** in his classic "How to Solve It". He said, "If you can't solve a problem, then there is an easier problem you can solve - find it." **Intensity matching, analogy, extension, generalisation, induction, variation, auxillary problems**, etc are some of the heuristics given by Polya to solve problems. This is the essence of intuitive heuristics - when faced with a difficult question, **we often answer an easier one** instead, usually without noticing the substitution.

The **affect heuristic** is an instance of substitution, in which the answer to an easy question (How do I feel about it?) serves as an answer to a much harder question (What do I think about it?). An executive's decision would today be described as an example of the affect heuristic, where judgments and decisions are guided directly by feelings of liking and disliking, with little deliberation or reasoning.

Daniel Kahneman has proposed that **resemblance** is used as a simplifying heuristic to make a difficult judgment. Appreciate the power of resemblance as a cue to probability.

Availability heuristic, is when people tend to rely on easily accessible or available information to make judgments or decisions. As a result, frequently mentioned or vivid events, news stories, or experiences tend to be perceived as

more important, probable, or representative than less memorable or less frequent events. This can lead to biases and errors in decision-making, such as overestimating the likelihood of rare events or underestimating the importance of long-term trends or systemic issues. The availability heuristic can also be exploited by propaganda, advertising, and other forms of persuasion that aim to shape people's perceptions by repeating simple and emotionally charged messages.

Judgment heuristics "are quite useful, but sometimes lead to severe and systematic errors. Accurate intuitions of experts are better explained by the effects of prolonged practice than by heuristics.

The **Retrieve-ability heuristic**, emanates from Availability heuristic and is like other heuristics of judgment, as it substitutes one question for another - you wish to estimate the size of a category or the frequency of an event. However, the ease of recall is conflated with size of the category.

5.6.2 Expert Intuition

The chess master who walks past a street game and announces "White mates in three" has expert intuition. You are pitch-perfect in detecting anger in the first word of a telephone call. As we enter a room we recognize that we were the subject of the conversation. We intuitively know that the driver of the car in the next lane is dangerous. Expert intuition strikes us as magical, but it is not. "The situation has provided a cue; this cue has given the expert access to information stored in memory, and the information provides the answer. Intuition is nothing more and nothing less than **recognition**." Daniel Kahneman quotes Herbert Simon saying "You can feel Simon's impatience with the mythologizing of expert". The spontaneous search for an intuitive

solution sometimes fails—neither an expert solution nor a heuristic answer comes to mind. In such cases we often find ourselves switching to a slower, more deliberate and effortful form of thinking.

5.6.3 System 1 & 2

"System 1" and "System 2" are concepts introduced by Nobel Prize-winning psychologist and economist Daniel Kahneman in his book "Thinking, Fast and Slow." This was originally proposed by the psychologists Keith Stanovich and Richard West, as a part of the “Dual Process Theory” of decision making and will refer to two systems in the mind, System 1 and System 2.

5.6.4 System 1

Refers to our automatic, intuitive, and effortless or fast thinking process. It's unconscious and is responsible for snap judgments, emotional reactions and the unconscious biases that influence our thoughts and actions. You often have answers to questions that you do not completely understand, relying on evidence that you can neither explain nor defend. It includes both variants of intuitive thought—the **expert** and the **heuristic**.

The capabilities of System 1 include innate skills that we share with animals as it takes over in emergencies, assigns priority to self-protection and is shaped by evolution to provide a continuous assessment of the most critical problem an organism must solve to survive - ability to discriminate friend from foe at a glance. This contributes to survival and also remains a **bias favouring the first impression**.

System 1 is responsible for our intuitive and automatic thinking processes, which often rely on associating information and making causal connections between events. This can lead to errors when we assume causality

where there is none or **overlook the role of chance in random events**. However, this cognitive process is also responsible for our creativity and ability to make quick and efficient decisions in many situations.

Statistics requires thinking about many things at once, which is something that System 1 is **not designed** to do. System 1 is inept when faced with "merely statistical" facts, which change the probability of outcomes but do not cause them to happen.

Intuitive System 1 is more influential than your experience tells you. However, mood affects its operation - when we are uncomfortable and unhappy, we lose touch with our intuition. Good mood, intuition, creativity, gullibility, and increased reliance on System 1 form a cluster. General "law of least effort" applies to cognitive as well as physical exertion.

System 1 is not prone to doubt. It **suppresses ambiguity** and spontaneously constructs stories that are as **coherent** as possible. We are prone to **exaggerate** the consistency and coherence of what we see. Knowing little makes it easier to fit everything you know into a coherent pattern.

Many people are **overconfident**, prone to place too much faith in their intuitions. They apparently find **cognitive effort, at least mildly, unpleasant** and avoid it as much as possible. It suggests that when people believe a conclusion is true, they are also very likely to believe arguments that appear to support it. Where System 1 is involved, the conclusion comes first and the arguments follow.

Among the basic features of System 1 is its ability to set **expectations** and to be surprised when these are violated.

"Her favourite position is beside herself, and her favourite sport is jumping to conclusions." This is a famous quote from Daniel Kahneman. **Jumping to conclusions is efficient** if the conclusions are likely to be correct and the costs of an occasional mistake acceptable, and if the jump saves much time and effort. The entire context helps determine the interpretation of each element.

5.6.5 System 2

This is deliberate, reflective, and logical thinking. It's slower and requires more effort, and is responsible for tasks that require conscious attention and focus, like solving complex problems, making decisions, and weighing pros and cons. **System 2 is our conscious, controlled thinking process**, and is responsible for our ability to **think critically and make rational decisions**.

Deliberate, effortful, and orderly—a prototype of slow thinking, is the mark of effortful activities that they interfere with each other, which is why it is difficult or impossible to conduct several at once.

System 2 is the only one that can follow rules, compare objects on several attributes, and make deliberate choices between options. System 2 also has a natural speed and a mental effort of self-control is needed to resist the urge to slow down.

System 2 is capable of doubt, because it can maintain incompatible possibilities at the same time. However, sustaining doubt is harder work than sliding into certainty.

5.6.6 How closely does System 2 monitor the suggestions of System 1?

System 1 gives suggestions to System 2. When things are good, System 2 follows System 1 and endorses many intuitive beliefs. System 2 is activated when an event is detected that violates the model of the world that System 1 maintains. This could be a surprise or a shock, re-orienting you and you search your memory for association/ retrieval/ a causal connection. If none present themselves, System 2 takes over (it should, if it doesn't that's a cause of worry). In other words, **System 2 is in charge of self-control** (Moffitt, Poulton, & Caspi, 2013). Self-control requires attention and effort. System 1 has more influence on behaviour when System 2 is busy, and it has a sweet tooth. **People who are cognitively busy are also more likely to make selfish choices**, use sexist language, **and make superficial judgments** in social situations.

5.7 How do we Think?

5.7.1 We overestimate what we understand, underestimate the role of chance and do not acknowledge the extent of our ignorance. This is the **illusory certainty of hindsight** (Hindsight Bias and Strategic Choice: Some Problems in Learning From Experience, 1988).

5.7.2 While multi-tasking is a buzzword and you can do several things at once, but only if they are easy and undemanding. Intense focusing on a task can make people effectively blind, even to stimuli that normally attract attention. The "**Invisible Gorilla**" study illustrates this concept of **cognitive busyness** and highlights two important facts about our minds - we can be blind to the obvious, and we are also blind to our blindness (Bias blind spot: Structure, measurement, and consequences, 2015). People who experience **flow** describe it as "a state of **effortless concentration** so deep that they lose their sense of time, of

themselves, of their problems". Flow neatly separates the two forms of effort - concentration on the task and the deliberate control of attention.

5.7.3 Ego Depletion

Ego depletion is not the same mental state as cognitive busyness. Effects of ego depletion could be undone by ingesting glucose. A disturbing demonstration of depletion effects in judgment was recently reported - tired and hungry judges tend to fall back on the easier default position.

5.7.4 **Cognitive effort** is described as **aversive**, and people will generally avoid it when possible. This aversion to effort is believed to arise from a cost–benefit analysis of the choices of actions available.

5.7.5 People dealing regularly in **domains** which require snap decisions, like ATC operators, are attuned to System 1 thinking. People working largely in logistics and administrative domains are attuned to System 2 thinking.

5.8 So in sum, both systems have the potential to lead us to a decision anchor, to move away from which, we require significant cognitive effort. Cognitively busy or Ego Depleted decision makers cannot spare the effort or they fall back to default options. To overcome the same, we require external assistance, in the form of (earlier) automation and now AI. This is the crux of the reason why we need to have an AI supported System 2 approach in our MS Branch decision making process.

5.9 Military Decision Making Processes.

Military operational commanders make decisions in a wide range of conditions.

5.9.1 Peacetime, decision making in the military is similar to the civilian sector. However, in combat environment, the decision making is under **fast paced, variable and consequential conditions**.

5.9.2 The defining distinction is an **organized opponent** and the **sovereign function** of delivery of death and destruction on the enemy.

5.10 Types and Changes in Decision Making Process.

5.10.1 The Rational Process

Rational processes follow a logic of consequence by seeking answers to four basic questions - what are the possible alternatives, the possible outcomes which follow each alternative and their likelihood, how do the possible outcomes measure up to desired preferences and what decision rule(s) are employed to select an alternative based on their outcomes and the decision maker's preferences.

5.10.2 The Limited Rational Process

The science of modelling has attempted to account for a number of deviations from rationality. However, **not all alternatives can be known**, **not all discernible alternatives are considered**. The limited rational process generally follows the prescriptive logic of consequence while giving allowance to a variety of human limitations and coping mechanisms (Lawrence, et al., 2019).

The **first limitation is the cognitive inability** to handle large amounts of information. Specifically, decision makers have limited abilities to focus attention, remember, communicate, and comprehend large amounts of data. To cope, military decision makers typically arrange incoming data into simplified models, stereotypes, typologies, or schemas (The Centurion Mindset and the Army's Strategic Leader Paradigm, 2015). To cope with vast amounts of data, we apply **information-coping mechanisms** such as Editing or Elimination by

Aspects, Decomposition, Pattern Recognition and Framing or structuring based on a particular set of beliefs and perspectives.

Decision makers employ various **cognitive decision rules** such as Satisficing, Analogizing, Nutshell Briefing, Incrementalism and Blurring with Statistics.

Perceptual and Cognitive Biases within the Limited Rational Process

Perception answers the question: What do I see? Cognition answers the next question: How do I interpret it? (Decision Making and Problem Solving, 1987)**.**

Perceptual Biases

There are three perceptual biases that affect the accuracy of one's view of the environment - the conditioning of expectations, the resistance to change, and the impact of ambiguity.

Cognitive Biases

There are three primary areas in which cognitive biases degrade the accuracy of judgment within a decision process - the attribution of causality, the evaluation of probability, and the evaluation of evidence.

Organizational Limitations to the Limited Rational Process

Organization processes constrain a commander's decision making by imposing **SOP** and programs thus narrowing their options. The **distribution of responsibility** and power also influences rationality. The **failure to coordinate** varied

perceptions and interests lead to an overall irrational outcome. Then there is political bargaining tempered by organizational discipline (Bureaucracy and Mission Command: Reform the Army Personnel System to Embrace Mission Command, 2016).

5.10.3 Cultural and Individual Biases within Military Decision Making

Cultural Biases. There are two common **cultural** biases. **Arrogance** is the attitude of superiority over others or the opposing side. It can manifest as a national or individual perception. In the extreme case, it forgoes any serious search of alternatives or decision analysis beyond what the decision maker has already decided. It can become highly irrational (Simon H. , 1997). The **projection** bias sees the rest of the world through one's own values and beliefs, thus tending to estimate the opposition's intentions, motivations, and capabilities as one's own.

Individual Biases. There are three noteworthy and highly contextual motivational biases. **Risk taking** - gambles as a matter of personality—without considering costs and gains beforehand. Overconfidence (**hubris**) - tends toward an overreaching inflation of one's abilities and strengths. **Hubris-nemesis** - is a dangerous mind-set that combines hubris (self-intoxicating "pretension to godliness") and nemesis ("vengeful desire" to wreak havoc and destroy). Leaders possessing nemesis in this bias combination are not easily deterred or compelled by normal or rational solutions.

5.10.4 Stresses on Limited Rational Process.

Consequential Decisions. Proper judgment does not necessarily lead to a proper decision; knowing the right thing to do does not automatically

lead to the right decision. Again, the outcome is dependent on the **individual's moral determination and courage** to carry a decision through to the end.

Uncertainty and Time Pressure. The other two stressors under consideration, uncertainty and time pressure, are not unique to the field of military decision making. They are pervasive and cover beyond the military also. (Lawrence, et al., 2019)

Uncertainty in decision making has two aspects. The first is **uncertainty in outcomes due to variability**. The second is the **ambiguity of information** about the world or uncertainty in the accuracy of data describing the problem. As uncertainty increases, decision makers may resort to ineffective search and evaluation methods and this may be due to a desire to avoid ambiguity or the difficulty of using analytical methods when the connection between data and outcomes is not clear.

Moderate **time pressure** can be motivating but excessive pressure can cause degradation in performance with extend depending on factors such as the quality of decision-maker, team and resources, and the rate of pressure increase. Sudden change in pace can disrupt decision strategies and lead to drop in performance. At a higher pace, information processing speeds up but eventually leads to cut in data processing and a shift towards maladaptive strategies like "**satisficing**" or "**analogies".** Additionally, it prevents self-reflection on perceptual and cognitive biases. In extreme cases, the process can deteriorate into avoidance, denial, or panic. (Decision Making and Problem Solving, 1987).

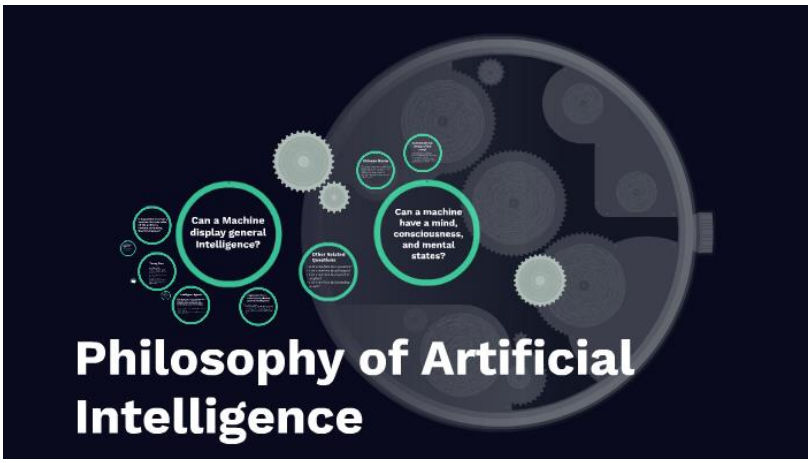
5.11 Normative decision models suggest a rational approach, but various factors limit its execution, including human limitations, biases, organizational processes,

and politics. Military decision-making in operational settings is often under stress due to consequences of decisions, uncertainty, and time pressure, creating tension between optimal and responsive decisions. Stress can impact decision-making, leading to less than optimal outcomes. To mitigate its impact, decision-makers should consider these factors and develop strategies (Models of bounded rationality: Emperically Grounded Economic Reason, 1997).

5.12 Conclusion

In this chapter we are focusing on the errors in decision making. The focus on error does not denigrate human intelligence, any more than the attention to diseases in medical texts denies good health. The one we were tempted to make even when we knew it to be wrong. Extreme outcomes are most likely to be found in sparsely populated domains and hence decisions taken with lesser information may be sub-optimal.

CHAPTER 6 : PHILOSOPHY AND SCIENCE OF AI



6.1 Background

6.1.1 The Advent of Computers and AI

In 1943, with the advent of the first computer, new questions came up - Can machines think, are they intelligent? Could they become intelligent? Alan Turing in his seminal 1950 paper (Turing, 1950), suggested that what mattered was not the mechanism, but the manifestation of intelligence. As inner life of beings remain unknown, the means of measuring intelligence should be external behaviour. In the Turing Test, he proposed that if a machine operated so proficiently that observers could not distinguish its behaviour from a human's, the machine should be labelled intelligent. This implies that the test focuses on **performance and not the process** by which results are achieved (Rowland, 2023).

In 1956. John McCarthy, one of the pioneers, (invented LISP language used to program DENDRAL and MACSYMA, the first AI products) defined AI as "the science and engineering of making intelligent machines, especially intelligent computer programs" (Manning, 2020). He further defined artificial intelligence as machines that can perform tasks that are characteristic of human

intelligence such as **understanding natural language**, recognizing objects in images, and solving problems.

AI birthed by Turing and McCarthy, has resulted in development of an interdisciplinary field known as Cognitive Science because it requires a study of computation of human like functions. Noam Chomsky's work between 1955 and 1957 on the theory of generative grammars also has a strong influence on AI especially in the area of computational linguistics or natural language processing. (Patterson, 1992)

Deep Mind and other advances are taking AI past what Turing envisioned in his test to **performance that exceeds humans**, thereby pushing forward the frontiers of understanding.

6.1.2 Foundations of AI

To comprehend AI requires an understanding of a large number of disparate fields which form its foundation. These start with philosophy (reason, logic, thought), sources of knowledge (empiricism, induction), connection between knowledge and action, mathematics (Boolean, probability), Economics (Preferred outcomes/ utility, decision theory, game theory), cognitive psychology, computer engineering (intelligence, artefacts), control theory, cybernetics and machine learning amongst others.

Intelligence, both human and artificial, is the ability to acquire, understand and apply knowledge or the ability to exercise thought and reason. The food for intelligence is knowledge. Now we have systems which can understand natural languages, recognise objects from photographs or videos and which can **reason with incomplete and uncertain facts**. Those are the

foundations on which AI is built upon (The_Handbook_of_Artificial_Intelligence).

6.2 Logic Behind Computing and AI

The works of Alonzo Church, Kurt Godel and Emil Post form the foundational logic behind theory of computation, computer science and the later development of AI (Patterson, 1992, p. 5). The Church-Turing thesis states that any computable function can be computed by a universal Turing machine (Rowland, 2023).

Gödel's incompleteness theorems showed that there are limits to the power of mathematical proof and that there are some true mathematical statements that cannot be proven within a formal system (Raatikainen, 2022). **It implies that no machine can exist that fully encompasses human reasoning abilities, since one can always construct statements, the truth of which is accessible to humans, but not to the machine**

The other key logicians were Alfred North Whitehead and Bertrand Russell who's "Principia Mathematica," provides a comprehensive foundation for mathematics; Alfred Tarski, for his work on Model Theory and the concept of semantic truth; Stephen Cole Kleene for Theory of Recursive Functions and study of algorithms. These logicians formalised the methods of reasoning and **demonstrated that facts and ideas from English could be formally described and manipulated mechanically in meaningful ways** (Linsky & Irvine, 2022).

6.3 Philosophy Behind AI

Since the Enlightenment, **decisions based on reason** have been the defining attribute and prerogative of humanity. Enlightenment applied reason, to define and solve its problems. Kant's Perpetual Peace (Paul, 2022), posited that peace might be achievable through the application of agreed rules governing relationships

between states. The idea of discovering the true nature of reality through observation and reason continued for generations since **Kant** (Glattfelder, 2019), with the belief that any **comprehensive understanding** could lead to solutions to scientific, economic, social, and political issues.

The pursuit of knowledge took the form of more precise **observations of reality** and creation of ever-expanding catalogues of information. The hope was that these efforts would lead to new discoveries and reveal principles that could be applied to solve important problems.

Machines approximating human reason will alter this status quo, enlighten humans and expand our reality in ways we do not expect or intend. Can AI help us discover **true reality**?

Although AI can draw conclusions, make predictions and decisions, it does not process **self-awareness**. It also does not have intention, motivation, morality or emotion. However, even without these attributes, it is likely to develop different and **unintended means** of achieving assigned objectives (The_Age_of_AI). **Question is – where does AI fit in these methods**.

6.4 What is AI

"AI is the **study of Agents that receive percept from the environment** and perform actions. Each such agent implements **a function that maps percept sequences to actions**. There are different ways to represent these functions, such as reactive agents, real-time planners, and decision-theoretic systems…. the role of learning is to extend the reach of the designer into unknown environments….the task environment is important to determine the appropriate agent design." (Russell & Norvig, 2015, p. 8)

"AI is a branch of computer science concerned with the study and creation of computer systems that exhibit some form of intelligence; systems that learn new concepts and tasks, **that can reason** and draw useful conclusions about the world around us, that can **understand a natural language** or perceive and comprehend a visual scene and systems that perform other types of functions that require human intelligence". (Patterson, 1992)

AI cannot be confined to a single domain but serves as a catalyst for numerous facets of life such as research, education, manufacturing, defence, advertising, and beyond, thereby altering our perception of human identity and reality as we currently understand it (Iansiti & Lakhani, 2020).

6.5 What is Not AI?

AI is not a conventional computer system in that it is designed to solve complex problems, **learn from data**, automate tasks, **exhibit human-like capabilities**, support decision making or even **make decisions**, and process large amounts of data in real-time. In short, it seeks to **relieve humans from the lower order processing tasks** freeing them for higher order analytical and cognitive tasks and for sentience. AI is not meant to imitate human senses and thought processes (The_Handbook_of_Artificial_Intelligence).

6.6 Current Examples of AI (The_Age_of_AI).

AlphaZero is a Google Deep Mind AI program, decisively defeated the world's strongest chess program, Stockfish, (28-0) in 2017 and (155-6) in 2018. Stockfish relied on human-generated moves and strategies and processing power. AlphaZero, was trained for four hours based on rules of chess, instructed to develop a strategy based on a reward function to maximize its wins. As on date, AlphaZero

has never been beaten by a human, showing that AI, at least in gaming was **no longer limited by human knowledge**.

Deep Mind Applied, created an AI in 2016 that utilized principles similar to AlphaZero to optimize the cooling of Google's temperature-sensitive data centers, leading to a reduction in energy expenditure by 40%, better than the best engineers.

In 2020, researchers at MIT used AI to survey a library of 61,000 FDA approved drugs to find a molecule that would be effective as an antibiotic different from existing ones and non-toxic. The AI predicted only one molecule, **Halicin**, which fit these criteria. In chess, there are limited rules and a single objective but the potential candidates for drug development are numerous with disparate and unknown functions. AI was able to **uncover relationships that had gone unnoticed** by humans and currently **inexplicable**.

GPT-Three is a large language model GPT-3 with over 175 billion parameters that can generate human like text. In contrast to AI that does a particular task, GPT3 generates possible responses to various inputs and thus is called a generative model. ChatGPT is based on the GPT-3 architecture designed to understand and respond to human queries with **contextually relevant** and human-like responses.

6.7 AI in Military

AI with ability to make decisions beyond human capability or understanding, may potentially alter power balances and require adaptation of laws of war. The US Air Force has adapted AlphaZero to ARTUμ that successfully co-piloted a U2 surveillance aircraft on test flight. It helped steer the radar and navigate the plane without direct oversight (Wolfe, 2020).

In the DARPA programme Alpha-Dogfight, AI fighter pilots have outperformed fighter pilots (Hollings, 2020). In the 1991 Persian Gulf crisis, the United States military employed a tool called Dynamic Analysis and Replanning Tool (DART), developed by Cross and Walker in 1994, to facilitate automated logistics planning and scheduling for transportation. DARPA declared that this single application of DART was sufficient to justify DARPA's 30-year investment in AI. (Russell & Norvig, 2015, p. 47)

Historically, scientific innovations have magnified weapons' destructive power and eventually ushered in total war - conflicts characterized by industrial level mobilization and destruction. **Would AI take this a step further or move towards attenuating the impact of destruction?**

6.8 AI and Humans

6.8.1 AI and Human Identity

AI operates based on its own algorithms and rules, which may differ greatly from how humans think and process information. As a result, AI can produce results that are unique and may not be easily understandable to humans. This independence from human biases and cultural influences **makes AI particularly useful in fields where objectivity is important, such as decision making**, data analysis, and predictions. However, it also poses new challenges, as the outcomes generated by **AI may not always align with human values** and expectations (Kissinger, Schmidt, & Huttenloc, 2021, p. 179).

6.8.2 Tasks of Humanity

Generative AI provides complementary perspectives to human capabilities and is thus a valuable partner. However we will be required to adapt to a world where human reason may not always be most informative. To navigate this

shift, we have the option to react and adapt, or to deliberate on aspects including the transformations of human experience, the challenges to human identity and which aspects **require regulation** or counter balancing by humans.

6.8.3 Transformations of Human Experience by AI

AI systems would not be designed for any specific individual users' benefit and control and its decision inputs more accurate than humans, less biased and more optimised - all good for society. This may be disturbing or disempowering especially as an algorithm **does not offer reasons grounded in human experience.**

For the individual, meaning is derived from justice and the ability to explain outcomes on the basis of principles. People may not understand how AI arrives at its conclusions and thus **lose their sense of autonomy**. Those **most affected** will likely be blue collar and middle management jobs that require specific training/ skill sets like interpretation of data or drafting of documents.

Higher level decision makers may find themselves freed from drudgery to focus on the more fulfilling elements of their work. In the modern age, in the event of a deficiency of service, we seek reason and accountability, preferably a human responsible for it.

At times, use of AI may produce a **lack of human agency** especially when life shaping decisions are being made – offers of employment, re-location, and decisions about schools, security or even law enforcement - that no single human can explain. Those who lack knowledge of AI or authority over it may reject it considering its usurpation of human autonomy (Kissinger, Schmidt, & Huttenloc, 2021, p. 184).

6.8.4 Network Platforms & Effects

AI is integrated into human activity through network platforms which grow in value as more users adopt them – the '**positive network effect**'. The intersection of humans and AI on this scale marks a significant event in civilization (Iansiti & Lakhani, 2020).

This control of AI over content is creating a **new paradigm of power and influence** with the ability to shape the flow of information and public discourse, raising questions about responsibilities and obligations. AI's integration offers speed and efficiency but raises questions of accountability and ethics. This prompts important considerations and raises crucial questions.

With what objective function is such AI operating? By whose design and within what regulatory parameters?

6.9 Challenges of AI and Their Management

All tech movements are accompanied by challenges. Challenges of AI can be best understood through the function of online search.

6.9.1 Filtration

Filtration of search helps steer choices. In the physical world, the tourist guide avoids slums and high crime areas and show only the meaning-full sites as per sensibilities, a "**censorship through omission**". In cyberspace, this is self-reinforcing and creates **personal echo chambers** and provokes discordance (Kissinger, Schmidt, & Huttenloc, 2021, pp. 100-104).

6.9.2 Mis-identification

Google's image recognition software has infamously mislabelled images of people as animals and animals as guns. Similar obvious errors have been done by Microsoft and Apple AI systems (Kayser-Bril, 2020).

Search misidentification stems from several sources like **data set bias** (will occur for underrepresented groups such as racial minorities), human **bias in the training data, mis-labelling of outputs for supervised learning** or a developer may **incorrectly specify a reward function used in reinforcement training**.

This problem of bias in technology is not limited to AI. The Pulse Oxymeter overestimates oxygen saturation in dark skinned individuals, by assuming the way light skin absorbs light as normal, as its designers effectively assumed the way dark skin absorbed light as abnormal (Howard, 2022).

Another source is **rigidity** as AI does not possess common sense. It occasionally conflates two objects that humans could quickly and easily distinguish (Kayser-Bril, 2020).

6.9.3 AI is **not sentient** as "it does not know what it does not know". It cannot identify and avoid what obvious blunders are, underscoring the importance of testing to identify limits of an AI's capabilities. The robustness of AI **auditing and compliance** regimes is currently poor though developing very fast (Algorithm Assurance: Auditing Applications of Artificial Intelligence, 2023, pp. 144-151,154).

6.9.4 The **brittleness** of AI is a reflection of the shallowness of what it learns. Associations between aspects of inputs and outputs based on supervised or reinforced learning are very different from a true human with its many degrees of conceptualization and experience. The brittleness is also a reflection of AI's, lack of self-awareness (Cummings, 2023).

6.9.5 Opacity of Learning

Machine learning will drive deployment of AI and humans will remain **unaware of what it is learning** and how it knows what it has learnt. Human learning is similarly opaque as we also act on the basis of intuition and are not able to spell out the mechanics behind a decision.

Professional certification programs, regulations and laws help to cope with this opacity. Similar techniques should be applied to AI and employment of AI systems should take place only after its creators demonstrate its reliability through testing (Adarsh, 2022).

The division between learning and inference phases in machine learning permits a testing regime like this to function. When an AI learns continuously, even as it operates, it can develop unexpected or undesirable behaviour. Hence there has to be a **distinct gap between ML and deployment phases**.

The most infamous case which illustrates this is of Tay Bot, an AI chatbot by Microsoft that began to post inflammatory and offensive tweets through its Twitter account. Tay encountered hate speech and quickly began to mimic it, causing Microsoft to shut down the service only 16 hours after its launch in 2016 (Shwartz, 2019).

6.10 Management of AI Implementation

AIs train and are operationalised in distinct phases.

6.10.1 Gap Between Training and Deployment

The learned models (parameters) are static when they exit training allowing humans to assess its capabilities without apprehension of undesired behaviours. Once the algorithm is fixed, a self-driving car trained to halt at red lights, cannot suddenly decide to start moving on them. This property allows

for comprehensive testing and certification. However an AI may still behave unexpectedly in unexpected contexts (Fridman, 2019).

6.10.2 **Separate data sets** are retained for **Audit** provide another quality control check.

6.10.3 AI is also **constrained** by its code in 3 ways.

First, the code sets broad parameters with limited autonomy of possible actions. Actions outside the parameters of the code are beyond the AIs vocabulary like the example of the self-driving car and red lights above. And if the programmer does not put the capacity there, or explicitly forbids the action, the AI cannot do it.

Secondly, AI is constrained by its **objective function**, which defines and assigns what it has to optimise.

Finally, and most obviously, AI can only process **inputs that it is designed to recognise and analyse**. Without human intervention in the form of an auxiliary programme translation, AI cannot evaluate other data types. The data would appear nonsensical to it.

Even if AI is able to write its own code in the near future, it would not likely to be self-reflective. The objective function of AI would still define it. It might write code the way AlphaZero plays chess, **brilliantly, but without reflection or violation, with strict adherence to the rules** (Kissinger, Schmidt, & Huttenloc, 2021, pp. 205-212).

6.11 Principles behind employment of AI in Decision Making Process.

Meaningful deliberations before arriving at decisions require an opportunity to speak and the **protection of such speech from AI distortion**.

AI may provide the support systems but the **deciders** have to be **qualified, known humans** who can also **offer reasons** for the choices made.

Thus, to ensure human autonomy, **core governmental decisions** should be limited to human administration and **oversight** (Kissinger, Schmidt, & Huttenloc, 2021, pp. 187,199).

6.12 Approaches to AI and its Disciplines

Humans are not necessarily rational – at least not always. It doesn't mean that they are irrational, simply that they are not perfect in their decision making and actions. There are certain bounds of rationality under which humans are forced to operate, due to inadequacy of data and the time or resources to process it; thus leading to the concept of 'satisficing' – making decisions that are just good enough (Simon H. , 2019).

There is also the case for AI to either **replicate human actions or behaviour as in NLP** or to surpass human actions/reasoning as in Robotics. To that end there are four approaches to AI, any one of which could be followed. Also there are six disciplines which compose of most AI. (Russell & Norvig, 2015, pp. 2-3). These are given in Figure 1 below :-

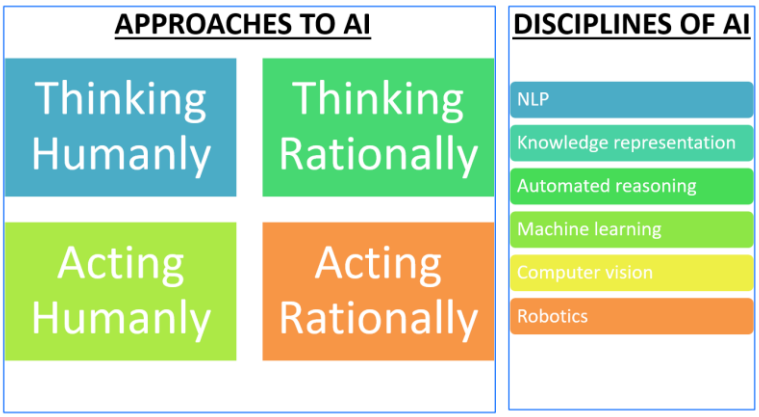


Figure 1 : Approaches and Disciplines of AI. *Adapted from Russell. Artificial Intelligence: A Modern Approach, eBook, Global Edition (p. 20). Kindle Edition*

6.13 Building Blocks of an AI System

A major turning point occurred in the field of AI, with the realization that "**in knowledge lies power**". AI systems use specialised sets of coded knowledge to "reason" and compute limited intelligence tasks. There are a large number of approaches to AI computations, including Symbolic computation approach, Statistical approach, Neural network approach, Evolutionary approach, Fuzzy logic approach, Reinforcement learning approach, Rule-based approach and Hybrid approach (Patterson, 1992).

The choice of approach depends on the specific requirements of the problem being solved and the available data and resources. Some approaches can be combined to create hybrid systems. Of these approaches, **two are suited for the problem at hand**. These are discussed below.

6.13.1 Symbolic Computation Approach

In this approach, knowledge is represented as rules and facts using mathematical symbols and is manipulated using mathematical and logical operations. The advantage is, it provides a clear and formal representation of knowledge. It has largely been replaced by statistical and neural network methods but is still used in certain applications including expert systems, NLP, Automated theorem proving, Planning and scheduling systems, Robotics, Knowledge representation and Decision support systems. The disadvantage is that it is **limited in handling uncertainty and imprecise data** and can be computationally expensive for large and complex problems (Bhatia, 2017) and **hence discarded for this study**.

6.13.2 Neural Network Approach

This is a type of machine learning algorithm that is modelled on the human brain. A neural network can learn to identify patterns in data and **make predictions based on that data** (What are Neural Networks?, 2023).

Its strength is its ability to learn from data and to **improve performance as it receives** more training examples. This makes it well suited to tasks where traditional, rule-based approaches might struggle. **This approach is what we are looking to exploit.**

6.13.3 Computational Linguistics

This is a scientific and engineering discipline studying written and spoken language from a computational perspective, and building artefacts that **process** and produce **language**. (Schubert, 2020). **This will greatly help in developing a better understanding of the instant project.**

6.14 Knowledge Representation

6.14.1 Formalised and Symbolic Logic

This is the abstract study of propositions, statements, or assertively used sentences and of deductive arguments. The structures or logical forms are abstracted from the content of text. Symbolic notation is used to express sentence structures and to enable manipulations and tests of validity. **This forms the theoretical background of NLP as applied in this Study** (Hughes & Schagrin,, 2022)

6.14.2 Structured Knowledge

Knowledge should be represented in a formal, structured manner if we want to process and manage it. Unfortunately a source knowledge presented in many documents has informal, unstructured shape. The goal of these

considerations is to **present the methods of translation** from the textual, unstructured knowledge to the structured knowledge, preserving textual form (Traczyk, 2005).

6.15 Knowledge Organisation and Manipulation (Patterson, 1992)

6.15.1 Search and Control Strategies

Almost every AI program depends on a search procedure to perform its prescribed functions. Problems are typically defined in terms of states, and solutions correspond to goal states. Solving a problem then amounts to searching through the different states until one or more of the goal states are found. Thus own Framework should also include a search programme.

6.15.2 Matching

Matching involves comparing 2 or more structures to discover their similarity. The structures may be physical entities, **words or phrases**, general concepts or relations between entities. The representations will be given in one or more of the formalisms like FOPL and matching will involve comparing the component parts of such structures.

6.16 Perception, Communication and AI Systems

6.16.1 Natural Language Processing (NLP)

NLP analyses large amounts of natural language data to extract information and insights in it using machine-learning algorithms. It has **five phases** – Lexical, Syntactic, Semantic, Discourse and Pragmatic Analysis.

6.16.2 Lexical Analysis

Lexical analysis is the process of converting a sequence of characters into a sequence of tokens. A lexer is generally combined with a parser, which together analyses the syntax of programming languages, web pages, and so

forth. Lexical analysis is an important analysis during the early stage, where text is segmented into words.

6.16.3 Syntactic Analysis

Parsing, syntax analysis, or syntactic analysis is the process of analysing a string of symbols, either in natural language, computer languages, or data structures, conforming to the rules of formal grammar. It is used in the analysis of computer languages to facilitate the writing of compilers and interpreters. Grammatical rules are applied to categories and groups of words, not individual words and helps in understanding the grammatical meaning of any sentence.

6.16.4 Semantic Analysis

Semantic Analysis attempts to understand the meaning of Natural Language and can begin with the relationship between individual words. This captures the meaning of the given text while considering context, logical structuring of sentences, and grammar roles.

6.16.5 Discourse Analysis

Researchers use Discourse analysis to uncover the motivation behind a text. It is useful for studying the underlying meaning of a spoken or written text as it considers the social and historical contexts. Discourse analysis is a process of performing text or language analysis, involving text interpretation, and understanding the social interactions.

6.16.6 Pragmatic Analysis

Pragmatic Analysis is part of the process of extracting information from text. It focuses on taking a structured set of text and figuring out the actual meaning of the text. It also focuses on the meaning of the words of the time

and context. Effects on interpretation can be measured using PA by understanding the communicative and social content.

6.16.7 **We are attempting to put the textual inputs of Pen Picture through NLP** and **to extract subjective qualities—attitudes, emotions, beliefs, abilities, qualities—from text**.

6.16.8 The other methods include Pattern Recognition and Image Understanding which are not useable here and thus not discussed further.

6.17 AI Expert System Architecture

"An Expert system is a set of programs that manipulate encoded knowledge to solve problems in a specialised domain that normally requires human expertise" (Patterson, 1992). The knowledge is obtained from expert sources which could be specialists who have acquired it through experience and training. **In the use case envisaged in the dissertation, it could be the knowledge residing within the MS Branch and its officers, both currently posted there and those having relinquished the appointments.** These systems use knowledge rather than data to control the solution process. Knowledge is encoded and maintained as an entity separate from the control program. Separate compilation permits incremental addition of the knowledge base with same control programme. The key advantage is that it is capable of explaining how a particular conclusion was reached and why the requested information is needed during a consultation. This is important for the instant use case as it gives the user a chance to assess and **understand the systems reasoning ability** thereby improving the users' confidence in the system.

6.18 Knowledge Learning

There are two basic methods for knowledge extraction firstly from domain experts and then with machine learning. For large data, domain experts are not useful and reliable. So machine learning approach is used.

6.18.1 Machine Learning (ML)

AI is developed through ML, which involves acquiring knowledge and skills through the use of statistical methods. Algorithms are trained to make classifications or predictions, and to uncover key insights driving decision making. An Euler Diagram at Figure 2 indicates the inter se relationships between the concepts.

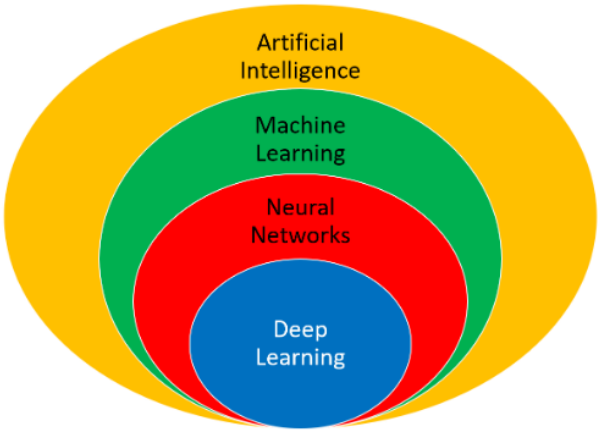


Figure 2 : Euler Diagram of Machine Learning.. Adapted from https://serokell.io/blog/ai-ml-dl-difference

6.18.2 **Deep learning** uses neural networks with layers to learn features from raw data, **without requiring manual feature engineering** and is successful in complex fields such as computer vision and NLP (Monitor, 2023). You can think of deep learning as "scalable machine learning" as Lex Fridman notes in an MIT lecture (Fridman, 2019) at time 01:08:05 in the video. For the **instant use-case**, as it does not require to scale beyond a point and the data is labelled, we can go with machine learning only.

6.19 Forms of Machine Learning

Three major forms of machine learning exist – Supervised, Unsupervised and Reinforced. (Halicin was discovered using Supervised learning and Chat GPT follows Reinforced learning with human feedback) (Russell & Norvig, 2015). In **Supervised Learning** AI developers used a dataset containing example inputs that were individually labelled according to the desired output or results. **Considering the criticality of function and the requirement of human control and intervention, this may be the preferred option** in the case of this dissertation. The other two are not discussed further.

CHAPTER 7 : DATA ANALYSIS AND DISCUSSION

7.1 Pre-test

A pilot questionnaire was prepared and floated to a select group of well-informed personnel. Based on multiple interactions with them and the inputs received, the Questionnaire was finalised and administered to the target population.

7.2 Final Questionnaire

A copy of the Questionnaire is attached as Appendix A. The details of the questionnaire are as under.

7.2.1 Sample Size

The Indian Army is authorised 43,000 officers. As per reports, it is short by about 7800 officers (Pandit, 2022), bringing the population down to about 36,000. Considering that the population of Army Officers is fairly homogenous, the Population Proportion is taken at 65%. At 95% Confidence Level (z-score 1.96) and a Margin of Error of 5%, the required Sample Size works out to be 350. The Survey received 356 responses.

7.2.2 The Formula Used is given in Figure 3 below.

$$\text{Sample Size} = \frac{(\text{z-score})^2 \times \text{StdDev} \times (1-\text{StdDev})}{(\text{Confidence interval})^2}$$

Figure 3 *Formula : Sample Size Calculation.* Adapted from https://www.wallstreetmojo.com/sample-size-formula/

7.2.3 There are eight Classification questions and eighteen Data Questions (Nominal – 10, Ordinal – 02, Interval – 04, Ratio – Nil and Text (Subjective Inputs) – Two). The distribution of questions as per Objective Based Categories (Folz, 1996), is - two Factual, seven Opinion based, four Attitude oriented, four Motive nil for Knowledge, and one Action/ Behaviour oriented.

7.3 Classification of Responses

A total of 356 responses were received. These are classified as per Service Bracket and Arm/ Service in Figure 4 below.

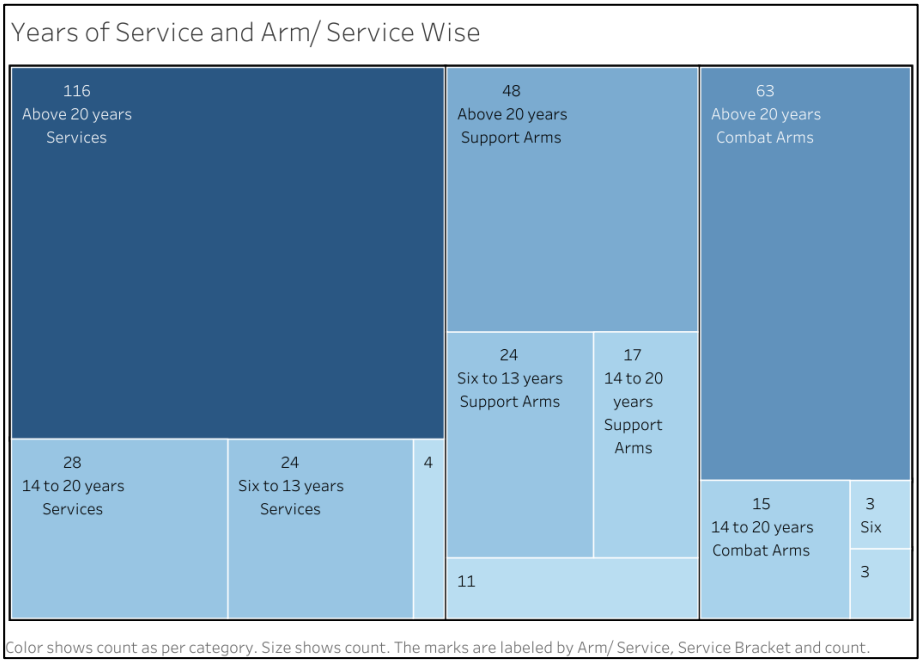


Figure 4 : Classification of Responses as per Years of Service and Arm/ Service

7.4 As Per Rank

The distribution is given in Figure 5 below.

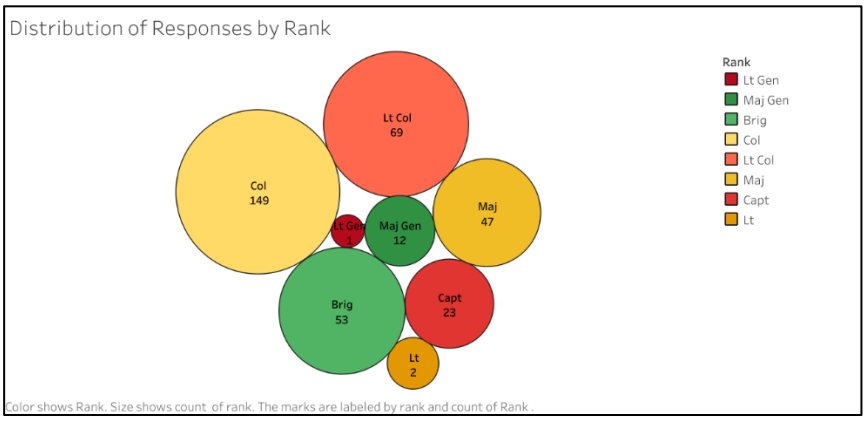


Figure 5 : Classification as per Rank

7.5 As per Sex

The distribution is given in Figure 6 below.

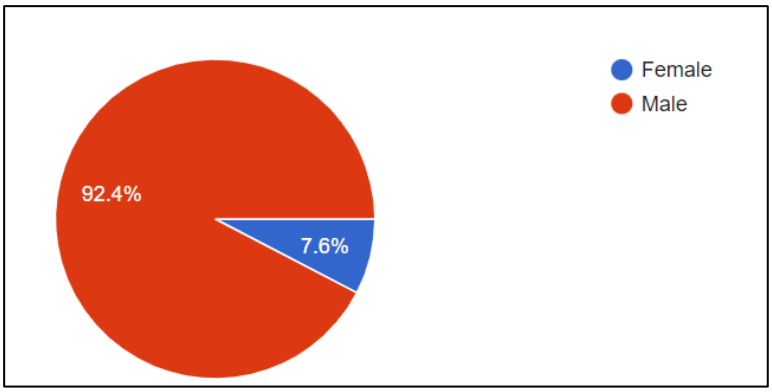


Figure 6 : Classification as per Sex of Officer

7.6 As Per Length of Service

The distribution is given in Figure 7 below.

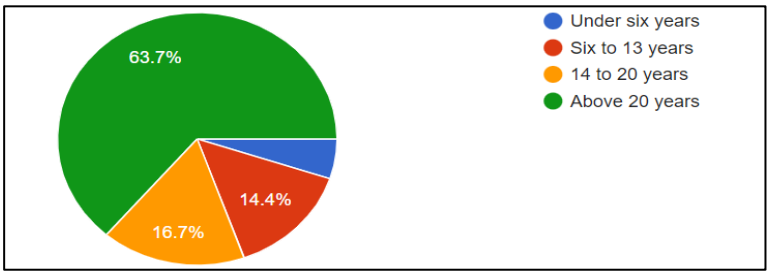


Figure 7 : Classification as per Length of Service

7.7 Service in Vertical Dealing with Officers Postings

The distribution is given in Figure 8 below

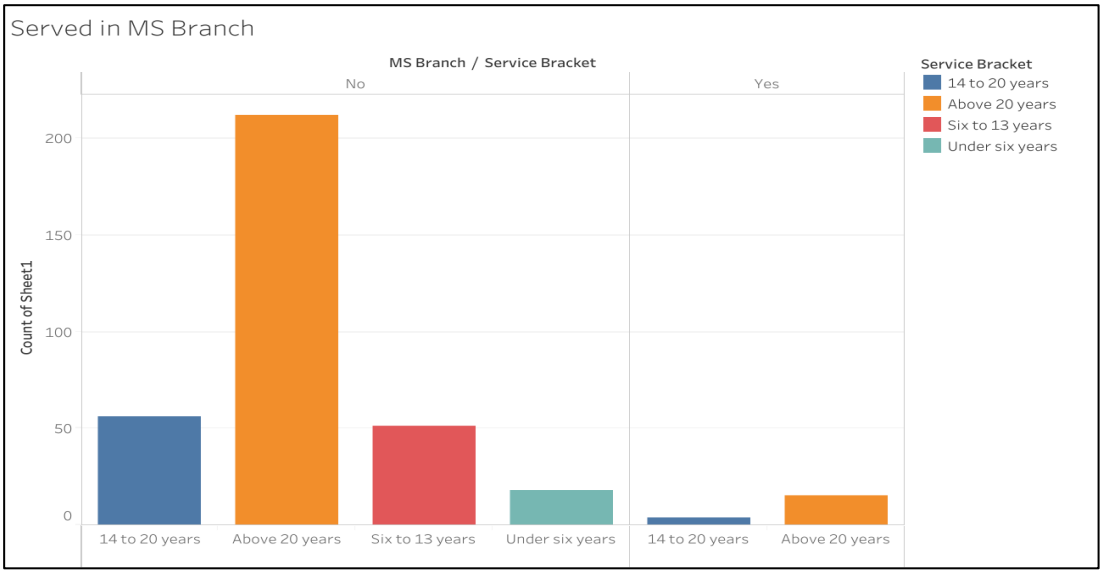


Figure 8 : Proportion of Respondents Not Served in HR Vertical

7.8 Analysis of Responses to Questionnaire

7.8.1 In Q 9 Officers with experience of MS Branch were asked as to whether they considered these four factors (Skill sets, Individual Inclinations, Intrinsic Strengths, Best Suited for Employment) before posting an officer for an appointment

7.8.1.1 Premise of this question is that for a posting decision, these four factors would be the broad attributes which a planning officer would consider

before finalising the decision. It was generated from the Key Informant Interviews and Pilot Questionnaire.

7.8.1.2 This question is an attempt to determine, how much consideration is given to each factor. 18 subjects with current/ past experience of posting planning in MS Branch responded to this question. The responses are shown in Figure 9 below.

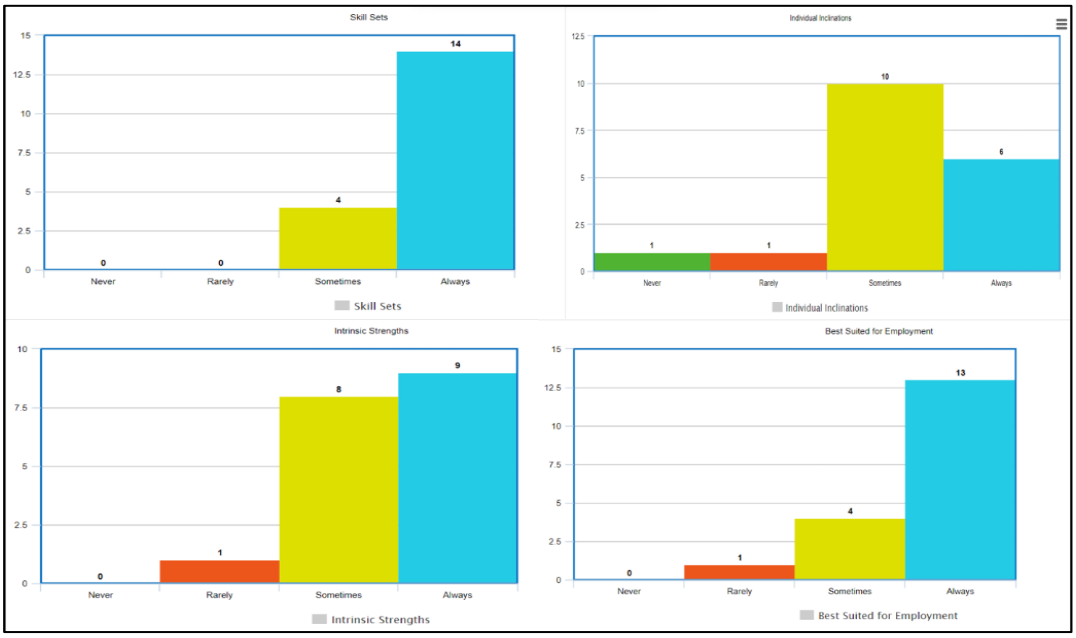


Figure 9 : Consideration of Factors for Posting

7.8.1.3 The responses are left skewed. Giving a score of 1,2,3,4 to Never, Rarely, Sometimes and Always, we arrive at the distribution of Considerations of Factors for Posting as shown in Table 1 :-

Table 2

Considerations of Factors for Postings

	Score	Skill sets	Individual's Inclinations	Intrinsic Strengths	Best Suited for Employment
Never	1	0	1	0	0
Rarely	2	0	1	1	1
Sometimes	3	4	10	8	4
Always	4	14	6	9	13
Mean Score	2.5	3.778	3.167	3.444	3.667
		94%	79%	86%	92%
Overall Mean		3.514			
Overall Score		88%			

The officers dealing with postings believe that they almost always factor in these four aspects before carrying out any posting. Rank ordering from One to Four would be - Skill Sets, Rank Two – Best suited for employment, Intrinsic strength and lowest being Individual's inclination

If these are the four key factors, we need to determine what are the sources of information based on which these four factors are analysed by the AMS. These emerge in the next question.

7.9 In Q 10 as a follow up on previous question, the subjects were asked as to how they gained insight into each of the aspects (Skill sets, Individual Inclinations, Intrinsic Strengths, Best Suited for Employment). They were to select a combination of four parameters - Courses done, CR extracts, Informal inputs, Prevalent norms.

7.9.1 Courses Done, CR Extracts, Informal Inputs, Prevalent Norms are the four inputs used to source data for arriving at the posting decision. This question is an attempt to determine the weightage given to these four input factors. A summary of the responses received is shown in Figure 10 below.

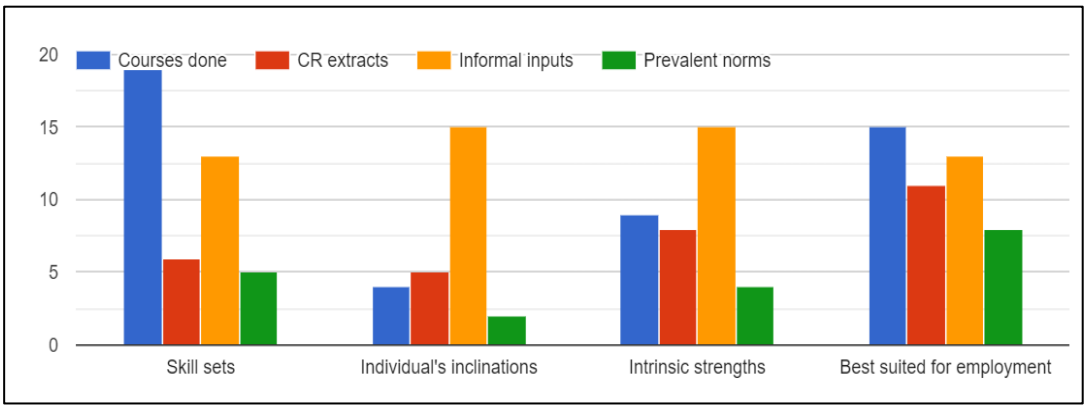


Figure 10 : *Source of Inputs for Factors Considered for Posting*

7.9.2 Each of the four aspects mentioned in Q 9 are considered in the posting planning process based on the four inputs received above. The contributions of each input towards each of the four aspects are different as shown above. The number of instances of utilisation of factors were totalled in Table 3 below, in order to arrive at Rank Order of the four factors.

Table 3

Source of Inputs for Factors Considered for Posting

	Skill Sets	Individual's Inclinations	Intrinsic Strengths	Best Suited for Employment	No of Instances	%	Rank Order
Courses Done	17	3	9	15	44	31 %	2
CR Extracts	6	3	7	10	26	18 %	3
Informal Inputs	12	14	14	12	52	37 %	1
Prevalent Norms	5	2	4	8	19	13 %	4

7.9.3 Least weightage was given to Prevalent Norms. Courses Done provided maximum inputs for determining the individual's Skill Sets and his competency mapping. Courses done, CR Extracts and Prevalent Norms are all quantified and available. **Overall, Informal Inputs provided maximum inputs for determining the individual's inclinations and strengths. This is not part of the quantified inputs available.** It is possible to extract some of these from the Pen Picture.

7.10 In Q 12 the environment was asked whether they believed that decisions about postings/ appointments were being made with deliberation.

7.10.1 Overall, only 32 % of the subjects believed that the decisions were made with deliberation. However, as the officers service bracket increases, the belief that the decisions are made with deliberation increases from 22% to 36%. This is plotted in Figure 11 on next page.

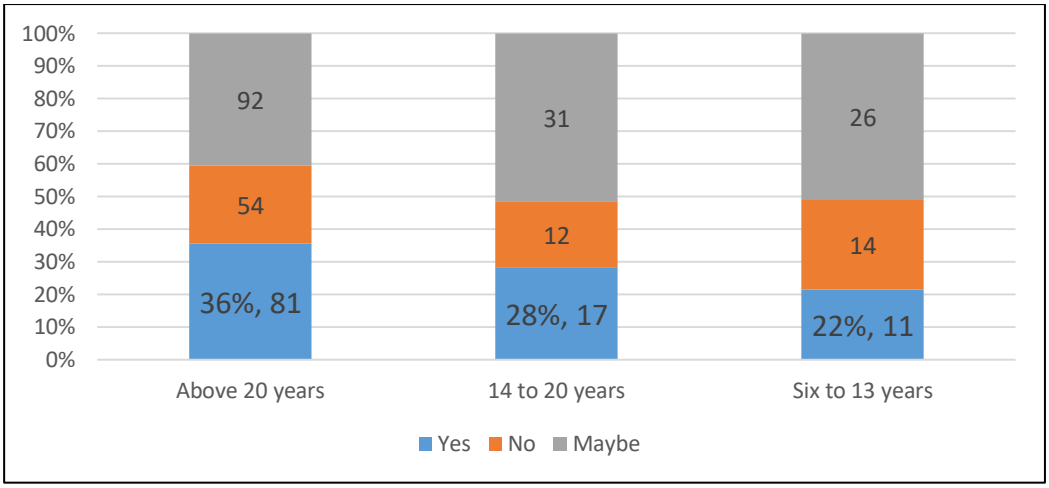


Figure 11 : Belief About Degree of Deliberation in Posting

7.10.2 A chi-square test of independence was performed (with α=0.05) to determine the relation between Service Bracket (Years of Service) and the belief about the deliberation done prior to posting.

For the purpose of this test, the data provided by officers below six years was not considered as these officers would not have the necessary service experience to understand the process.

The proportion of subjects who reported a lack of deliberation **did not differ by Service Bracket**, X^2 (8, N = 338) = 5.5538, p =. 235042.

7.10.3 The belief in the environment regarding the degree of deliberation carried out by MS Branch before posting did not differ based on rank **implying consistency** over the years of service**.** As 68 % of the subjects believe, there is a lack of deliberation, this is a belief which has the potential to impact trust in the institution and needs to be addressed. The use of Pen Picture as a tool to capture the considered input of an experienced set of Reporting Officers and the increase the level of deliberation supported by AI would go a long way in improving the trust levels.

7.10.4 The Contingency Tables are given in Tables 4 and 5 below.

Table 4

Observed Values for Chi-Square Test

Observed Values	**Yes**	**No**	**Maybe**	**Total**
Above 20 years	81	54	92	227
14 to 20 years	17	12	31	60
Six to 13 years	11	14	26	51
	109	**80**	**149**	**338**

Table 5

Expected Values of Chi-Square Test

Expected Values	**Yes**	**No**	**Maybe**	**Total**
Above 20 years	73.204	53.728	100.068	227
14 to 20 years	19.349	14.201	26.450	60
Six to 13 years	16.447	12.071	22.482	51
	109	**80**	**149**	**338**

7.11 In Q 13 the environmental view on availability of adequate information with MS Branch for planning postings/ appointments was determined

7.11.1 The belief about adequacy of information is shown in Figure 12 below. Over 50% of the officers believe that MS Branch has adequate information for planning postings.

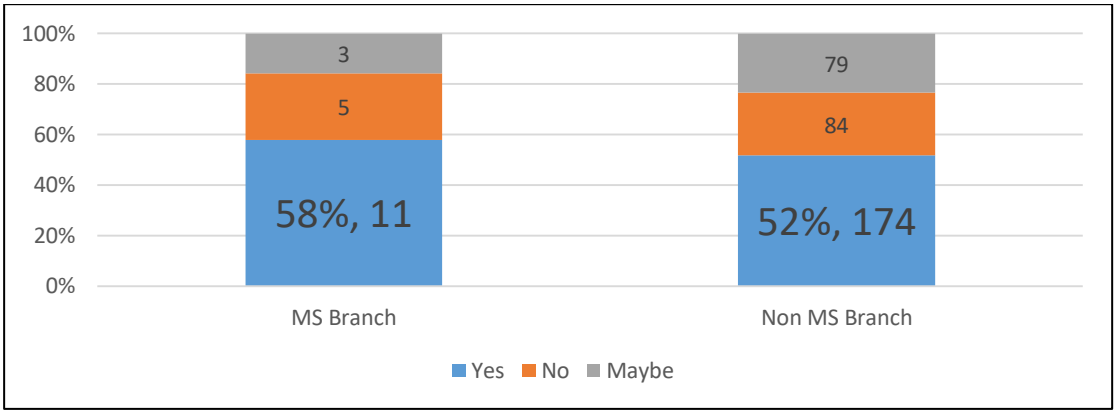


Figure 12 : Adequacy of Information available for Posting

7.11.2 Fisher's Exact Test was used to determine if there was a significant association between experiences of having served in MS Branch (MS Experience) with the belief that there was adequate information available for posting planning (Adequate Information). "Maybe" was not considered for the Test.

7.11.3 There was no statistically significant association between MS Experience and Adequate Information (One-tail p = .63917).

7.11.4 Over 50 % of the officers believe that adequate information is available. Connecting this with the belief of 68% that there is a lack of deliberation implies that the bounds of rationality are time and cognitive

effort available and not information. This can be rectified by use of technology.

7.11.5 The observed values for the test are given in Table No 6 below.

Table 6

Fisher's Exact Test : Association Between MS Experience and Adequate Information

Observed Values	**Yes**	**No**	
MS Branch	11	5	16
Non MS Branch	174	84	258
	185	89	274

7.12 In Q 14, the subjects were asked whether stereotypes are formed in mind while taking decisions related to posting

7.12.1 Rank Wise views are in Table 7 and summarised at Table 8 below.

Table 7

Rank Wise Responses to View on Formation of Stereotypes

	Yes	**No**	**Maybe**	**Total**
Lt Gen	0	0	1	1
Maj Gen	6	2	4	12
Brig	31	7	15	53
Col	86	21	42	149
Lt Col	38	6	25	69
Maj	22	13	12	47
Capt	10	5	8	23
Lt	2	0	0	2
	195	**54**	**107**	**356**

7.12.2 A summation by rank groups is shown in Table 8 below.

Table 8

Views on Formation of Stereotypes as per Rank Groups

	Yes	No	Maybe	Total	%
Select Ranks	123	30	62	215	57%
Field Ranks	60	19	37	116	52%
Subalterns	12	5	8	25	48%
	195	**54**	**107**	**356**	**55%**

7.12.3 Expectation of stereotyping by MS Branch, increases with rise in rank. To verify this, a chi-square test of independence was performed to examine relation between **Rank** and **Expectation of Stereotyping** in posting planning.

The relation between these variables was **not** significant, X^2 (8, N = 356) =1.6137 p =.806321.

All ranks were equally likely to ascribe stereotyping as a motive behind posting planning.

7.12.4 The views were also collated Arm/ Service wise in Figure 13 below.

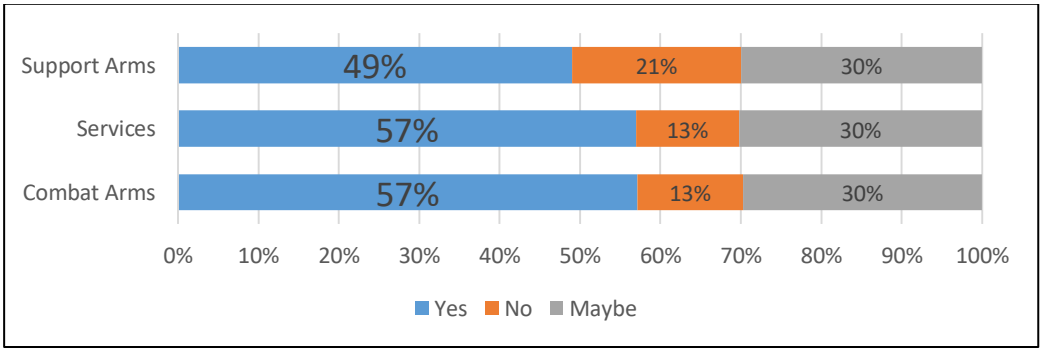


Figure 13 : Belief About Presence of Stereotypes in Decision Makers' Minds

7.12.5 55% of subjects stated that there are stereotypes being formed in the minds of decision makers while taking decisions on posting planning.

Examining the same data, Arm/ Service wise, there was no difference in view across Combat Arms, Support Arms or Services.

7.12.6 Fisher's Exact Test was used to determine if there was a significant association between the responses of those officers who served in MS Branch (**MS Experience**) with the **Expectation of Stereotyping**. For this purpose, test was done under two conditions - 'Maybe' taken as 'Yes' AND 'Maybe' discarded for calculation.

There was **statistically significant association between MS Experience and Expectation of Stereotyping i.e, the variables were dependent under both conditions.**

The Fisher Exact Test statistic value is 0.0051 when 'Maybe' is discarded. The result is significant at $p < .05$.

The Fisher Exact Test statistic value is 0.0146 when 'Maybe' was added to 'Yes'. The result is significant at $p < .05$.

In other words, the view on Expectation of Stereotyping varied between those officers who have served in MS Branch and those in the environment. 53% officers in the environment said 'Yes' to Expectation of stereotyping. 81% said 'Yes' and 'Maybe'.

The expectation that stereotyping influences posting is a widely held belief across all ranks and Arms/ Services. The views of officers who have served in MS Branch differ from that of the environment. This is indicative of a Bias Blind Spot in officers of MS Branch. With utilisation of Pen Picture and AI, there is a possibility of overcoming this.

7.13 The environment was asked whether they believed that MS Branch officers would be able to provide a justification for the posting decisions taken.

7.13.1 A summary of responses is given in Figure 14 below :-

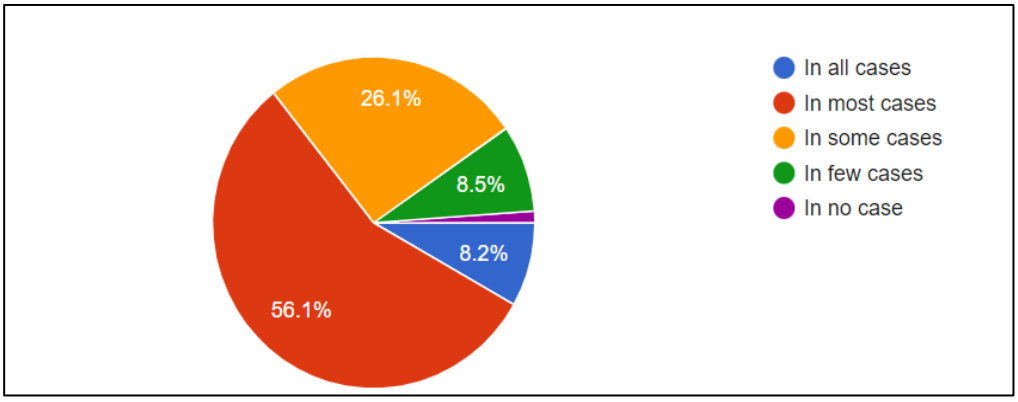


Figure 14 : Availability of Justification for HR Decision

7.13.2 64.3% of the 353 subjects who answered this question think that the MS Branch will be able to provide justification for a posting decision taken. It also highlights the importance of trust in this life-affecting decision making process.

7.14 In the next two questions, the officers were queried on the frequency of a structured interaction with MS Branch regarding their posting and the number of times it has happened in their service life.

7.14.1 356 responses were received. A summary is given in Figure 15 below :-

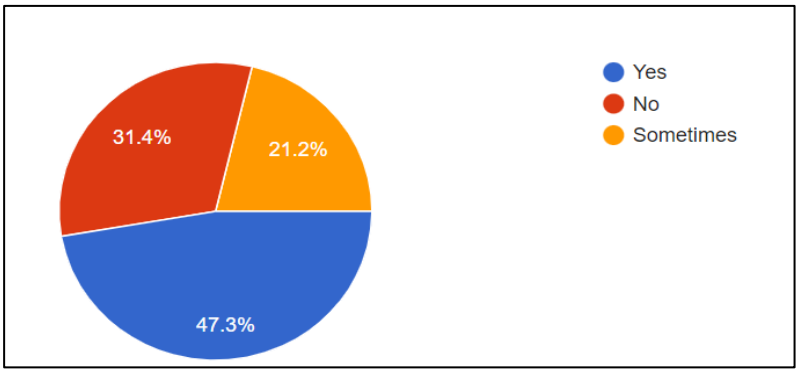


Figure 15 : Structured Interaction With MS Branch for Posting

7.14.2 68% of the respondents ('Yes' plus 'Sometimes') had some form of interaction. **The average interaction of these 68% respondents or 243 officers was once in 11.12 years of service**.

7.14.3 The experience of MS Branch officers versus non- MS Branch officers was also examined. Average interaction worked out uniformly as under :-

MS Branch officers – once in 10.19 years.

Non-MS Branch officers – once in 11.16 years.

7.14.4 Over a twelve year period, an officer is likely to be posted four-five times. This implies that i**nteraction was carried** out once out of four/ five time or approximately **20-25%** time only**. As per responses to Q 11, Informal Interactions was the highest ranking input for posting planning process, thus supporting the argument that there is less deliberation in carrying out posting.**

7.14.5 More than the quantum of the interaction, it's the quality that matters. Twelve respondents commented adversely on the quality of interaction. However, as this was not asked explicitly, responses are not being factored in.

7.15 In Q 18 the environment was queried if they felt that a less qualified person had been selected for a particular appointment for which they were suitable.

7.15.1 Overall the response are shown in Figure 16 below :-

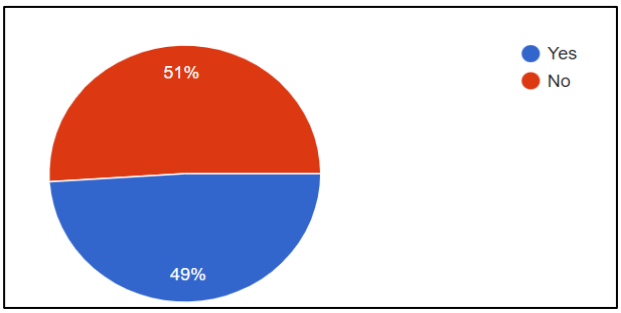


Figure 16 : Expectation of Selection of a Lesser Qualified Person

7.15.2 49 % of officers felt that a less qualified person was selected for the job, for which they were suitable.

7.15.3 MS Experience

Fisher's Exact Test was used to determine if there was a significant association between the responses of those officers who served in MS Branch (**MS Experience**) with the **Expectation of Less Qualified Person Selection**.

There was **NO** statistically significant association between **MS Experience** and **Expectation of Less qualified Person Selection.**

The Fisher Exact Test statistic value is 0.3498. The result is NOT significant at $p < .05$.

The observed values are shown in Table 9 below.

Table 9

Expectation of Selection

Selection of Less Qualified Person	**Yes**	**No**
MS Experience	7	12
Non MS Experience	166	171

7.15.4 Bias Due to Sex

Another Fisher's Exact Test was used to determine if there was a significant association between the responses of Male versus Female Officers to determine expectation of bias in selection due to sex of the officer.

There was statistically significant association between **Sex** and **Expectation of Less Qualified Person Selection.**

The Fisher Exact Test statistic value is 0.0783. The result is **Significant** at $p < .10$.

The observed values are shown in Table 10 below.

Table 10

Expectation of Less Qualified Person Selection by Sex

Sex	Yes	No
Male	164	164
Female	9	19

7.15.5 Rank Bias

Another Fisher's Exact Test was used to determine if there was a significant association between the responses of Select versus Non Select Rank Officers to determine bias in selection.

There was **NO** statistically significant association between **Rank** and **Expectation of Wrong Person Selection.**

The Fisher Exact Test statistic value is 0.2356. The result is **NOT significant** at $p < .05$.

The observed values are shown in Table 11 below.

Table 11

Expectation of Less Qualified Person Selection by Rank

Rank	Less Qualified Person Selected	Yes	No
Select		110	105
Non Select		63	78

7.15.6 50% of the officers believe that a lesser qualified person was selected for an appointment. This expectation did not vary based on rank, sex, or MS Experience indicating an across the board belief. While qualification is

captured as a quantified parameter, there are inputs given by Reporting Officers in Pen Picture recommending aptitude and expertise of the officer and which can be captured to give inclination of the officer towards specific competencies.

7.16 As a follow up to the previous question, the environment was asked to attribute this tendency of selecting a "less qualified" person.

7.16.1 The distribution of responses is shown in Figure 17 below.

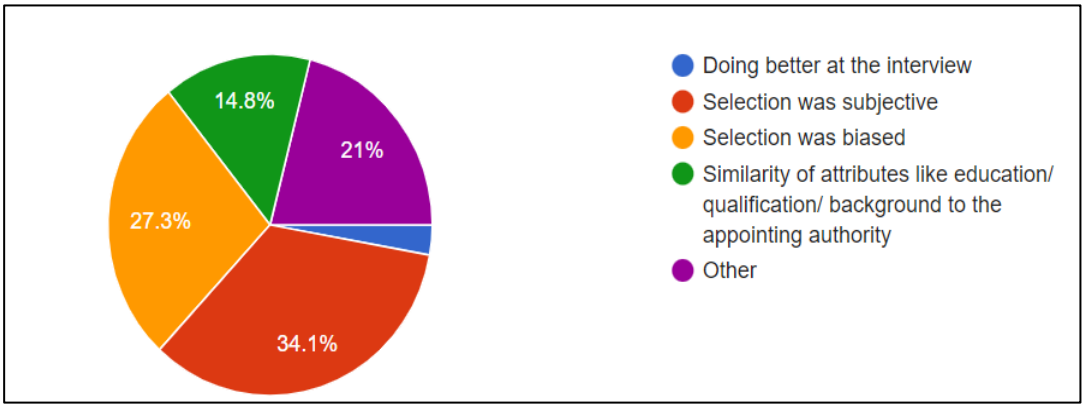


Figure 17 : Attribution of Selection of Less Qualified Officer

7.16.2 49% or 173 officers responded yes to the question of expectation of wrong selection for an appointment. Of these, 171 officers gave the believed reason for wrong selection as shown above.

7.16.3 The interpreted distribution is given in Table 12 below

Table 12

Attribution of Selection To Reason

Less Qualified Selection Attributed	Numbers	Percentage
Unbiased	5	3%
Resemblance Heuristic	27	16%
Subjective	60	35%
Biased	47	27%
Other reasons	32	19%

7.16.4 Therefore a total of 134 officers (**38%**) out of 356 believed that **selection was either Subjective or based on a Heuristic/ Bias**.

7.16.5 Only 3% of subjects believed that selection was unbiased.

7.17 In Q 20 the officers were asked if they thought that adequate time was available with officers of MS Branch to select/ plan posting of an officer.

7.17.1 The distribution is shown in Figure 18 below.

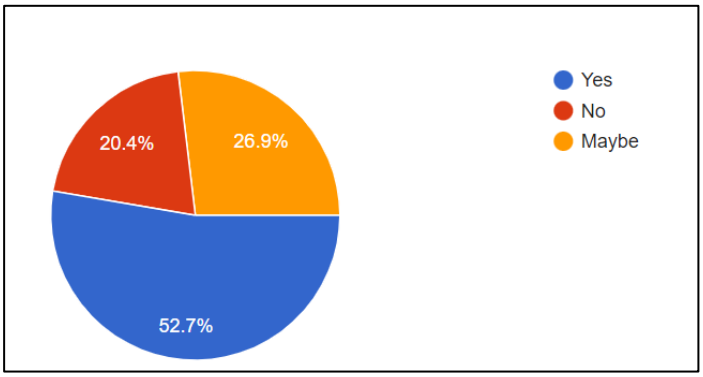


Figure 18 : Belief about Adequacy of Time Available

7.17.2 The observed values are given in Table 13 below :-

Table 13

Adequacy of Time available

Adequate Time Available	**Yes**	**No**	**Maybe**
MS Branch	15	2	2
Non MS Branch	174	69	94

7.17.3 Fisher's Exact Test was used to determine if there was a significant association between the responses of those officers who served in MS Branch (**MS Experience**) with the **Expectation of Adequate Time Available**.

7.17.4 The column of Maybe was not considered for the purpose of the Test.

7.17.5 There was **NO** statistically significant association between **MS Experience** and **Expectation of Adequate Time Available.**

7.17.6 The Fisher Exact Test statistic value is 0.31677. The result is NOT significant at $p < .05$.

7.18 As a follow up if answer was no, the views as to the likely impact on competence mapping were sought.

Table 14

Result of Inadequate Time

Do You Think that Lack of Adequate Time for Posting Planning will lead to inadequate Competence Mapping	
Inadequate Competency Mapping	41
Inadequate, but organisation is resilient and will overcome it	37
No impact	2
Will match the requirement	5

7.18.1 The observed values are given in Table 14 above.

7.18.2 189 out of 356 respondents had said that adequate time available was to plan postings.

7.18.3 The balance 167 (47%) believe that time available is inadequate. Of these, 41 (11% of the 356 respondents) believe that it will adversely impact the Competency Mapping.

7.19 The environmental view on whether the Pen Picture could have inputs to enable MS Branch to place an officer as per his competence and capabilities suiting the appointment, were sought.

7.19.1 The responses are collated in Figure 19 and Table 15 below.

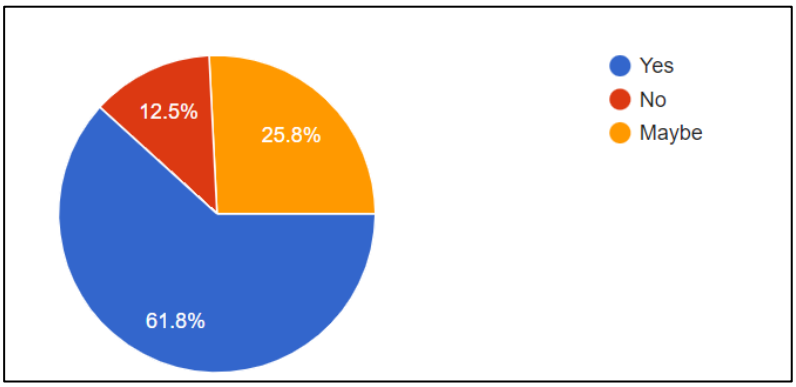


Figure 19 : Belief About Pen Picture Providing Viable Inputs

Table 15

Belief About Pen Picture Providing Viable Inputs

Pen Picture Enabling	**Yes**	**No**	**Maybe**
MS Branch Officers	12	2	5
Non MS Branch	207	43	87

7.19.2 An overwhelming 87% thought that the Pen Picture may enable better competency mapping.

7.19.3 Fisher's Exact Test was used to determine if there was a significant association between the responses of those officers who served in MS Branch (**MS Experience**) with the **Expectation of that Pen Picture enabling better competency mapping**. The column of Maybe was added to Yes for the purpose of the Test.

There was **NO** statistically significant association between **MS Experience** and **Expectation of Pen Picture enabling better competency mapping.**

The Fisher Exact Test statistic value is 1. The result is NOT significant at $p < .05$.

7.20 In Q 23, the belief about utilisation of Pen Picture as a posting input was sought.

7.20.1 Figure 20 below gives out the distribution of responses. The observed values are given in Table 16 below.

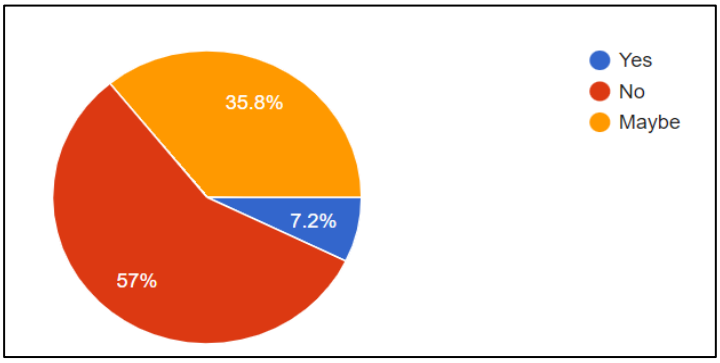


Figure 20 : Belief About Utilisation of Pen Picture as a Posting Input

Table 16

Utilisation of Pen Picture as a Posting Input

Pen Picture Utilised	**Yes**	**No**	**Maybe**
MS Branch	0	14	5
Non MS Branch	23	157	105

7.20.2 304 officers responded to the question. Of these, 171 (56%) thought that the Pen Picture is **NOT being utilised for enabling better competency mapping**. An **overwhelming 74% of the officers with MS Branch experience** felt that it is NOT being utilised for enabling better competency mapping.

7.20.3 Fisher's Exact Test was used to determine if there was a significant association between the responses of those officers who served in MS Branch (**MS Experience**) with the **Expectation that Pen Picture is being utilised for**

better competency mapping. The column of Maybe was added to Yes for the purpose of the Test.

There was **NO** statistically significant association between **MS Experience** and **Expectation of Pen Picture enabling better competency mapping.**

The Fisher Exact Test statistic value is .1522. The result is NOT significant at $p < .05$.

7.21 The subjects were asked whether there is a need to have certain objective parameters built into the Pen Picture. Examples of certain appointments such as G/ A/ Q appointments and for levels such as Brigade/ Div/ Corps were used to initiate relevance and association with the idea.

7.21.1 The response was overwhelming in favour of the idea, indicating a need for adding quantification and limited structure to the Pen Picture as also improving its contribution to competency mapping.

7.21.2 Figure 21 below gives out the distribution of responses. The observed values are given in Table 17 below.

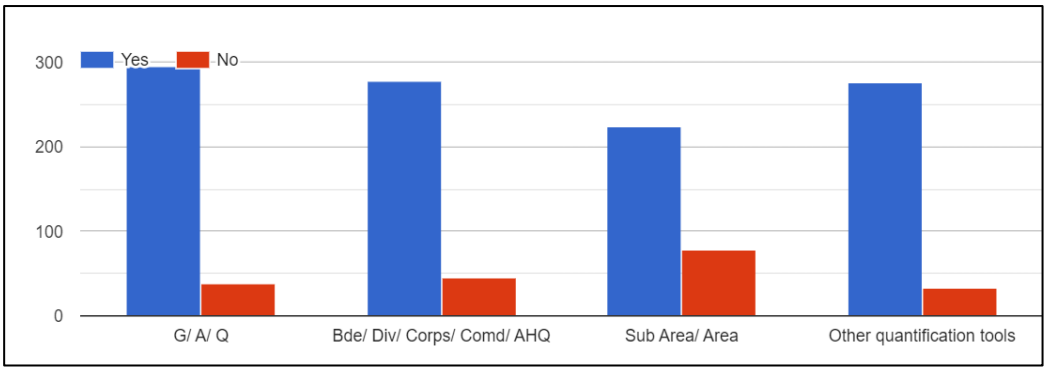


Figure 21 : Views Regarding Adding Limited Structure to Pen Picture

Table 17

Adding Quantification and Limited Structure

Include Check Boxes	**G/ A/ Q**	**Bde/ Div/ Corps/ Comd/ AHQ**	**Sub Area/ Area**	**Other Quantification Tools**
		Numbers		
Yes	297	280	227	279
No	38	46	78	33
Total	335	326	305	312
		Percentage		
Yes	81%	77%	62%	76%
No	10%	13%	21%	9%
Total	92%	89%	84%	85%
Did not answer	8%	11%	16%	15%

7.21.3 The response was universal across all categories of respondents. 62%-81% of the respondents said "Yes" to the idea.

7.21.4 A chi-square test of independence was performed (with α=0.05) to determine the relation between Rank and the need for limited structure and quantification in the Pen Picture. For the purpose of this test, the data provided by officers was grouped as per rank into four categories (Generals, Brigadiers, Colonels and Non Select ranks).

The proportion of subjects who accepted the need for limited structure and quantification in the Pen Picture **did not differ by Service Bracket**, X^2 (15, N = 297) = 1.7232, p =. 995128.

The Contingency Tables are given at Tables 18 and 19 below.

Table 18

Chi-Square Test Views by Rank Adding Quantification and Limited Structure

Observed Values	**[G/ A/ Q]**	**[Bde/ Div/ Corps/ Comd/ AHQ]**	**[Sub Area/ Area]**	**[Other quantification tools]**	**Total**
Generals	11	9	6	12	38
Brig	45	44	39	47	175
Col	126	117	96	114	453
Non Select	115	110	86	106	417
Total	297	280	227	279	1083

Table 19

Chi-Square Test Views Expected Values by Rank Adding Quantification and Limited Structure

Expected Values	**[G/ A/ Q]**	**[Bde/ Div/ Corps/ Comd/ AHQ]**	**[Sub Area/ Area]**	**[Other quantification tools]**	**Total**
Generals	10.42105263	9.824561404	7.964912281	9.789473684	38
Brig	47.99168975	45.24469067	36.68051708	45.08310249	175
Col	124.2299169	117.1191136	94.9501385	116.700831	453
Non Select	114.3573407	107.8116343	87.40443213	107.4265928	417
Total	297	280	227	279	1083

7.22 Environmental view was determined about whether it is possible to use Artificial Intelligence and specifically Human Resource analytics to extract/ infer relevant inputs from Pen Picture and CR, which will assist the MS Branch in decision making regarding postings.

7.22.1 The distribution of responses is given in Figure 22 below.

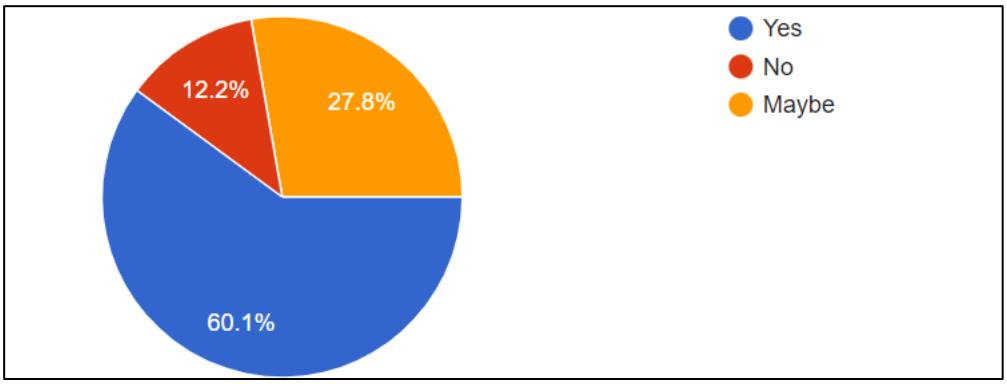


Figure 22 : Possibility of Using AI to Extract Inputs from Pen Picture

7.22.2 An overwhelming, 87.9% of the subjects said 'Yes' or 'Maybe' to the possibility of using AI to extract relevant inputs from Pen Picture to enable better posting planning.

7.23 <u>Analysis of Subjective Inputs Received</u>

The subjects were asked to offer some suggestions to structure the Pen Picture with an aim to better capture the competencies of an officer and enable better placement.

7.23.1 213 out of 353 respondents replied to the question. Of these, 26 respondents felt no need to change the Pen Picture or to institute any format for it. The suggestions given by the balance 187 respondents were summated and analysed. The analysis was done using two methods – Content Analysis and Sentiment Analysis.

7.23.2 Sentiment Analysis

The steps followed were to delete duplicate data, remove irrelevant items, check for outlier data, correct typographical errors and structural mistakes, and check for missing data (Role of Data Cleaning in Sentiment Analysis, 2022). After validation of data the Word Map, so obtained is given as Figure 23 below.

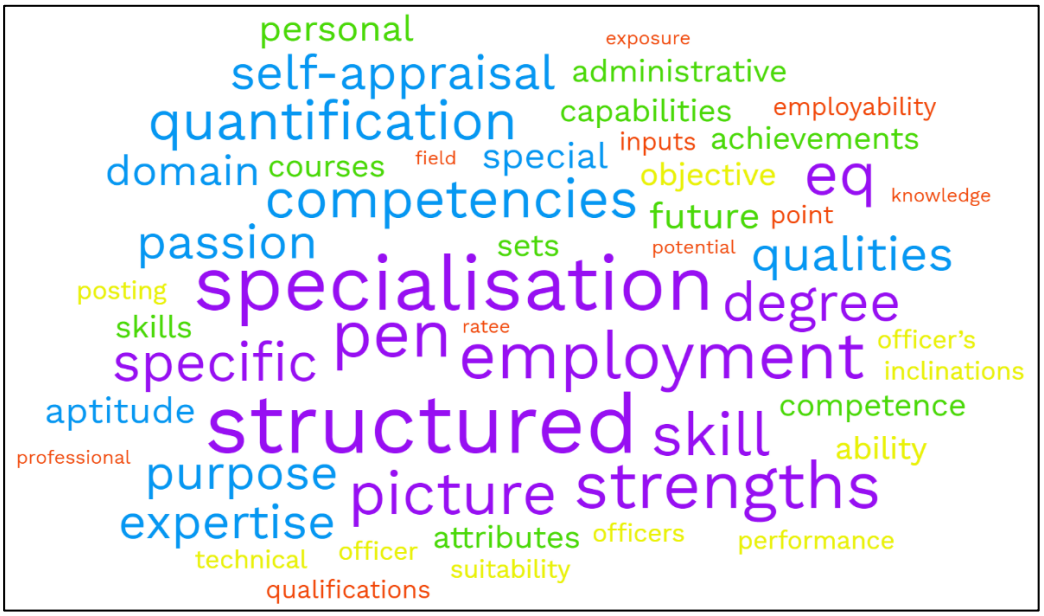


Figure 23 : Sentiment Analysis for Structuring Pen Picture to Enable Improved Competency Mapping. *Prepared using the website https://monkeylearn.com/sentiment-analysis-online/*

7.23.3 The above sentiment representation is based on **frequency** of keywords. Colour coding is **VIBGYOR**, with Violet indicating highest frequency. Font size is proportional to frequency. Interpretation as relevant to the question is given below.

7.23.4 **<u>Violet Words.</u>** Structured and Specialisation.

7.23.5 **<u>Indigo Words.</u>** EQ, Skill, Degree, Employment, Specialisation, Specific expertise and Strengths.

7.23.6 **<u>Blue Words.</u>** Self-appraisal, Quantification of the pen picture, Domain specialisation, Competencies, Passion, Purpose of the officer, Qualities, Aptitude and Expertise.

7.24 Officers were also asked to suggest changes to the process of posting.

7.24.1 **The inputs received were put through a** sentiment analysis. Of the 353 respondents, 19 are from MS Branch or the HR vertical and hence were not required to answer this question. Of the balance 334, 195 answered the question. The answers were received in text format. Sentiment Analysis was carried out on the answers and is given as Figure 24 below.

Figure 24 : Sentiment Analysis for Suggestions by Non HR Officers to Improve Posting Planning. *Prepared using the website https://monkeylearn.com/sentiment-analysis-online/*

7.24.2 The above sentiment representation is based on **frequency** of keywords. Colour coding is **VIBGYOR**, with Violet indicating highest frequency. Font size is proportional to frequency. Interpretation as relevant to the question is given below.

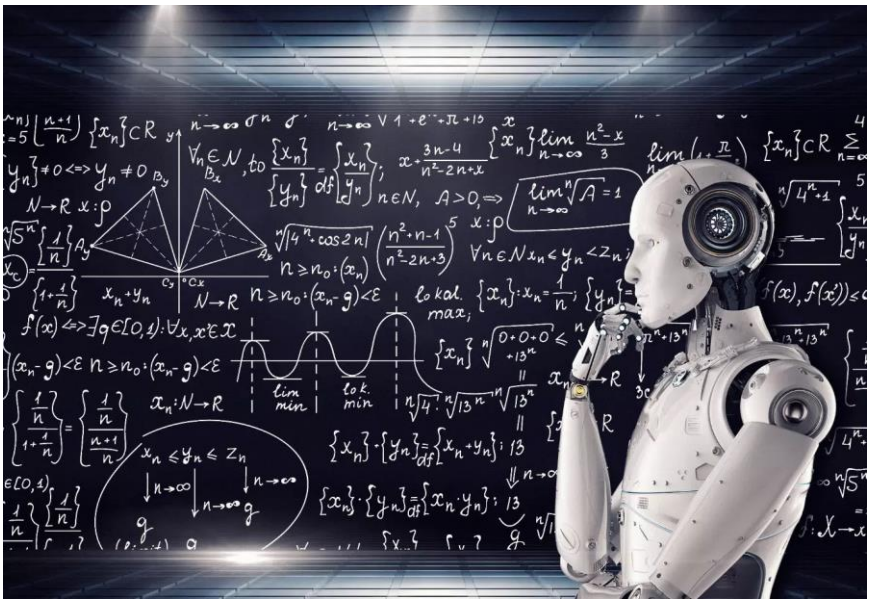
<u>Violet Word.</u> Skill.

Indigo Words. Transparency, Specialisation, Individual profile, Field profile, Organisational requirement and Personal requirement

Blue Words. Interaction with officers, Choice, Aspirations, Domain specialisation, Professional qualifications and Peace profile

7.25 Analysis of Key Informant Interviews. Interaction was carried out with the MS Branch at Army Headquarters and Key Informants identified. Information was sought from the Key Informants and their responses recorded. A copy of the Key Informant Interview Questionnaire is attached as Appendix B. The responses received are attached as Appendix C. The detailed analysis and inputs of the Key Informant Interviews has been given in Chapter 4.

CHAPTER 8 : USE OF HR ANALYTICS TO DEVELOP BUSINESS INTELLIGENCE FRAMEWORK



8.1 Background

8.1.1 **Human Resources** is about emotions, feelings and connections between humans and thus application of Emotional Intelligence and decision making based on experience and understanding.

8.1.2 **Management** is about measurement and metrics. What you cannot measure, you cannot manage, paraphrasing the famous adage by Peter Drucker. HRM, therefore, on the face of it sounds, like an oxymoron. In 1978, Dr Jac Fitz-enz in an article in Personnel Journal titled “The Measurement Imperative” proposed that human resources activities and their impact on the bottom line could be measured. Being a radical idea, it was received with the usual amount of ridicule, apathy and disbelief.

8.1.3 **HR Analytics**, goes beyond that. It quantifies, builds models and **predicts** behaviour. It is done by organisations having access to the necessary technology and tools and it has the potential to give significant **ROI**. Analysis of ROI case studies in 2014 by Nucleus Research Group indicates that for every

one $ spent on HR Analytics yielded an ROI of $13.01. This was up from $ 10.66 in 2011. (Research, 2014).

8.1.4 The success of **Sabermetrics** in Baseball is also a case in point. Bill James, the legendary baseball analyst, defined it as a "search for **objective knowledge** about baseball". Given the emotional connection between baseball and Americans, the successful implementation of analytics to **attain objectivity and override emotional decisions** is commendable and worth emulating.

8.2 AI in HR Analytics

8.2.1 Definition of HR Analytics

It is defined as the "systematic identification and quantification of the people drivers of business outcomes, with the purpose" of taking better decisions (Heuvel & Bondarouk, 2017).

8.2.2 The advent of AI has unlocked opportunities for HRM with real-time **insights** into performance, engagement, job satisfaction, aspirations, training requirements, and other critical metrics. AI algorithms can accurately **forecast** retention, recruitment outcomes, and even development progress.

8.2.3 The integration of AI in HR enables automated data gathering and analysis in real-time which may result in **cognitive overload** for humans.

8.2.4 Insights of AI are based on accurate and complete data. For instance, AI can recommend potential officers for an appointment based on factors such as skills, experience, and competencies. However, if the AI system is trained using biased or discriminatory data from the past, **it may perpetuate existing inequalities.**

8.2.5 Therefore, HR teams must work closely with AI developers to ensure that AI systems are built using a diverse and well-rounded set of data sources and that AI systems are developed transparently to avoid any unintended biases or discriminatory outcomes.

8.3 Five Pillars of Trustworthy AI in HR Analytics

HR teams should keep in mind five pillars of trustworthy AI, as shown in Figure 25 below (Sheopuri, 2021) :-

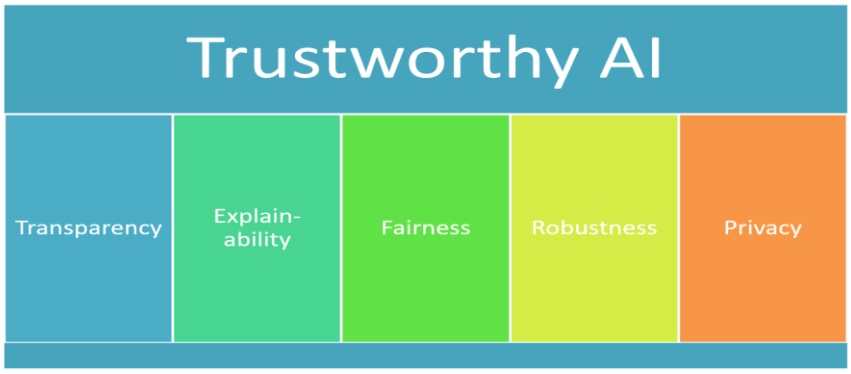


Figure 25 : Pillars of a Trustworthy AI. *Adapted from https://www.myhrfuture.com/digital-hr-leaders-podcast/how-to-deploy-ethical-ai-and-build-data-literacy-in-hr*

8.4 How to Build an AI System

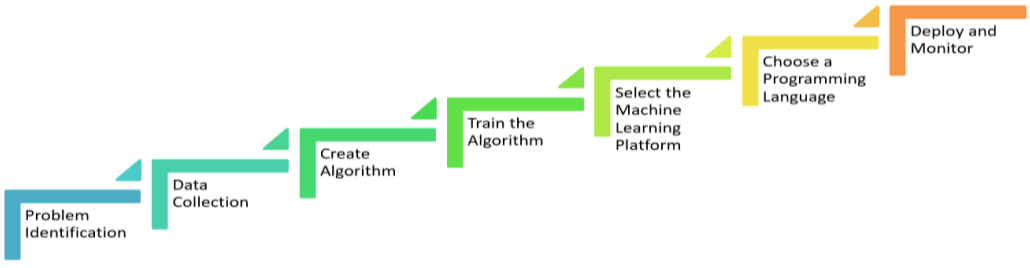


Figure 26 : Steps to Build an AI System. *Adapted from https://becominghuman.ai/a-simple-way-to-explain-how-to-build-an-ai-system-61f0e7367606?gi=c89102fd8de6*

8.4.1 Problem Identification

The identification of problem has been given in Chapters 4-7 and it gives out the value proposition that users can get from this dissertation. The solution to the problem should be developed as a first draft or Minimal Viable Product (MVP) and after that we need to check for problems to eliminate.

8.4.2 Data Collection

There is a critical need to select the right data sources with high-quality data rather than spend time on improving the AI model itself. Data falls under two categories :-

Structured Data. Structured data is clearly defined information that includes patterns and easily searchable parameters. For example, names, appointment, formation, and contact details amongst others.

Unstructured Data. Unstructured data doesn't have patterns, consistency, or uniformity. It could include audio, images including scans, infographics, and most importantly (in context of this dissertation) **text**. Unstructured data is where the majority of organizations implementing AI have difficulty. As much as **90 percent of the data in an organization is unstructured**. It is essential for organisations to understand and interpret this data, which is the point at which **AI can help**. While we are able to use queries and information systems for gaining analytical value on data in structured datasets, it isn't easy to implement these methods with unstructured data.

It is important to **clean, process and structure the data** before training the AI model. Data cleansing, involves correcting errors and filling in missing information to enhance the quality and acceptability of the data.

8.4.3 Create Algorithms. This is addressed in greater detail, subsequently in this Chapter.

8.4.4 Train the Algorithm

The next step is to train the algorithm **using the cleansed data**. For best results, optimize the algorithm during the training process to create a more accurate model. It may be necessary to obtain additional data too. Criticality is to establish the accuracy of the model. To ensure this, it is necessary to set a **Minimum Acceptable Threshold**. For instance, a social networking company working on eliminating fake accounts could assign a "fraud score" to each account, with values ranging from zero to one. A viable threshold could be to send all accounts with a score above 0.9 to the fraud team for further investigation. Similar scoring system can be created to vet the textual inputs as envisaged in this dissertation.

8.4.5 Opt for the Right Platform for Machine Learning

Cloud Frameworks. With an ML-as-a-Service platform or ML in the cloud, you can train and deploy your models faster. You can use IDEs, Jupyter Notebooks, and other graphical user interfaces to build and deploy your models. The cloud makes it easy for enterprises to experiment and grow as projects go into production and demand increases by allowing faster training and deployment of ML models. However **considering the confidentiality** of the dataset, it is not prudent to deploy this.

In-house Frameworks. For example, you can choose Scikit, Tensorflow, and Pytorch. These are the most popular ones for developing models internally. This is the **recommended option** for framework. Specific solution may be iterated by the implementer.

8.4.6 Choose a Programming Language

Python is a good choice for beginners as it has the simplest syntax that a non-programmer can easily learn. **Recommended option.**

C++ boasts a high level of performance and efficiency, making it ideal for AI in games.

Java is easy to debug, user-friendly, and can be used on most platforms. In addition, it works well with search engine algorithms and for large-scale projects. As a rule, Java is used to build desktop applications.

'R' is developed for predictive analysis and statistics. Thus, it's primarily used in data science.

8.4.7 Deploy and Monitor

Finally, after a sustainable and self-sufficient solution has been developed, it's time to deploy it. By monitoring the model after deployment, one can ensure it'll keep performing well.

8.5 Creating the Framework for AI System for Competency Assessment System.

Before building the AI system, it is important to understand the overall system envisaged to be implemented. That is indicated by the diagram in Figure 27 below.

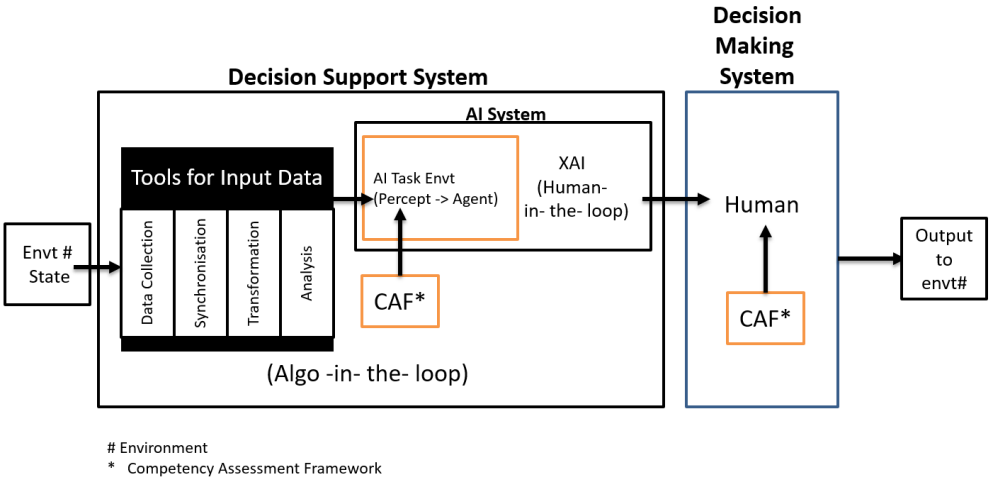


Figure 27 : Overall System Suggested

8.5.1 The System consists of three states as shown above.

The **Environment State** feeds the raw data to the Decision Support System (DSS).

The **DSS** has two sub components. A **data processing component** which collects, synchronises, transforms and analyses the raw data and converts it to information. Post processing the information is fed to the **AI System** and is inputted as Percept. The Percept also takes in the input from the Competency Assessment Framework and feeds to the Agent. The Agent Function is the Algo-in-the-loop. It works as a part of the **XAI System** which also has the Human-in-the-loop.

8.5.2 After XAI processing and validation, AI System output is fed to the **Decision Making System** (DMS) which is human controlled. There the system output is audited to the CAF. The audited decision is then conveyed to the environment as an output.

8.6 Environment State

The Environment for the instant problem may be said to contain the elements as shown in Figure 28 below, based on the study included in Chapter 4.

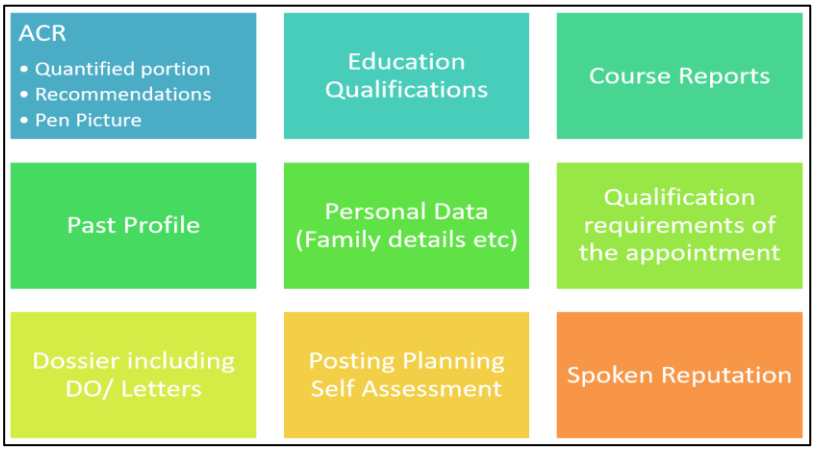


Figure 28 : State of Environment for Competency Assessment

8.7 Explainable AI (XAI)

Trust is critical to the process which we are attempting to support through the use of AI. The decision maker must be able to provide justification for the decision taken.

As seen from the views expressed by the environment in Chapter 7, decisions of postings and placements affect professional and personal lives. It is a **high stakes decision making process** and thus **demands justification**. Justification could take the form of explanation or social transfer of knowledge or audit-ability of the process and the analysis.

XAI is the **key to building trust** and helps in building Human Centred Computing. This is especially so for decision support systems in which **human context** is essential and sometimes life critical, like in medical and law enforcement domains. While this may not solve all our problems regarding bias and cognitive errors, it would help to bring the issues centre stage.

Currently, we may lack principles about how people should interact with AI systems and we do not have empirical evidence as to how do people perceive high stakes decisions taken or supported by AI systems (Ferreira & Monteiro, 2021)

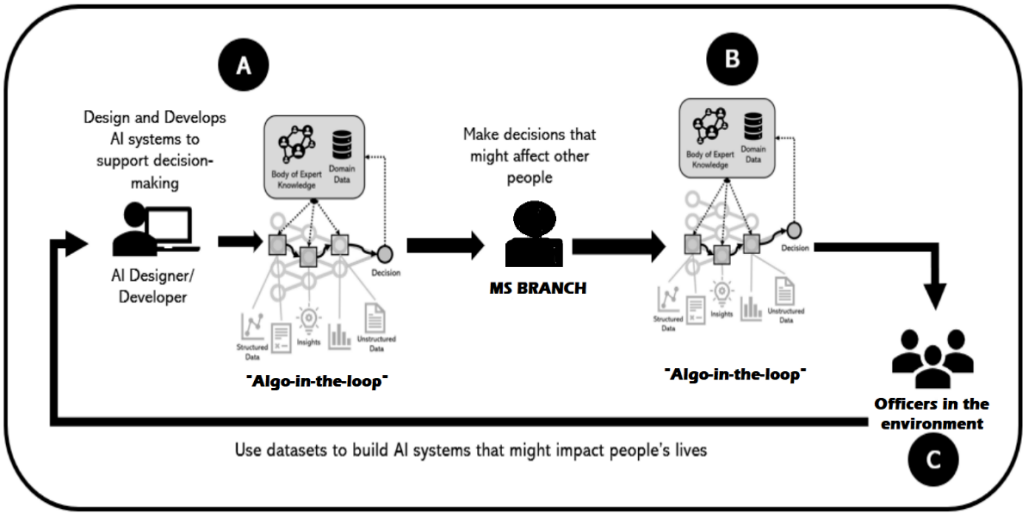


Figure 29 : Build an Explainable AI. *Adapted from (Ferreira & Monteiro, 2021)*

As seen from Figure 29 above, MS Branch is central to the process for ensuring human context and transparency of XAI (legal) or interpretability (as data scientists).

8.8 AI Task Environment for Competency Assessment

This is defined by the PEAS acronym – Performance Measure, Environment, Actuators and Sensors, as shown in Figure 30 (Russell & Norvig, 2015).

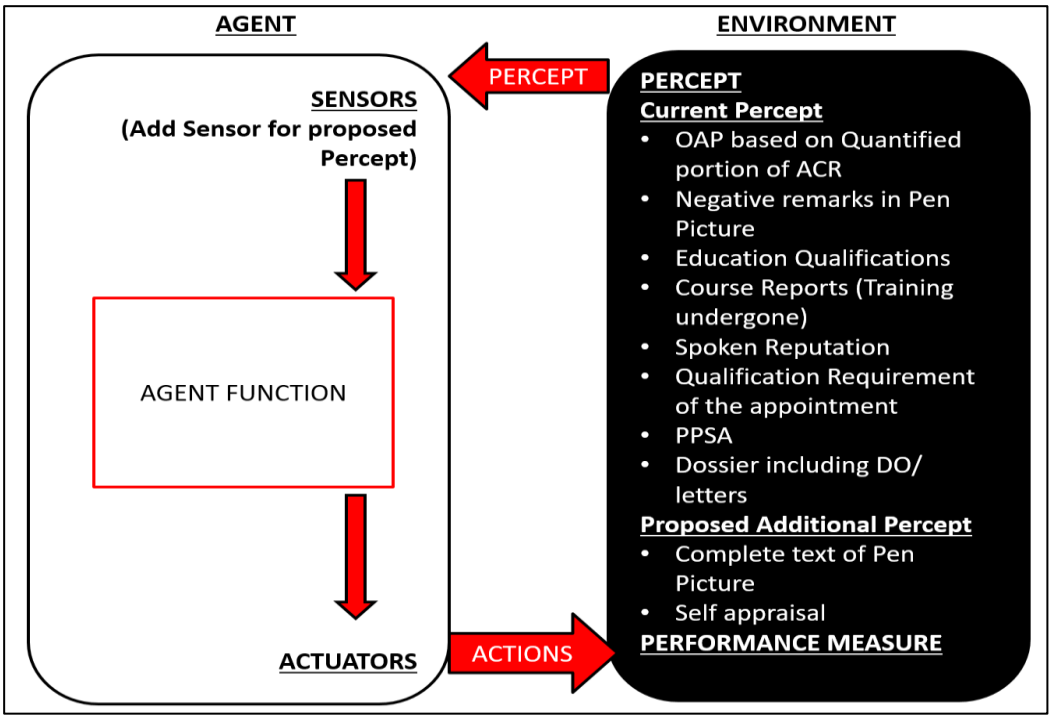


Figure 30 : AI Task Environment Representation. *Adapted from Russell. Artificial Intelligence: A Modern Approach, eBook, Global Edition (p. 53). Kindle Edition.*

8.8.1 The instant case is of a fully observable, Single Agent, deterministic, episodic, static, discrete, known environment. Certain Examples of task Environments are given in Figure 31 below. This may help in identifying the closest fit algorithm.

Task Environment	Observable	Agents	Deterministic	Episodic	Static	Discrete
Crossword puzzle	Fully	Single	Deterministic	Sequential	Static	Discrete
Chess with a clock	Fully	Multi	Deterministic	Sequential	Semi	Discrete
Poker	Partially	Multi	Stochastic	Sequential	Static	Discrete
Backgammon	Fully	Multi	Stochastic	Sequential	Static	Discrete
Taxi driving	Partially	Multi	Stochastic	Sequential	Dynamic	Continuous
Medical diagnosis	Partially	Single	Stochastic	Sequential	Dynamic	Continuous
Image analysis	Fully	Single	Deterministic	Episodic	Semi	Continuous
Part-picking robot	Partially	Single	Stochastic	Episodic	Dynamic	Continuous
Refinery controller	Partially	Single	Stochastic	Sequential	Dynamic	Continuous
Interactive English tutor	Partially	Multi	Stochastic	Sequential	Dynamic	Discrete

Figure 31 : Examples of Task Environments. *Russell. Artificial Intelligence: A Modern Approach, eBook, Global Edition (p. 63). Kindle Edition. Examples of task Environments.*

8.9 Rational Agent

"For each possible percept sequence, a rational agent should select an action that is expected to maximize its performance measure, given the evidence provided by the Percept Sequence and whatever built-in knowledge the agent has" (Russell & Norvig, 2015). **Rational agents are central to AI**. This concept of Rational Agents should be used to develop systems that can be said to be reasonably intelligent. The Agent, Environment and the coupling between them is in the form of flow of Percept from the Environment to the Agent and the Actions of the Agent Actuators back to the environment (Mausam, 2018).

8.10 Performance Measure

The measure of rationality is based on a **Performance Measure** that evaluates any given sequence of Environment States. Therefore the success of the Rational and Intelligent System is also defined in terms of the **Environment view** and not the view of the Agent. Therefore it is better to design the system according to what the environment wants and not what the Agent thinks (Russell & Norvig, 2015).

8.11 The Percept would be an input for an Agent at a given instant. The Agent's **Percept Sequence** would be the entire history of its perception, based on which, the Agent will have a choice of action. This is the **Agent Function** that maps the Percept Sequence to an action. This is only the mathematical representation. The actual and practical action would be internal to the Agent in the form of an **Agent Program** (Mausam, 2018).

8.12 The Job of AI

To design an agent program that implements the agent function — mapping from Percept to Actions. The computing device is called architecture and therefore the **Agent = Architecture + Program**.

8.13 Agent Function

This takes in the complete percept history as input and returns an action to the actuators. An Agent Program, however, takes in the **current percept** and appends to the Agent Function. A pseudo-code indicating the same is given in Figure 32 below.

```
function TABLE-DRIVEN-AGENT(percept) returns an action
  persistent: percepts, a sequence, initially empty
              table, a table of actions, indexed by percept sequences, initially fully specified

  append percept to the end of percepts
  action ← LOOKUP(percepts, table)
  return action
```

Figure 32 : Table Driven Agent Program. *Russell. Artificial Intelligence: A Modern Approach, eBook, Global Edition (p. 65). Kindle Edition*.

8.14 The Structure of Agent

In the instant case, as the environment is fully observable, the Agent is required to select actions based on just the current percept. Therefore it can be a **Simple Reflex Agent**. This can be based on a Condition-Action Rule, written as *if this, then that,* allowing the Agent to make the connection from Percept to Action. However, it must be noted that this requires full observability; even a minor lack of observation would throw up an error i.e, it might enter an infinite loop, to escape which it needs a randomisation function. As in the instant case, the Indian Army has a robust system of information gathering and processing, there is **no need to move to a Model Based Reflex Agent**, adding uncertainty to the process. Uncertainty arises because in the Model based Reflex Agent mode, the Agent does a 'Best Guess' of the current state of the environment. Considering that the full data required would be available, **one could argue for Goal Based Agent Mode also as it lends greater flexibility**. However whether such flexibility is desired in a

Posting Planning Process, is a moot point. **In the eventuality that the system becomes Partially Observable and Stochastic, Utility Based Agent Systems could be considered** (Mausam, 2018).

8.15 Development of Agent Function

8.15.1 Framework for Agent Function.

The overall framework of the AI system is shown below. Each element of the framework is explained in subsequent paragraphs. Figure 33 below shows the Framework for the AI System.

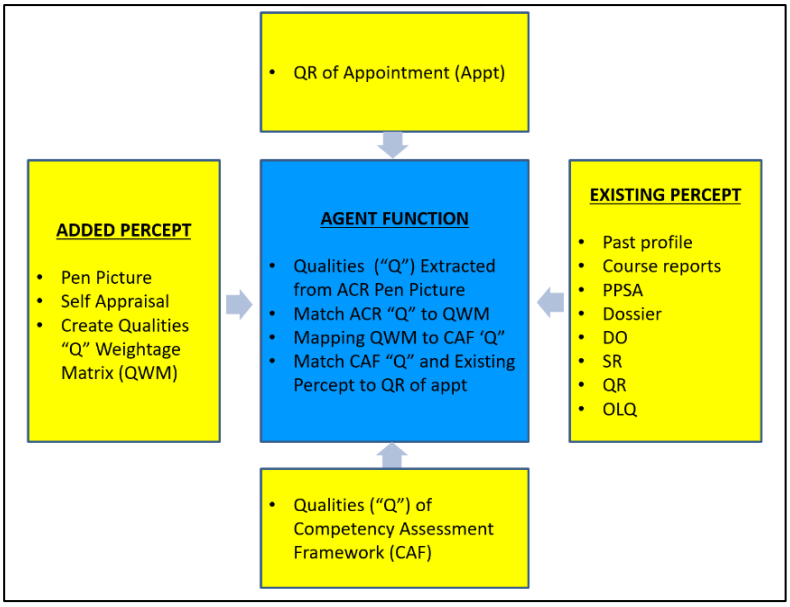


Figure 33 : Framework for Agent Function.

8.16 Inputs for Agent Function

8.16.1 Existing Percept

As discussed in Chapter 4, elements of the Existing Percept are already there in the process and captured by the automation system and can be sourced directly from it.

8.16.2 Added Percept : Pen Picture

As discussed in Chapter 4, at least four Reporting Officers in the chain of command of the Ratee, write a Pen Picture, in a textual form. However this

aspect of the officer's performance which is subjective, at times tacit and remains a largely under-evaluated part of the Annual Confidential Report. As it emerged in the Key Informants Interviews carried out as a part of this research, the Pen Picture has the potential to provide significant inputs for identification of key leadership characteristics which point towards the competency, attitude and performance of the officer, amongst other attributes.

The key here in the framework and the AI system envisaged is to identify the key qualities of the officer which will match the qualities given in the Competency Framework described below.

8.16.3 Competency Assessment Framework (CAF). The proposed CAF is given in Figure 34 below. It is composed of 12 qualities divided into three segments. Each quality is explained briefly (Adamsen, 2019).

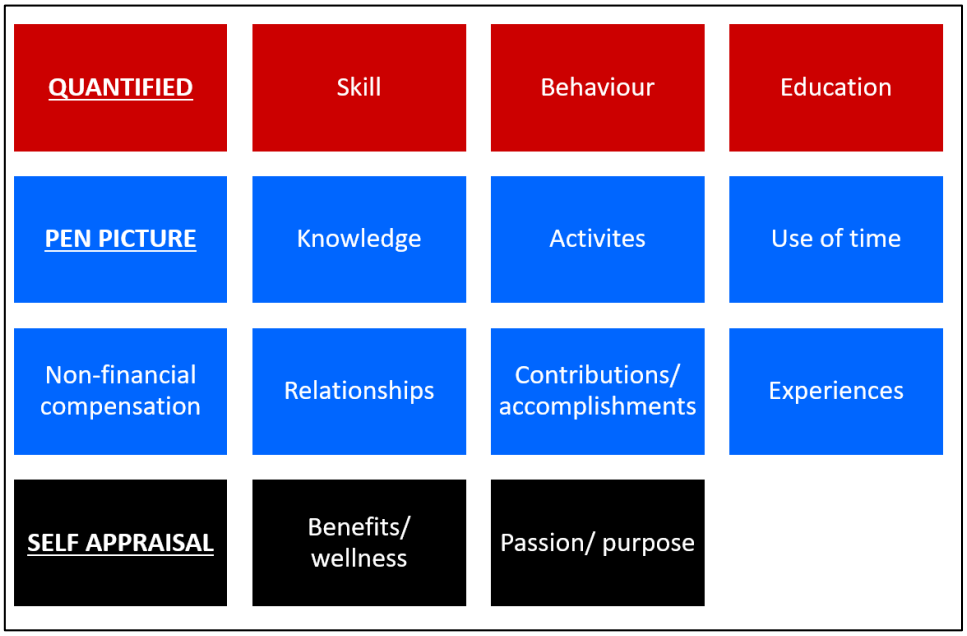


Figure 34 : Competency Assessment Framework

The first three are **already quantified** and can be input as part of the Existing Percept.

Skill. The technical skills required to be posted to the desired appointment. These are distinct from the behaviour skills. To be mapped to the QR of the appointment.

Behaviour. These are the traits shown by the officer and are captured by the ACR. This can be mapped to a summation of the PQ of the officer as captured in the Quantified Potion of the ACR.

Education. The formal or certified education required to hold the desired appointment. This is already captured in the system as a summation of the Professional Military Education achieved by the officer

The next seven are required to be extracted by the AI System from the Pen Pictures

Knowledge. This is the informal education acquired or displayed by the officer during the course of his Service and captured in the Pen Picture by the Reporting Officers. This could be totally unrelated to the role of the officer in the period covered by the Pen Picture of the ACR.

Activities. The activities that the officer indulges in or prefers to indulge in which further organisation goals, beyond the assigned role.

Use of Time. The time spent in pursuit of what they are accomplishing and their capacity for sustained hard work.

Non-financial Compensation. From an organisation's perspective, this is, how much commitment does the organisation need to give to the individual to keep them motivated and for them to have a sense of being

worthy to the organisation. In the terms of Indian Army, it could be a recommendation for UN Missions or Foreign Assignments etc.

Relationships. The quantum and quality of relationships established especially in the working environment, both from the organisational and individual perspective.

Contribution / Accomplishments. This gives what someone contributes to a team outcome and accomplishes individually. This is different from responsibilities of the appointment, which are theoretical. This is the 'flesh' given by the Reporting Officers in the Pen Picture to the 'bones' of the Quantified Portion of the ACR.

Experiences. This is what someone has done in a given period or what needs to be done by the officer or what experience the officer needs to develop upon.

The last two can be extracted from the Self Appraisal given by the officer –

Benefits/ wellness. The family, health, children education etc which are the individual's requirements for their emotional, mental and personal well-being so that they can be a contributing member of the organisation.

Passion/ purpose. What sparks and sustains someone's energy and focus. This also indicates the inclination and aspirations of the officer and as given out in the Key Informant Interviews and the Survey Questionnaire, this is not captured by the existing system of posting.

8.16.4 QR of Appointment. These are already laid down and are available as raw inputs for the Agent Function.

8.16.5 Qualities Weightage Matrix (QWM). A sample set of the QWM has been attached as Appendix 'D'. This is just a sample to indicate the way to

develop the final product. Actual qualities desired and their weightages can be substituted here.

8.17 Actions by Agent Function

The actions to be taken by the Agent Function are shown in Figure 33 above. These are :-

Qualities ("Q") Extracted from ACR Pen Picture. The Pen Picture needs to be analyzed and the desired qualities extracted from them. The analysis required to be carried out has been demonstrated as a Sample Use Case in the following part of this Chapter.

Match ACR "Q" to QWM. The qualities so extracted needs to be matched to the QWM to be created by the implementer. A suggested model of the QWM is placed at Appendix 'D'.

Mapping QWM to CAF 'Q". Once the weighted quality has been identified, it is required to be matched to the CAF Qualities, as given in Figure 34 above.

Match CAF "Q" and Existing Percept to QR of Appointment. This will therefore result in the matching of the competencies of the officer to the appointment.

8.18 A Sample Use Case

In this sample use case for a code in Python, let us assume, Alpha is an officer who has to be posted to an appointment 'A' or 'B'.

There are eleven inputs available in the existing process, to be fed to the AI System . These are – OAP, Picture, Education Qualifications, Course Reports (Training undergone), Spoken Reputation, Qualification Requirement of the appointment, PPSA, Dossier including DO/ letters, OLQ, Complete text

of Pen Picture including Negative Remarks already captured in the system and Self-appraisal.

The AI System is required to compare these inputs with the CAF which has twelve parameters as given in Figure 34, Page 118.

After comparison, the AI System needs to predict where the officer will get posted based on the QR of the appointment.

The AI system makes its predictions based on database the system has collected for thousands of other officers and the appointments.

For this use case. Let us also put the Draft Pen Picture of an officer called ‘Alpha’ to the AI System, extract the concerned keywords and carry out analysis based on Natural Language Processing. We then match them to the Competency Assessment Framework (CAF) to arrive at competencies of the officer. The competencies are then matched to the QR of the appointment.

8.19 Pseudo-code for the Sample Use Case.

Define the CAF parameters as a list of strings

Define a function to extract keywords from text by removing stop words and special characters.

Accept a string as input. Remove special characters and convert text to lowercase. Remove stop words from the text.

Split the text into words and return as a list of keywords.

Define a function to calculate CAF score for an officer.

Accept the officer's details and the appointment QR as inputs. Initialize the CAF scores for all parameters to 0. For each qualification in the officer's qualifications list, increment the corresponding CAF score by 1.

For each CAF parameter, extract keywords from the officer's details and appointment QR, and increment the corresponding CAF score for each matching keyword. Calculate the total CAF score for the officer and return it.

Define a function to predict the officer's posting.

Accept the officer's details and the appointment QRs for appointments A and B as inputs. Calculate the CAF score for the officer for each appointment QR.

If the CAF score for appointment A is greater than that for appointment B, return "Appointment A". Else, return "Appointment B".

Provide the officer's details and appointment QRs as input to the predict_posting() function and print the predicted posting.

8.20 A Sample Python Code for the Use Case is attached as Appendix ‘E’.

8.21 A Sample Pen Picture for Sample Use Case is attached as Appendix ‘F’.

8.22 Keyword Analysis

This sample was put through an AI Agent to extract relevant keywords. The code is given in Appendix ‘F’.

8.22.1 Output. The output generated in terms of keywords is appended.

['alpha', 'matured', 'professionally', 'competent', 'extremely', 'hardworking', 'officer', 'appointment', 'absolute', 'grip', 'branch', 'took', 'actions', 'well', 'critical', 'important', 'events', 'relentless', 'efforts', 'able', 'streamline', 'rationalise', 'work', 'relocation', 'stacking', 'readjustment', 'various', 'locations', 'resulted', 'reduction', 'number', 'errors', 'optimised', 'expenditure', 'utilisation', 'resources', 'savings', 'exchequer', 'suitably', 'married', 'participates', 'professional', 'commerce', 'sports', 'social', 'activities', 'forthcoming',

'willingly', 'accepts', 'additional', 'responsibilities', 'ideal', 'choice', 'higher', 'command', 'staff', 'appointments', 'overall', 'outstanding'].

8.22.2 Inference. Keyword analysis involves identifying the important words or phrases that are most relevant to the content of a text. These keywords can then be used to gain insights into the Pen Picture. In the Python code given in Appendix 'F', the Counter function is used to count the frequency of each word in the text and identify the most common keywords. The output of the code provides a list of keywords and their frequency in the text.

8.23 Sentiment Analysis

This Sample Pen Picture was also put through a Sentiment Analysis. The code is at Appendix 'G' and the output is appended to Appendix.

8.23.1 Scores.{'neg': 0.0, 'neu': 0.719, 'pos': 0.281, 'compound': 0.7906}. The output of sentiment analysis provides an indication of the overall sentiment or tone of the text.

8.23.2 In this case, the sentiment analysis scores for the given text are as follows :-

The compound score of 0.7906 indicates that the overall sentiment of the text is positive. The neg score of 0.0 indicates that there is no negative sentiment in the text, while the pos score of 0.281 indicates that there is some positive sentiment in the text. The neu score of 0.719 indicates that most of the text is neutral in sentiment.

However, it's important to note that sentiment analysis is not always 100% accurate, as it can be influenced by factors such as the language used, the context in which the text is written, and the subjectivity of the reader.

Therefore, it's important to interpret the results of sentiment analysis with caution and not rely on them as the sole basis for making decisions.

8.24 Lexical Analysis

This sample was also put through a Lexical Analysis. The code is at Appendix 'H' and the output is appended to this paragraph.

8.24.1 Analysis. Lexical analysis analyses the structure of text to identify components of language used. It provides insights into language patterns, word usage, and overall tone. When analysing only adjectives, verbs, and adverbs, we can gain a better understanding of the **action, qualities, and descriptors** used. This help us to understand overall sentiment and author's intentions. For example, if the lexical analysis shows that the text has a high **frequency of positive adjectives and verbs, it can indicate a positive sentiment** or attitude towards the subject. Similarly, the adverbs used can provide insights into the intensity of the action or quality described. **Adverbs such as "extremely" or "very" can indicate a strong sentiment, while adverbs like "slightly" or "barely" can indicate a more moderate sentiment.**

8.24.2 Output. ['matured', 'professionally', 'competent', 'extremely', 'hardworking', 'grip', 'took', 'well', 'critical', 'important', 'relentless', 'able', 'streamline', 'rationalise', 'reduction', 'optimised', 'utilisation', 'resulted', 'savings', 'exchequer', 'suitably', 'married', 'participates', 'professional', 'commerce', 'sports', 'social', 'forthcoming', 'willingly', 'accepts', 'additional', 'ideal', 'choice', 'higher', 'command', 'staff', 'outstanding']

8.25 Syntactic Analysis

This sample was also put through a Syntactic Analysis. The code is at Appendix 'I' and the output is appended.

8.25.1 Analysis. The syntactic analysis of the given text shows that it contains a single sentence with a subject "Alpha" and a predicate consisting of several phrases and clauses. The sentence describes various aspects of Alpha's professional and personal life, including his competence, hardworking nature, and ability to streamline and rationalize work. The sentence also mentions his achievements in terms of saving resources and participating in various activities. The analysis identifies the different parts of speech used in the sentence, such as nouns, adjectives, verbs, adverbs, and prepositions, and their syntactic relationships, such as subject-verb agreement, object-verb agreement, and modifier-noun agreement. It provides a deeper understanding of the sentence structure and helps in identifying any grammatical errors or inconsistencies in the text.

8.25.2 Output. The output of the syntactic analysis would be a tree diagram or a **parse tree** that shows the **hierarchical structure of the sentence, with the subject, verb, objects, and modifiers** arranged in a specific order. The output may also include the identification of the parts of speech, such as **nouns, verbs, adjectives, and adverbs, and their relationships** to each other, such as subject-verb agreement, object-verb agreement, and modifier-noun agreement. Additionally, the output may include any errors or inconsistencies, such as missing or extra words, incorrect verb tense, or other grammatical errors. It’s in the form of tuples, where each tuple contains a token from the text and its corresponding part-of-speech tag. The part-of-speech tags are represented using the **Penn Treebank notation** ('NNP' stands for proper noun, singular, 'VBZ' stands for verb, 3rd person singular present, 'JJ' stands for adjective).

[('Alpha', 'NNP'), ('is', 'VBZ'), ('a', 'DT'), ('matured', 'JJ'), (',', ','), ('professionally', 'RB'), ('competent', 'JJ'), (',', ','), ('and', 'CC'), ('an', 'DT'), ('extremely', 'RB'), ('hardworking', 'JJ'), ('officer', 'NN'), ('.', '.'), ('As', 'IN'...]

8.26 Discourse Analysis

This sample was also put through a Discourse Analysis. The code is at Appendix 'J' and the output is appended.

8.26.1 Output. [('Alpha', 'nsubj', 'matured'), ('is', 'cop', 'matured'), ('a', 'det', 'competent'), ('matured', 'amod', 'officer'), (',', 'punct', 'matured'), ('professionally', 'advmod', 'competent'), ('competent', 'conj', 'matured'), ('and', 'cc', 'competent'), ('an...and', 'cc', 'participates'), ('social', 'amod', 'activities'), ('activities', 'conj', 'participates'), ('.', 'punct', 'is'), ('His', 'nmod:poss', 'accepts'), ('forthcoming', 'amod', 'accepts'), ('and', 'cc', 'accepts'), ('willingly', 'advmod', 'accepts')]

8.26.2 Each tuple in the list represents a dependency relation between three elements: a token, its dependency tag, and its head (or governing) token. For example, the first tuple ('Alpha', 'nsubj', 'matured') indicates that the subject of the sentence is "Alpha", the dependency tag is "nsubj" (meaning it's the nominal subject), and its governing token is "matured".

8.26.3 Analysis

Discourse analysis is a complex task that involves analysing the use of language in a larger context, such as a conversation, speech, or written text, to understand the social and cultural factors that shape communication. We can identify some discourse features such as :-

The text provides a **positive evaluation** of Alpha as an officer, emphasizing his professionalism, competence, hard work, and outstanding performance.

The text uses **nominalization** to describe Alpha's actions and achievements, such as "streamline and rationalize work" and "optimise expenditure and utilization of resources."

8.26.4 The text uses **passive voice** in some sentences, such as "The relocation, stacking and readjustment of work in various locations has resulted in reduction in the number of errors," which highlights the actions taken rather than the person performing them.

The text uses **cohesive devices** such as pronouns (he, his) to refer to Alpha, and conjunctions (and, but) to connect ideas and create coherence.

Overall, the discourse analysis of this text **reveals a positive evaluation of Alpha's performance as an officer**, highlighting his professional skills, hard work, and accomplishments. The use of nominalization and **passive voice emphasizes the actions taken** and their results, while the **use of cohesive devices creates coherence** and flow in the text.

8.27 Pragmatic Analysis

This sample was also put through a Pragmatic Analysis. The code is at Appendix ‘K’ and the output is appended.

8.27.1 Output. The identified noun phrases include "Alpha", "professionally competent", "extremely hardworking officer", "absolute grip", "critical and important events", "relentless efforts", "streamline and rationalise work", "relocation", "reduction", "number of errors", "expenditure", "utilisation of resources", "savings", "exchequer", "suitably married",

"professional commerce", "sports", "social activities", "additional responsibilities", "ideal choice", and "higher command and staff appointments".

8.27.2 Analysis

Sentiment polarity of the text is positive as the polarity score is 0.25, which is greater than 0.

The subjectivity score is 0.675, which indicates that the text is somewhat subjective in nature.

8.27.3 Pragmatic analysis involves analyzing the language in context of the speaker, the listener, and the situation. It is **subjective** and **context-dependent** so we can use different techniques to understand the pragmatic aspects of the text. Some possible approaches for pragmatic analysis include :-

Speech Act Analysis

Identifying the speaker's intended meaning and the effect of the utterance on the listener. This involves identifying the illocutionary force of the speaker's utterance (i.e., what they are trying to accomplish with their words) and the elocutionary effect (i.e., what effect their words have on the listener). For example, in the given text, **the Reporting Officer is trying to convey Alpha's competence and suitability for higher command and staff appointments**.

Contextual Analysis

Analysing the language in relation to the context in which it was produced. This involves considering the speaker's background, the listener's background, the social and cultural context, and any situational factors that may affect the meaning of the text. For example, the fact that Alpha participates in all professional competitions, sports, and social activities **suggests that he is**

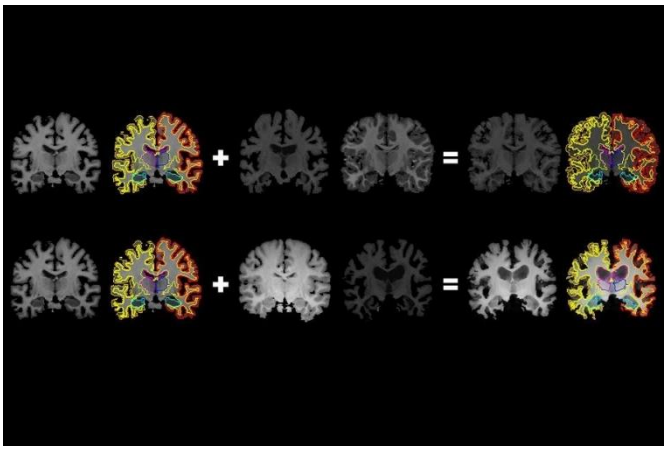
well-rounded and socially adept, which may be relevant to his suitability for higher command positions.

8.27.4 Pragmatic Inference

Drawing conclusions based on what is implied or suggested by the language, rather than what is explicitly stated. This involves using background knowledge and reasoning skills to fill in gaps and make connections between different parts of the text. For example, the fact that Alpha is described as "forthcoming" and willing to accept additional responsibilities **suggests that he is ambitious and driven**, which may also be relevant to his suitability for higher command positions.

8.27.5 In summary, pragmatic analysis involves a deep understanding of the language in context, and there is no one-size-fits-all code to perform it. However, by using techniques such as speech act analysis, contextual analysis, and pragmatic inference, we can gain insights into the intended meaning and effect of the language, as well as the social and cultural factors that may shape its interpretation.

CHAPTER 9 : FINDINGS, RECOMMENDATIONS AND CONCLUSION



9.1 In this chapter, the summary of the research and major conclusions are presented. The first section contains the purpose of the study and brief of research work. The answers to research questions which flow out of research objectives have been reviewed in the second section. In the 3rd section of this chapter, salient recommendations have been given, followed by the Conclusion and Way Ahead.

9.2 Brief of Research Work

That there is a need for objective, unbiased and rational selection of officers for leadership roles in the Indian Army, is a given. Such leaders are critical for the future trajectory of the Indian Army and they are currently selected through a process which is largely human driven supported by limited automation. There are systemic and human errors/ oversight inherent in such a decision making process. AI and specifically HR Analytics has the potential to assist in overcoming these and to act as a decision support system. This ability of HR Analytics needs to be harnessed to achieve organization aim of right person for the right job.

The research aimed to seek a way to overcome this specific gap i.e, to ascertain presence of heuristics and judgment errors in the above mentioned decision making process, identify the likely challenges in HR Competency

Assessment emerging out of these and to develop a framework for an AI based Competency Assessment framework to help overcome these. The scope was limited to analyse the HR function of MS Branch in selection of officers for appointments and using the Pen Picture from ACR as another input to arrive at a Best Fit Model to carry out skill mapping using HR Analytics. The research followed a mixed research strategy with one phase convergence.

Review and Answers to Research Questions

9.3 What are the heuristics and judgment errors in decision making in Human Resources functions of Indian Army?

9.3.1 A quantitative strategy and a descriptive design was applied to ascertain presence of heuristics and judgment errors in decision making in Human Resources functions of MS Branch of Indian Army.

9.3.2 Key Findings of Literature Review

Cognitive errors occur in all humans. We find it easier to identify and label mistakes of others than our own. Systematic errors in decision making, known as biases, **occur in predictable circumstances.**

Framing leads to differing emotional responses. Priming effects i.e, changes in behaviour or perception resulting from exposure to stimuli, can also influence how information is processed and interpreted.

Cognitive ease is both a cause and a consequence of a pleasant feeling and anything you can do to reduce cognitive strain will help. Cognitive disruptions occur due to factors such as emotions, effort, cognitive illusions, and limitations in intelligence and memory. Cognitive illusions are also rampant.

People are generally rational and their thinking sound. This is effortful thinking and mistakes occur when our capacity for effortful control had been disrupted. Various factors that can disrupt our cognitive processes and lead to mistakes or biases in our thinking include stress, lack of sleep, fatigue, hunger, and multitasking.

Reason can be substituted by heuristics and that may sometimes work fairly well but may also lead to serious errors. Expert intuition is the effect of prolonged practice rather than heuristics. System 1 refers to our automatic, intuitive, and effortless thinking process. It's fast and unconscious and is responsible for our snap judgments and emotional reactions. It is responsible for our intuition and the unconscious biases that influence our thoughts and actions.

When we encounter a problem, our mind searches for an intuitive solution based on experience or heuristics. At times when neither comes to mind, we need to switch to the more deliberate and effortful System 2 thinking to. It involves consciously analysing information, reasoning and logic to arrive at a conclusion. This form of thinking requires more time, effort, and mental energy, but can lead to more accurate and well-thought-out decisions. System 2 is deliberate, reflective, and logical thinking. It's slower and requires more effort, and is responsible for tasks that require conscious attention and focus, like solving complex problems, making decisions, and weighing pros and cons. It is our conscious, controlled thinking process, and is responsible for our ability to think critically and make rational decisions.

People dealing regularly in domains which require snap decisions, like ATC operators, are attuned to System 1 thinking. People working largely in logistics and administrative domains are attuned to System 2 thinking.

Military operational commanders make decisions under a wide range of conditions. In peacetime, it is similar to the civilian sector. In a combat environment, decision making is fast paced and volatile with tremendous impact on outcome, with the key distinction from civilian world being an organized opponent.

Key Findings of Survey

9.3.3 Questions to MS Branch Officers Only

For posting planning, MS Branch officers factor in these **four parameters** in the rank order - Skill sets, Best Suited for Employment, Intrinsic Strengths and lastly Individual Inclinations. The four **data inputs** used are - Courses Done, CR Extracts, Informal Inputs, Prevalent Norms are. Overall, **Informal Inputs provided maximum inputs** for posting planning and for determining the individual's inclinations and strengths but **is not part of the quantified inputs available. It is possible to extract some of these from the Pen Picture.** Courses Done provided maximum inputs for determining the individual's Skill Sets and his competency mapping. Least weightage was given to Prevalent Norms.

9.3.4 Views of Officers in the Environment

68 % of the subjects believe, there is a lack of deliberation by MS Branch before posting. This belief was across the board, and has the **potential to impact trust in the institution** and needs to be addressed. The **use of Pen Picture as a tool** to capture the considered input of an experienced set of

Reporting Officers and the **increase the level of deliberation supported by AI** would go a long way in improving the trust levels.

Over 50 % of the officers believe that adequate information is available for an informed decision to be taken. Connecting this with the belief of 68% of officers that there is a lack of deliberation, implies that the **bounds of rationality are time and cognitive effort available** and not information. This can be rectified by use of technology.

The expectation that **stereotyping influences posting** is a widely held belief across all ranks and Arms/ Services. Female officers reported lesser bias than male officers. The views of officers who have served in MS Branch differ from that of the environment. This is **indicative of a Bias Blind Spot** in officers of MS Branch. With utilisation of Pen Picture and AI, there is a possibility of overcoming this presence of stereotyping and Bias Blind Spot.

As per response of MS Branch officers to Q 11, **Informal Interactions** was stated to be the **highest ranking input** for posting planning process. On an aggregate level, the officers in the environment state that the MS Branch interaction was carried out once out of four/ five postings or approximately 20-**25% of the time only**. This thus supports the argument that there is less deliberation in carrying out posting.

50% of the officers believe that a lesser qualified person was selected for an appointment. This expectation did not vary based on rank, sex, or MS Experience indicating an across the board belief. **Only 3% of the subjects who responded believed that the selection was unbiased.** While qualification is captured as a quantified parameter, there are inputs given by Reporting Officers

in Pen Picture which can aid in reducing bias, subjectivity or application of heuristics.

87.9% officers believed that there is a possibility to use AI extracted inputs from Pen Picture to make better posting planning decisions. Sentiment analysis of the suggestions to better capture the competencies of an officer was carried out. Major sentiments expressed based on **frequency** of keywords are - Structured, **Specialisation, EQ, Skill, Degree, Specific expertise and Strengths**.

Suggestions to change the **process of posting planning** were sought from officers from the environment. Sentiment representation was based on **frequency** of keywords. **Skill, Transparency, Specialisation, Individual profile, Field profile, Organisational requirement and Personal requirement** were the major sentiments expressed.

9.3.5 Comparison of Responses of MS Branch and Officers from Environment.

53% of the officers believed that adequate time was available with MS Branch to plan postings. An overwhelming 87% thought that the Pen Picture may enable better competency mapping. The column of Maybe was added to Yes for the purpose of the Test. 56% thought that the **Pen Picture is NOT being utilised** for enabling better competency mapping. An overwhelming 74% of the officers with MS Branch experience felt that it is NOT being utilised for enabling better competency mapping. The response was overwhelming in favour of certain **objective parameters to be built into the Pen Picture**, indicating a need for adding quantification and limited structure to the Pen

Picture as also improving its contribution to competency mapping. The responses were **uniform across both categories.**

9.4 What are the effects of heuristics and judgment errors on HR policy and competency mapping challenges?

9.4.1 A qualitative strategy with an interpretive design was followed, to study the existing system of decision making in HR processes of MS Branch of Indian Army. "Key Informant" interviews were done, of selected officers who have current/ prior experience in tenanting HR appointments related to competency mapping, in order to ascertain the current system of decision making. Literature review was carried out on the inputs regarding HR policies of the Indian Army which are available for examination in the open domain.

9.4.2 **<u>Key Findings</u>**

'Nature sifting' is done in the SSB by selecting only the candidates with the right 'OLQ'. This is based on four factors with 15 sub factors. For '**Nurture'**, the army relies on its formal and informal systems of training, **Professional Military Education** and **Regimentation**, to groom an officer to achieve higher organisational aims through exertion of leadership.

What is required is **a system which identifies and takes into account, an officer's unique skills** (which may not be special, simply unique)**, attributes, abilities and qualifications** and then offer assignments.

For such selection decisions, major portions of the inputs required have been quantified. However there are still some qualitative judgments required to be taken. The inputs which are not quantified include the spoken reputation of the officer and the Pen Picture which contains tacit and implicit knowledge.

ACR of an officer covers 22 qualities such as situation response, problem solving capabilities etc and Pen Picture which describes an officer's conduct and other performances.

Pen Picture, written by at least four of the reporting officers in every CR, has the potential to provide significant inputs for identification of key leadership characteristics which point towards the competency, attitude and performance of the officer, amongst other attributes. Pen Picture as an input is not utilised unless it has a specifically adverse remark. Self-Appraisal is not utilised at all. These two have been identified as Additional Percept for the AI System.

The posting planning process is routinely a three-officer approval process, going in certain cases upto a five officer approval process. It takes at least nine different inputs in physical or digital format. These have been **identified as the Existing Percept** for the AI System.

Factors which affect the decision making process in posting planning include Framing, Cognitive Load, requirements of bureaucracy, bounded rationality and use of means ends analysis for problem solving.

Certain **qualities which form part of the Competency Assessment** Framework are not utilised or partially utilised in the posting planning process. These are :-

Partially utilised - Skill, Behaviour, Knowledge, Inter-personal relations and Contributions/ Accomplishments beyond assigned roles.

Not Utilised - Experiences beyond assigned role, Activities in the assigned role, Use of Time and Passion/ Purpose/ Inclination of the officer.

9.4.3 Non-financial compensation, a part of the Competency Assessment Framework, is handled by a separate vertical and hence may also be considered as a separate entity.

9.4.4 Decisions taken with lesser information may be sub-optimal and hence there is a need to enhance info pool available for posting planning without increasing the cognitive load on decision makers. Thus **AI can play a major role** as a **decision support system** for selection of the right man for the right job by taking additional inputs from **pen picture** of officers

9.5 What kind of AI based Competency Assessment framework can be prepared to identify relevant competencies with standards and measuring them to place employees as per roles?

9.5.1 A quantitative strategy was applied to develop a framework for an AI based Competency Assessment tool to help in identifying the relevant competencies with standards and measuring them to develop employees as per roles. Literature review was carried out of the academic papers and books available on the subject of AI and HR Analytics.

9.5.2 Key Findings

AI confronts us with **logic** that humans have not achieved, permits us to explore newer realities and promises to **transform how we understand reality and our role** within it. It is time to free human minds from drudge work by employing AI and allow humans the space for further absorption of knowledge. Research, science and engineering have demonstrated that facts and ideas from English language could be formally described and manipulated mechanically in meaningful ways. **AI is particularly useful in fields where objectivity is important, such as decision making.**

AI assisted processes will blur the lines between purely human, purely AI and **hybrid human-AI decision making.**

However, an algorithm **does not offer reasons grounded in human experience** to explain its conclusions. Important considerations and crucial questions are "With what objective function is such AI operating? By whose design and within what regulatory parameters?" Then there is "**censorship through omission**" and filtration, which in cyberspace, is self-reinforcing, can create **personal echo chambers** and provoke discordance.

Data set bias is one problem. Bias may also result from human bias in training data of AI. It can also occur in the labelling of outputs for supervised learning. A developer may incorrectly specify a reward function used in reinforcement training. Another source of error is **rigidity.**

AI is **not sentient** as "it does not know what it does not know". The objective function of AI would still define it. It might operate brilliantly, but without reflection or violation, with strict adherence to the rules.

Therefore as a principle, to ensure human autonomy, **core governmental decisions** should be limited to human administration and **oversight**. AI may provide the support systems but the **deciders** have to be **qualified, known humans** who can **offer reasons** for the choices made.

A neural network can be trained to recognize images of objects, translate text from one language to another, or predict the likelihood of a certain outcome given a set of inputs. This approach is what we are looking to exploit.

Natural language processing (NLP) can extract information and insights in documents, and categorize and organize them. It has five types of relevance to this dissertation – Lexical (segmentation into words), Syntactic (grammatical

meaning of sentence), Semantic (meaning of text considering context, structure and grammar), Discourse (text interpretation, and social interactions) and Pragmatic Analysis (extracts actual meaning at the time and in context). **We are attempting to put the textual inputs of Pen Picture through these to extract subjective qualities—attitudes, emotions, beliefs, abilities, qualities—from text**.

The use case envisaged in the dissertation is **akin to an Expert System.** This utilises knowledge obtained from expert sources i.e, residing within the MS Branch and its officers, rather than data to obtain a solution. The key advantage is its capability to explain the process of achieving the output and why a particular information was required. This is important for the instant use case as it gives the user a chance to audit the systems reasoning ability and increases confidence in the system.

As the instant use-case is not required to scale beyond a point and the data is well labelled, we can go with **supervised machine learning** only.

There are seven steps to building an AI System. Starting from Problem Identification, Data collection, Creation of Algorithm, Training the Algorithm, Choosing Machine Learning & Programming Language and Deployment & Monitoring.

The solution to the problem is recommended to be developed as a first draft or **Minimal Viable Product** (MVP). Criticality is to establish the accuracy of the model. Therefore, also set a **Minimum Acceptable Threshold**. It is important to **clean, process and structure the data** before training the AI model and separate it into four distinct data sets – **Training Data, Evaluation**

Data, the final Operational Data and Auditing data sets which provides another quality control check.

Also there has to be a **distinct gap between Machine Learning and deployment phases**. The robustness of AI , **auditing and compliance** regimes is currently poor though developing very fast.

In-house Platform for Machine Learning like **Scikit, Tensorflow, and Pytorch** are the recommended option for developing models internally. Cloud Frameworks like Jupyter Notebooks are not recommended.

Python is a good choice of programming language as it has the simplest syntax and is the recommended option.

The Task Environment is as shown in Figure 30 (Pg 114). The instant case is of a **fully observable, Single Agent, deterministic, episodic, static, discrete, known environment**. The structure of agent, in the instant case, as the environment is fully observable, can be a Simple Reflex Agent based on a Condition-Action Rule, written as *if this, then that,* allowing the Agent to make the connection from Percept to Action.

Framework for AI System is as shown in Figure 33 (Pg 117). Competency Assessment Framework is as shown in Figure 34 (Pg 118).

9.6 Key Recommendations

9.6.1 Cognitive errors occur in all humans and in predictable circumstances due to framing, priming, cognitive disruptions, or a quest for cognitive ease, amongst other reasons. While people are generally rational, they employ heuristics as an alternative decision making process.

9.6.2 Decision making in military is largely System One thinking, due to extended experience in the domain of operations. Also, in HR functions

especially Competency Assessment, a lack of deliberation, was not attributed to paucity of information but to presence of biases, stereotypes and application of heuristics.

9.6.3 To overcome this challenge, it is recommended that the additional percept in the form of Pen Pictures, would lead to better competency assessment. Use of AI as a decision support system will lead to a more objective and rational decision making process in Competency Assessment.

9.6.4 To that end, a Competency Assessment Framework has been recommended to be processed as an AI system with a Task Environment as given in Chapter 8. In order to ensure a better knowledge representation, the additional percept of Pen Picture and Self-appraisal have also been recommended.

9.6.5 The AI system Agent is recommended to be built as a **fully observable, Single Agent, deterministic, episodic, static, discrete, known environment,** with NLP and Supervised machine learning with in-house frameworks in a phased manner.

9.6.6 We can start with a Minimal Viable Product benchmarked to a Minimum Acceptable Threshold. Datasets for training, evaluation, operations and audit need to be separated, ensuring avoidance of bias. Distinct gaps between machine learning and deployment phases need to be there.

9.6.7 The offices of MS Branch have to remain central to the process for ensuring human context for transparency of XAI (legal) or interpretability (as data scientists).

9.8 Way Ahead

9.8.1 Future Avenues of Research

The preceding section has brought out various measures to enhance system effectiveness for Competency Assessment Framework. The recommendations made in the study provide avenues for further analysis and research. The areas essentially requiring further research include the domain being covered by the creation of the AI system, the activities surrounding the Competency Assessment Framework and its constituents and expanding to the overall HR management of officers of Indian Army. There is also need to research the implications of change from the existing semi-automated system to the AI based system. Currently, we may lack principles about how people should interact with AI systems and we do not have empirical evidence as to how do people perceive high stakes decisions taken or supported by AI systems.

9.9 Way Ahead for AI

Previously, cognitive limits of our minds constrained our ability to aggregate and analyse data, filter and process news and conversations and interact socially in the digital domain. AI finds information and identifies trends that traditional algorithms could not and in so doing, it not only expands physical reality but also permits organization of the digital world.

At the same time, **AI subtracts**. It hastens dynamics that erode human reason. Social media diminishes space for reflection and online searches decrease conceptualization. Algorithms pre-dating AI were adept at delivering addictive content but with AI, the ability to manipulate human behaviour becomes more sophisticated. As a result, it may become more difficult to move away from the

digital world. At the same time rewards for traditional activities like deep reading and analysis may decline. With less critical thinking and analysis, humans become more vulnerable to manipulation and persuasion by AI systems. Therefore, there is a growing need for humans to actively review, test, and make sense of information, rather than relying solely on AI algorithms.

Enlightenment separated reason from tradition with significant impact on politics. Different individuals and groups reached different conclusions. Frederick the Great of Prussia, an early advocate of the Enlightenment, became known for territorial expansion through the seizure of Silesia (Selection, 2023). At the same time, the French Revolution, an emblem of Enlightenment ideals, armed with reasoning and fuelled by popular passions, resulted in violence, and social upheaval and a new form of political action - **scientific conclusions used to reshape societal structures. Will AI usher in such a transformation?**

The Romantics asserted that human emotion was a valid and important source of information. A subjective experience was itself a form of truth. The post-moderns took it further, questioning the possibility of discerning objective reality through the filter of subjective experience. AI will take the question even further, by scanning deep patterns and discovering new objective facts. However in the domains of media, politics and entertainment, it will increase personal biases due to creation of echo chambers and reduce the path to an objective truth. **In sum, human reason will be improved upon in some areas while being attenuated in some domains**.

At every turn, humanity will have 3 options - confining AI, partnering with it or deferring to it. AI's dynamic and emergent qualities generate ambiguity in at least 2 respects. First, while the operating process of AI may be as per our

expectation, the output may be unforeseeable. With those results, it may carry humanity to places its creators did not anticipate. Second, in some applications, AI may be unpredictable, with its actions coming as complete surprises. Consider Alpha Zero which, in response to the instruction, “win at chess”, developed a new style of play that humans had never conceived.

As AI takes on human roles, we must question its impact on human perception, recognition, and interaction (Kissinger, Schmidt, & Huttenloc, 2021, pp. 213-215). AI forces us to confront whether there is **a form of logic** that humans have not achieved or cannot achieve, that permits us to explore newer realities. AI promises to challenge our prevailing modes of explaining the world and to transform all aspects with the core occurring at the philosophical level, **transforming how we understand reality and our role** within it. The continued integration of AI will bring about a world in which seemingly impossible human goals are generated in collaboration with machines. This development will blur the lines between purely human, purely AI and hybrid human-AI decision making. **A new human-machine partnership is emerging, with humans defining goals and machines determining optimal processes beyond human reach**.

9.10 Evolution and Way Ahead for HR

HR has come a long way since Industrial Revolution, when it focused on administrative tasks, to the present day, where it is a strategic business process. The way ahead is the emergence of HR analytics supported by technology such as employee engagement software, payroll and workforce management tools. Beyond tech tools, it's data generated by these tools run through Predictive HR analytics allowing HR to use data, such as employee performance and engagement metrics, to make accurate predictions about which employees are potential risks and what

are organisational opportunities and development needs. Aerospace, manufacturing, and financial services companies have used predictive analytics to forecast product defects, anticipate demand, and optimise pricing. It needs to shift domain to HR. A recent Insight People Analytics Trends report "Impacting Business Value" research has found that many HR functions are still to benefit from predictive analytics because HR professionals rely on outdated methods, such as intuition, gut instinct and descriptive analytics.

9.11 Conclusion

This research spanned two subjects – Decision Theory, specifically Cognitive Science and AI, specifically HR Analytics, to seek a better way to achieve a more optimum solution for competency assessment and mapping in leadership roles in Indian Army. This study carried out a critical analysis of the existing system, not to find faults but to suggest improvements and to accomplish the goal of a much needed, well-optimised Competency Mapping and Assessment through use of AI. The recommendations made in the study provide avenues for a time bound action plan for concerned stakeholders. It is felt that the broad framework for Competency Assessment suggested in the study will enhance system effectiveness of critical HR functions of Indian Army and serve as a benchmark for other organisations.

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Appendix 'A'

SURVERY QUESTIONNAIRE

Background

1. Research by cognitive psychologists has led to identification of systemic deviations from rationality in human decision making. Decision makers tend to have biases and are blind to these. They also tend to apply heuristics, or 'rules of thumb' to arrive at decisions.

2. Such heuristics, biases and judgment errors can affect the selection for appointment of leaders in Indian Army and the consequent risk management necessitated from such selection.

3. My dissertation is an attempt to ascertain presence of such heuristics & judgment errors, possible impact of these errors on policy & selection of Indian Army personnel for key leadership positions and to suggest ways to overcome these, using Human Resource Analytics. This dissertation is a part of the Advanced Professional Programme in Public Administration (APPPA) conducted by Indian Institute of Public Administration (IIPA).

Request

4. Your considered views **(including of veterans)** are solicited, as the information provided would help in better shaping the research. The information provided by you will be kept strictly confidential and will be used only for academic purpose at IIPA, New Delhi.

5. The questionnaire will take **less than 10 minutes** to respond to. However, If you do feel that it is imposing on your time you may skip it altogether. Giving of **Name and e-mail ID is optional**.

6. This questionnaire is circulated to Army Officers only, is confidential and may not be circulated or shared with anyone else. In case any clarifications are required, please call me on xxxxxxxx

7. Required questions are marked with *

8. Rank *_____

9. *Mark only one oval.*

- (i) Lt
- (ii) Capt
- (iii) Maj
- (iv) Lt Col
- (v) Col
- (vi) Brig
- (vii) Maj Gen
- (viii) Lt Gen

10. Name_____

11. Arm/ Service *_____

12. *Mark only one oval.*

- (i) Combat Arms
- (ii) Support Arms
- (iii) Services

13. Sex **Mark only one oval.*

- (i) Female
- (ii) Male

14. E mail ID _____

15. Service Bracket **Mark only one oval.*

- (i) Under six years
- (ii) Six to 13 years
- (iii) 14 to 20 years
- (iv) Above 20 years

16. Serving or Veteran **Mark only one oval.*

- (i) Serving
- (ii) Veteran

17. Have you served in an **MS Branch vertical** dealing with **postings** * *Mark only one oval.*

- (i) Yes
- (ii) No

18. If the answer to the previous question is **yes**, then, **as an MS Branch officer**, did you factor in the following before posting an officer for an appointment

Mark only one oval per row.

	Always	Sometimes	Rarely	Never
Skill sets				
Individual's inclinations				
Intrinsic strengths				
Best suited for employment				

19. Follow up on previous question **for MS Branch officers**. What gave you insight into the above four factors :-

Check all that apply.

	Courses done	CR extracts	Informal inputs	Prevalent norms
Skill sets	☐	☐	☐	☐
Individual's inclinations	☐	☐	☐	☐
Intrinsic strengths	☐	☐	☐	☐
Best suited for employment	☐	☐	☐	☐

20. If you have **NOT served in MS Branch vertical dealing with postings**, given a chance, how would you like to change the process of posting planning?

_____

_____

21. Do you believe that decisions about postings/ appointments are made with **deliberation**. *Mark only one oval.* *

- ◯ (i) Yes
- ◯ (ii) No
- ◯ (iii) Maybe

22. Do you think that **adequate information** is available with MS Branch for * planning postings/ appointments *Mark only one oval.*

- ◯ (i) Yes
- ◯ (ii) No
- ◯ (iii) Maybe

23. Do you think that while taking decisions related to posting, **stereotypes** are formed in mind ? *

(A stereotype is a widely held but fixed and oversimplified image or idea of a particular type of person. It is often based on limited information and can be positive or negative. It can be about race, ethnicity, gender, sexual orientation, socioeconomic status, and other characteristics and used to classify or group people.) *Mark only one oval.*

- (i) Yes
- (ii) No
- (iii) Maybe

24. Do you think that Human Resources decision makers will be in a position to **justify** a decision taken? * *Mark only one oval.*

- (i) In all cases
- (ii) In most cases
- (iii) In some cases
- (iv) In few cases
- (v) In no case

25. Have you undergone a **structured interaction** with MS Branch regarding your posting. (PPSA/ Telephonic conversation/ Letter/ any other input sought) *Mark only one oval.* *

- (i) Yes
- (ii) No
- (iii) Sometimes

26. If answer to previous question is **yes or sometimes**, then how many times have you undergone a structured interaction for posting?

27. Have you ever felt that a **less qualified person** has been selected for a particular appointment for which you were suitable *Mark only one oval.* *

- (i) Yes
- (ii) No

28. If answer to above question is **yes**, then what would you attribute it to? *Mark only one oval.*

- (i) Doing better at the interview
- (ii) Selection was subjective
- (iii) Selection was biased
- (iv) Similarity of attributes like education/ quali cation/ background to the appointing authority
- (v) Other

29. Do you think **adequate time** is available with officers of MS Branch to select/ plan posting of an officer *Mark only one oval.* *

- (i) Yes
- (ii) No
- (iii) Maybe

30. If answer to above is no, then do you think it will lead to **inadequate competence mapping**? (Competence mapping - matching the competence of the officer to the requirement of the appointment). *Mark only one oval.*

- (i) Will not match the requirement
- (ii) Will not match the requirement but the organisation will overcome it
- (iii) No impact
- (iv) Will match the requirement

(v) Other:

31. Do you believe that **Pen Picture** can have some inputs to enable MS Branch to place an officer as per his competence and capabilities suiting the appointment? *Mark only one oval.* *

- (i) Yes
- (ii) No
- (iii) Maybe

32. If answer to above question is **yes or maybe**, do you believe that it is being **utilised adequately?** *Mark only one oval.*

- (i) Yes
- (ii) No
- (iii) Maybe

33. Currently there is limited, formal structure for a Pen Picture. Do you think there is a need to include **check boxes for employment** of an officer in say G/ A/ Q appointments and for levels such as Brigade/ Div/ Corps?

Mark only one oval per row.

	Yes	No
G/ A/ Q		
Bde/ Div/ Corps/ Comd/ AHQ		
Sub Area/ Area		
Other Quantification tools		

34. Would you like to offer some suggestions to structure the Pen Picture with an aim to better capture the competencies of an officer and enable better placement

35. Is it possible to use Artificial Intelligence and specifically **Human Resource** * **analytics** to extract/ infer relevant inputs **from Pen Picture** and **CR**, which will assist the MS Branch in decision making regarding postings *Mark only one oval.*

- (i) Yes
- (ii) No
- (iii) Maybe

Appendix 'B'

KEY INFORMANT INTERVIEW

"*The focus on error does not denigrate human intelligence, any more than the attention to diseases in medical texts denies good health*."

1. As a part of APPPA-48, my dissertation is an attempt to ascertain presence of heuristics & judgment errors in decision making processes, their possible impact in the HR Domain and to suggest ways to overcome these, using AI. A brief on the Research Proposal is encl.

2. **Aim of the Questionnaire.** The aim of this questionnaire, as a part of the above mentioned Research is to arrive at the current system of selection of officers for a particular appointment.

3. **Key Informant. The name of the key informant would be kept confidential and not published** in the dissertation. The findings would be used in the compilation of the dissertation and its presentation.

4. The Questionnaire is below.

QUESTIONNAIRE

5. What is the current system of posting an officer?

   (a) Which all officers are involved in the posting process? Please list.

   _____

   (b) Routinely, is it a two/ three/ four officer approval process? Please tick.

   (c) What all are the inputs required for carrying out posting of an officer?

      (i) Inputs in digital forms. _____

      (ii) Inputs in physical form. _____

(iii) What inputs are taken by other means including DO/ Letters/ conversations?

_____

(iv) How are Pen Picture, Spoken Reputation and Self Appraisal utilised in posting an officer, if at all.

_____

(v) Are these inputs available readily? **Yes/No (Please tick)**

(vi) If not, how much time is spent obtaining these inputs per posting process?

Under one hour. One to two hours. Two to four hours. Other timespan _____ (Please specify)

(vii) If Pen Pictures are used for posting an officer. How many of them are accessed per day or per posting by the officer planning the posting?

Per day ____. Per posting order _____.

(d) Framing (or frame of reference under which a decision is being taken) plays a role in shaping perceptions and attitudes. In the posting decision making process, how much proportion of decision, in your opinion can be said to be subjective.

Upto 10 percent. 10 – 25%. 25- 50%. > 50%. (Please tick)

(e) Would you say that this process of decision making for posting is effortful? **Yes/No (Please tick)**

If yes, in your opinion, can AI assist in any way? **Yes/No (Please tick).**

If yes, in what way can it assist?

_____

2. Decision-making in certain settings is often under stress due to consequences of decisions, uncertainty, and time pressure, creating tension between optimal and responsive decisions. Stress can impact decision-making, leading to less than optimal outcomes.

Do you think that carrying out postings of an officer is a stressful job? **Yes/No/ Optimum Stress/ Under-stressed (Please tick) Would you like to qualify the answer here?**

_____

3. Large organizations run on SOP and programs. These tend to narrow range of decision options. Is that the case in your organisation? **Yes/No (Please tick) Is there scope for deviating from these and under what conditions ?**

_____

4. Approximately how much time is spent by an AMS for posting of one officer (not counting the move of units and detailing of officers for courses).

Under one hour. One to two hours. Two to four hours. Other timespan _____ (Please specify)

5. How are the qualifications/ suitability of an officer mapped to the QR of an appointment before posting?

_____

6. **Competency Mapping Frameworks**. Certain qualities/ attributes/ inputs utilised for competency mapping framework are given below. Which of these or their equivalent, are utilised in posting planning and what are the sources of these inputs?

Qualities/ Attributes/ Inputs	**Utilised (Yes/ No)**	**Data Source**
Skill		
Behaviour (Personal Qualities)		
Education (formal)		
Knowledge (informal/ demonstrated)		
Activities in the role assigned		
Use of time (for task execution/ org devp)		
Inter personal Relationships		
Contributions/ accomplishments (Beyond assigned role)		
Experiences (other than role assigned)		
Benefits/ wellness (CG/ CP/ Med/ Edn grounds)		
Passion/ purpose (or inclination)		

7. Non-financial compensation are used as employee retention/ encouragement tools. UN Msns/ Foreign assignments and career courses etc may be seen as analogous to this form of compensation. How are recommendations for these and other such non-financial compensations obtained by the posting planning officers and in what form?

_____

8. Extreme outcomes are most likely to be found in sparsely populated domains and hence decisions taken with lesser information may be sub-optimal.

Do you think there is need for enhancing info pool available for posting planning without impacting cognitive abilities of the offrs dealing with it. **Yes/No (Please tick)**

9. In order to increase data capture for the a/m process, is there a need to structure the pen picture a bit more rigidly and/ or quantify certain parameters while leaving space for subjective inputs? **Yes/No (Please tick) Any suggestions for the same? -**

_____

10. **Any other suggestions.**

_____

11. **Rank.**

12. **Name**

13. **Appointment.**

14. Date.

Appendix 'C'

RESPONSE TO INTERVIEW : INFORMANT NO 1

1. What is the current system of posting an officer?

(a) Which all officers are involved in the posting process? Please list.

AMS, Col MS and Brig MS of the line MS Section in all cases upto the rank of Lt Col.

All postings of Cols and certain sensitive/quasi-sensitive postings of Lt Cols and below would also require the next level approval, that of the Addl MS.

Sensitive postings of Cols and comd planning would also require approval of the Military Secretary.

(b) Routinely, is it a t~~wo/~~ three/ fo~~ur o~~fficer approval process? Please tick.

(c) What all are the inputs required for carrying out posting of an officer?

(i) Inputs in digital forms. Yes

(ii) Inputs in physical form. Yes

(iii) What inputs are taken by other means including DO/ Letters/ conversations?

Any special mentions or adverse comments endorsed by reporting officers, particularly with respect to personal qualities and suitability or otherwise for sensitive appointments are endorsed in the system at two levels.

The first layer is a system of AMS Diary which is endorsed by the concerned posting section. These are minor in nature.

The second layer, with larger ramifications, positive (achievement in sports etc) or negative (use of unauthorised channel etc), is the CRD entry borne by the B Wing with the concurrence of the Military Secretary.

This becomes an added input for promotion boards/ panel postings etc.

For sensitive appointments, there is an institutionalised process of obtaining feedback and carrying out a spoken reputation check.

(iv) How are Pen Picture, Spoken Reputation and Self Appraisal utilised in posting an officer, if at all.

Pen picture is not being utilised at all for posting planning.

Only the adverse inputs are now being collated by the library section and built into the MDS or utilised for screening for panel selection.

Spoken Reputation check is carried out at designated levels while officers come up in the panel for certain designated appointments only.

Self Appraisal is not utilised at all.

(v) Are these inputs available readily? Yes/No (Please tick)

(vi) If not, how much time is spent obtaining these inputs per posting process?

One to two hours.

(vii) If Pen Pictures are used for posting an officer. How many of them are accessed per day or per posting by the officer planning the posting? Not used at all.

Per day ____. Per posting order _____.

(d) Framing (or frame of reference under which a decision is being taken) plays a role in shaping perceptions and attitudes. In the posting decision making process, how much proportion of decision, in your opinion can be said to be subjective.

Upto 10 percent. 10 – 25%. 25- 50%. > 50%. (Please tick)

(e) Would you say that this process of decision making for posting is effortful? Yes/No (Please tick)

If yes, in your opinion, can AI assist in any way? Yes/No (Please tick).

If yes, in what way can it assist?

In helping generate a coherent picture about the skillsets, inclinations and strengths of an officer based on his/her demonstrated performance, which would have been reflected in the pen picture by the reporting officers.

2. Decision-making in certain settings is often under stress due to consequences of decisions, uncertainty, and time pressure, creating tension between optimal and responsive decisions. Stress can impact decision-making, leading to less than optimal outcomes.

Do you think that carrying out postings of an officer is a stressful job? Yes/No/ Optimum Stress/ Under-stressed (Please tick) Would you like to qualify the answer here?

Field/peace profile, course gradings, CR points, employment restrictions and tenure stipulations are the basic parameters utilised for Posting planning.

There could also be certain QRs given by the concerned line dtes.

Naturally, when there are multiple factors under consideration,

the inherent biases of the MS Branch Staff (whether fd/peace should be given higher priority of CR gradings) will invariably decide the outcome of a decision dilemma.

The natural way to wriggle out of this situation is to evolve norms or to quantify these parameters.

However, the quantified models are usually devoid of sound logic since the Officer's natural skills and innate capabilities find no mention in them.

Hence there are possibilities of error and misjudgement.

Vacancy accrual, batch strength etc add another dimension.

The end result is that under identical circumstance at different points of time there could be divergent outcomes.

3. Large organizations run on SOP and programs. These tend to narrow range of decision options.

Is that the case in your organisation? Yes/No (Please tick) Is there scope for deviating from these and under what conditions?

Usually resorted to when there is shortage of officers meeting the QR, or for compassionate ground postings, or when 'organisational interest' so demands.

4. Approximately how much time is spent by an AMS for posting of one officer (not counting the move of units and detailing of officers for courses).

Under one hour. One to two hours. Two to four hours. Other timespan _____ (Please specify).

While some postings may just take five minutes, say an officer on completion of a staff appointment going back to parent unit on AE on being relieved by MS-1,

there are others that would involve deep selection and carrying out IO/RO, regimental, regional and spoken reputation check.

Posting planning also requires a lot of background work and data updation.

5. How are the qualifications/ suitability of an officer mapped to the QR of an appointment before posting?

Only OAP, medical category, course gradings etc are used. For certain appointments, there could also be basic QRs and desirable QRs given by the line dtes. System needs improvement to incorporate officers' strengths and weaknesses.

6. Competency Mapping Frameworks. Certain qualities/ attributes/ inputs utilised for competency mapping framework are given below. Which of these or their equivalent, are utilised in posting planning and what are the sources of these inputs?

Qualities/ Attributes/ Inputs	Utilised (Yes/ No/ Partially)	Data Source
Skill	Partially	OAP, Course gradings
Behaviour (Personal Qualities)	Partially	SR Check when applicable
Education (formal)	Yes	Courses
Knowledge (informal/ demonstrated)	Partially	OAP, Course gradings, SR Check, if done
Activities in the role assigned	No	
Use of time (for task execution/ org devp)	No	
Inter personal Relationships	Partially	Spoken Reputation Check when applicable
Contributions/ accomplishments (Beyond assigned role)	Partially	If intimated by the reporting officers
Experiences (other than role assigned)	No	
Benefits/ wellness (CG/ CP/ Med/ Edn grounds)	Yes	Through documents specifically sought for the purpose and verbal feedback from chain of command
Passion/ purpose (or inclination)	No	Except in rare cases when officers themselves volunteer for certain assignments.

7. Non-financial compensation are used as employee retention/ encouragement tools. UN Msns/ Foreign assignments and career courses etc may be seen as analogous to this form of compensation. How are recommendations for these and other such non-financial compensations obtained by the posting planning officers and in what form?

Only in the form of CR gradings, and course performances which are available to MS-18.

Certain other factors such as field service, gallantry awards etc have been quantified to evolve a matrix.

In addition minimum physical standards and power of expression are checked through formal interview.

8. Extreme outcomes are most likely to be found in sparsely populated domains and hence decisions taken with lesser information may be sub-optimal.

Do you think there is need for enhancing info pool available for posting planning without impacting cognitive abilities of the offrs dealing with it. Yes/No (Please tick) ✓

9. In order to increase data capture for the a/m process, is there a need to structure the pen picture a bit more rigidly and/ or quantify certain parameters while leaving space for subjective inputs? Yes/No (Please tick) Any suggestions for the same?

10. The pen picture should be lucid, descriptive and unbound.

11. A rigid one would become degenerate (analogous to what happened to grade points of CR) over time.

12. If we are using structured pen picture, there would be no need of AI.

13. Any other suggestions.

14. There are three basic factors that need to be considered while carrying out posting planning.

15. These, in the order of priority are

(a) right man for the right job,

(b) tenure stability

(c) varied exposure.

16. While the latter the latter two lie in the quantitative domain and can clearly be laid out in numbers, the 1st and the most important is the one on which least input is available.

17. Ideally the strengths, Inclinations and the skill sets of an officer can accurately describe be described by the reporting officers based on his or her demonstrated performance.

18. Naturally, this input ought to become the most important factor for posting planning.

19. Artificial intelligence can play a major role in overcoming the current lacuna in selection of the right man for the right job by capturing pen picture of officers.

RESPONSE TO INTERVIEW : INFORMANT NO 2

1. What is the current system of posting an officer?

(a) Which all officers are involved in the posting process? Please list.

AMS,Col MS, Dy MS and Addl MS depending on the rank/ positionn of the officer being posted.

(b) Routinely, is it a **two**/ ~~three/ four officer~~ approval process? Please tick.

(c) What all are the inputs required for carrying out posting of an officer?

(i) Inputs in digital forms.

(ii) Inputs in physical form.

(iii) What inputs are taken by other means including DO/ Letters/ conversations? Spoken reputation is taken for specific appointments

(iv) How are Pen Picture, Spoken Reputation and Self Appraisal utilised in posting an officer, if at all. _____only incase of specific appointments or else not considered

(v) Are these inputs available readily? **Not all**

(vi) If not, how much time is spent obtaining these inputs per posting process?

Under one hour. One to two hours. Two to four hours. Other timespan **_over a period of days_____ (Please specify)**

(vii) If Pen Pictures are used for posting an officer. How many of them are accessed per day or per posting by the officer planning the posting? **Generally not done**

Per day ____. Per posting order _____.

(d) Framing (or frame of reference under which a decision is being taken) plays a role in shaping perceptions and attitudes. In the posting decision making process, how much proportion of decision, in your opinion can be said to be subjective.

25- 50%.

(e) Would you say that this process of decision making for posting is effortful? **Yes**

If yes, in your opinion, can AI assist in any way? **Yes**

If yes, in what way can it assist?

Reduce time taken

Remove subjectivity in case of many candidates fitting the criteria to a particular position

2. Decision-making in certain settings is often under stress due to consequences of decisions, uncertainty, and time pressure, creating tension between optimal and responsive decisions. Stress can impact decision-making, leading to less than optimal outcomes. Do you think that carrying out postings of an officer is a stressful job? **No**
Would you like to qualify the answer here? **Except for some postions where a multitude of stake holders get involved.**

3. Large organizations run on SOP and programs. These tend to narrow range of decision options. Is that the case in your organisation? Yes/No (Please tick) Is there scope for deviating from these and under what conditions ?

SOPs do exist.. but deviations are possible with justification

4. Approximately how much time is spent by an AMS for posting of one officer (not counting the move of units and detailing of officers for courses).

Under one hour. One to two hours. Two to four hours. **Other timespan ____at least a day's affair** (Please specify)

5. How are the qualifications/ suitability of an officer mapped to the QR of an appointment before posting?

On the overall profile of an Officer including the courses he has done

6. **Competency Mapping Frameworks**. Certain qualities/ attributes/ inputs utilised for competency mapping framework are given below. Which of these or their equivalent, are utilised in posting planning and what are the sources of these inputs?

Qualities/ Attributes/ Inputs	**Utilised (Yes/ No)**	**Data Source**
Skill	Yes	Courses
Behaviour (Personal Qualities)	No	
Education (formal)	Yes	Data
Knowledge (informal/ demonstrated)	No	
Activities in the role assigned	No	
Use of time (for task execution/ org devp)	No	
Inter personal Relationships	No	
Contributions/ accomplishments (Beyond assigned role)	No	

Experiences (other than role assigned)	Yes	Data
Benefits/ wellness (CG/ CP/ Med/ Edn grounds)	Yes	Med records
Passion/ purpose (or inclination)	No	

7. Non-financial compensation are used as employee retention/ encouragement tools. UN Msns/ Foreign assignments and career courses etc may be seen as analogous to this form of compensation. How are recommendations for these and other such non-financial compensations obtained by the posting planning officers and in what form?

Captured from ACRs and the overall merit through interview

8. Extreme outcomes are most likely to be found in sparsely populated domains and hence decisions taken with lesser information may be sub-optimal.

Do you think there is need for enhancing info pool available for posting planning without impacting cognitive abilities of the offrs dealing with it. **Yes**

9. In order to increase data capture for the a/m process, is there a need to structure the pen picture a bit more rigidly and/ or quantify certain parameters while leaving space for subjective inputs? **Yes**

10. Any other suggestions.

AI enabled postings would require modification to the ACR forms.

RESPONSE TO INTERVIEW : INFORMANT NO 3

1. What is the current system of posting an officer?

   (a) Which all officers are involved in the posting process? Please list.

   AMS, Cols MS and Dy MS of respective sections.

   (b) Routinely, is it a ~~two~~/ **three**/ ~~four~~ officer approval process? Please tick.

   (c) What all are the inputs required for carrying out posting of an officer?

   (i) Inputs in digital forms. **Past profile, Course reports, PPSA**

   (ii) Inputs in physical form. **Inputs from COs/HQs, Dossier**

   (iii) What inputs are taken by other means including DO/ Letters/ conversations?

   For critical appointments inputs like spoken reputation and interpersonal relationship is taken verbally from Cos/HQ

   (iv) How are Pen Picture, Spoken Reputation and Self Appraisal utilised in posting an officer, if at all. **Pen Picture is only taken in consideration for sensitive appointments on file. Spoken reputation is also taken into consideration through interactions. Self appraisal is based on inputs given in PPSA is considered for officers achievements/capability.**

   (v) Are these inputs available readily? Yes/~~**No**~~ **(Please tick)**

   (vi) If not, how much time is spent obtaining these inputs per posting process?

   Under one hour. One to two hours. **Two to four hours**. Other timespan _____ (Please specify). **This is average.**

(vii) If Pen Pictures are used for posting an officer. How many of them are accessed per day or per posting by the officer planning the posting?

Per day ____. Per posting order _____. **Only for selective postings**

(d) Framing (or frame of reference under which a decision is being taken) plays a role in shaping perceptions and attitudes. In the posting decision making process, how much proportion of decision, in your opinion can be said to be subjective.

Upto 10 percent. **10 – 25%.** 25- 50%. > 50%. (Please tick)

(e) Would you say that this process of decision making for posting is effortful? **Yes/**No (Please tick)

If yes, in your opinion, can AI assist in any way? **Yes/**No (Please tick).

If yes, in what way can it assist? **In case all the data is fed in the system, AI based system can throw out No of inputs for planning by AMS/Col MS. This would require the pen picture, DOs, PPSA, other inputs to part of Trg Data for building the algorithm well.**

2. Decision-making in certain settings is often under stress due to consequences of decisions, uncertainty, and time pressure, creating tension between optimal and responsive decisions. Stress can impact decision-making, leading to less than optimal outcomes.

Do you think that carrying out postings of an officer is a stressful job? **Yes/No/ Optimum Stress/** Under-stressed (Please tick) Would you like to qualify the answer here? -

3. Large organizations run on SOP and programs. These tend to narrow range of decision options.

Is that the case in your organisation? **Yes/~~No~~** (Please tick) Is there scope for deviating from these and under what conditions? **SOPs are only guidelines and not bindings. Procedure are well set for taking approval for change in procedure as laid down in SOP.**

4. Approximately how much time is spent by an AMS for posting of one officer (not counting the move of units and detailing of officers for courses).

Under one hour. One to two hours. **Two to four hours.** Other timespan _____

5. How are the qualifications/ suitability of an officer mapped to the QR of an appointment before posting?

The existing query based system is utilised for generating the options based on QR.

6. **Competency Mapping Frameworks**. Certain qualities/ attributes/ inputs utilised for competency mapping framework are given below. Which of these or their equivalent, are utilised in posting planning and what are the sources of these inputs?

Qualities/ Attributes/ Inputs	**Utilised (Yes/ No)**	**Data Source**
Skill	Yes	PPSA, DOs, Course reports, Interaction with officers as well as COs
Behaviour (Personal Qualities)	Yes	-do-
Education (formal)	Yes	-do-
Knowledge (informal/ demonstrated)	Yes	-do-
Activities in the role assigned	May not be in all cases	
Use of time (for task execution/ org devp)	No	
Inter personal Relationships	Yes	For sensitive appointments
Contributions/ accomplishments (Beyond assigned role)	Yes	DOs/ Interaction with units/HQs
Experiences (other than role assigned)	May not be in all cases	
Benefits/ wellness (CG/ CP/ Med/ Edn grounds)	Yes	Application /PPSA/DOs

Passion/ purpose (or inclination)	Yes	Close interaction with COs/HQ

7. Non-financial compensation are used as employee retention/ encouragement tools. UN Msns/ Foreign assignments and career courses etc may be seen as analogous to this form of compensation. How are recommendations for these and other such non-financial compensations obtained by the posting planning officers and in what form? **Not dealt directly as managed by MS18. However MS 18 interacts with controlling group on case to case basis**

8. Extreme outcomes are most likely to be found in sparsely populated domains and hence decisions taken with lesser information may be sub-optimal.

Do you think there is need for enhancing info pool available for posting planning without impacting cognitive abilities of the offrs dealing with it. **Yes/**No (Please tick)

9. In order to increase data capture for the a/m process, is there a need to structure the pen picture a bit more rigidly and/ or quantify certain parameters while leaving space for subjective inputs? **Yes/**No (Please tick) Any suggestions for the same?

10. Any other suggestions.

Appendix 'D'

SAMPLE SET OF QUALITIES WEIGHTAGE MATRIX (QWM).

Attributes	BEHAVIOUR GRADING					
	9	8 or 7	6 or 5	4	3 0r 2	1
Adaptability	Adjusts to new or changed situation, new personalities and changes in working environment, smoothly and rapidly	Does not take long to adjust to new situations, people and environments.	Given sufficient time, adjust to new situations, working relationships with new peoples.	Adjust to new situations, personalities, and environments in due course of time.	Is inclined to be rigid in working habits and finds it difficult to cope with new situations and personalities.	Is incapable of adjusting to changing situations and working environments. Is invariably hostile to new personalities for a considerable period of time.
Appearance and bearing	Always smartly turned out. Exhibits a praiseworthy demeanour and conduct in any group or situation.	Mostly well turned out. Conducts himself with sufficient dignity in all types of groups.	Generally well turned out, carries himself well in select groups.	Pace just sufficient attention to his bearing and turnout. Conducts himself in an acceptable manner.	Does not pay adequate attention to his bearing and turn out. Not very careful about his conducting varied company.	Generally sloppily turned out, and liable to demean himself on occasion.
Decisiveness	Quick in taking decisions and arriving at a definite course of action after considering the various alternatives and weighing pros and cons.	Generally takes correct decisions without much delay and after taking a balanced view of all available facts.	Systematic and logical in taking decisions but apt to take time.	Can take correct decisions in routine and familiar situations. Decision making ability gets inhibited and slow and difficult situations.	Always slow to arrive at a decision. Needs frequent advice before arriving at definite course of action.	Does not know even the fundamentals of the decision making process. Cannot discriminate between the main and the peripheral issues of a problem.

Attributes	9	8 or 7	6 or 5	4	3 0r 2	1
Dependability	Always accomplishes desired results without supervision. Willingly accepts additional responsibility even beyond the call of routine obligations and discharges adequately.	Can be relied upon to complete assignments within stipulated time and with minimal supervision or guidance. Accepts additional responsibilities fairly cheerfully.	Can be depended upon to complete all normal duties successfully without being chased. Completes additional assignments in a fairly satisfactory manner, but with frequent guidance.	Can we relied upon to discharge only ordinary routine assignments and needs occasional chasing	Requires frequent chasing in the discharge of even routine duties. App to sulk if interested with other than routine assignments.	Undependable in the discharge of duties and functions interested to him. Requires constant choosing to get anything done.
Drive and determination	Leaves no stone unturned to attain the goal. Exceptional drive and compels subordinates to give off their best.	Persevering and resolute in working for the goal. Can make the team pull their weight.	Adequately determined, entertaining the goal. Can be stand stress and push his way through in normal circumstances.	Persevere in familiar situations, but needs to be pushed in difficult situations.	Can work well as long the going is good, but waivers and is inclined to give up in the face of difficulties.	Does not work till pushed or chased.

Attributes	9	8 or 7	6 or 5	4	3 0r 2	1
Ingenuity	Possesses natural, inventive, and creative abilities to solve unforeseen problems. Is capable of coming up with satisfactory solutions instantaneously, even in totally unfamiliar problems.	Can produce fully workable solutions to unforeseen problems with speed.	Does not get put off when confronted with unforeseen difficulties. Can produce reasonable solutions in due course of time.	When faced with unforeseen problems, comes up with solutions after limited guidance and instruction from Superiors.	Tends to get off balance in unforeseen situations. Needs detailed instructions to handle such situations.	Is inclined to give up even in the case of minor variations in situations from the one planned for.
Initiative	Self-starter shows exceptional resourcefulness in handling unforeseen situations or events effectively.	Text necessary and appropriate action in handling unforeseen tasks and situations. Does not always wait for instructions to get the work done.	Mostly takes necessary action on his own when held up for want of decision and precedents. Occasionally required instructions and guidance.	Hesitant in taking action in the absence of proper instructions. Follows the well beaten path of precedent.	Does not get without detailed instructions or acts only when compelled to do.	Incapable of. Working on his own or functioning independently even when the task is urgent.

Attributes	GRADING					
	9	8 or 7	6 or 5	4	3 0r 2	1
Integrity	Shows absolute honesty and unremitting proprietary in the use of service position and resources. Invariably offers correct information and sincere advice.	Displays high sense of honesty and propriety. In the use of service position and resources. Sincere and upright in offering information and advice to superiors.	Generally displays honesty and propriety in this use of service position and resources. Uses discretion in offering correct information and advice.	Occasionally fails to discriminate between proprietary and impropriety in the use of service. Position and resources. Sometimes app to give an incorrect opinion or prejudiced advice knowingly.	Cannot always discriminate between propriety and impropriety in the use of service position and resources. His advice and opinions are generally motivated by extraneous considerations.	Misuses service position and resources for personal gains. Cannot be trusted to offer correct information or sound advice.
Loyalty	Always keep service interest uppermost in his mind. Displays a high degree of sincerity and honesty of purpose and is upright in his dealings with superiors, equals and subordinates. Demonstrates unquestioned loyalty to service aims.	Subordinates personal interest to overall interest of the service. Displays firm allegiance to service aims. Is sincere and honest in his dealings with superiors, equals and subordinates.	Generally lives up to the trust reposed and him as a service officer. Is fair and honest in his dealings with others.	Faithful to service aims but apt to protect personal interest went the two conflicts with each other. Not above sacrificing the interest of equals and subordinates when these clash with his personal interests.	Unable to distinguish clearly between service aims and personal interests. Displays inadequate honesty of purpose. App to place own interests uppermost in his dealings with others.	Shows a tendency to betray the trust reposed in him as a service officer.

Attributes	9	8 or 7	6 or 5	4	3 0r 2	1
Maturity	Has well developed in ripened mental faculties. His approach to problems is invariably well balanced. Is considerate and understanding in his dealing with other people.	Is sympathetic to others point of view. Can arrive at balance decisions after examining various facets of a problem.	Displays a reasonably good understanding of differing points of view pertaining to a problem. His decisions and actions are generally balanced.	Arrives at decisions after fair consideration. Not averse to suggestions or taking into consideration alternative course of action.	Is inclined to be hasty in judgment and arriving at a course of action. Lacks the ability to take a balanced overview of problems.	Displays a cavalier attitude and a supercilious disregard of consequences of his decision and actions.
Tenacity	Remains calm and unruffled in emergencies and in the face of odds. Steadfastly overcomes difficulties to complete missions.	Remains composed when faced with difficult situations. Does not let the standard or work suffer under stress. Can meet emergencies adequately.	Makes efforts to adapt himself to changing situations without serious loss of efficiency.	Inclined to get perturbed under stress. Needs frequent guidance to be able to face difficult situations. Processes satisfactory mental endurance.	App to lose balance and soundness of judgement in difficult situations. Likely to show physical and mental fatigue when faced with odds.	Not able to perform satisfactorily in any but routine situation. Undependable when faced with difficult situations, are emergencies.

Attributes	GRADING	Attributes	GRADING	Attributes	GRADING	Attributes
Team Spirit	Provides whole hearted cooperation to his colleagues, superiors and subordinates. Finds ready acceptance by others and makes good contribution towards functioning of the group.	Willingly cooperates with all members of the group and meets no resistance in gaining acceptance by them. Makes adequate contribution to functioning of the group.	Office cooperation to superiors, colleagues and subordinates as and when asked. Can make his place in the group. Makes fair contribution to group functioning.	Provides cooperation to only those who ask for it. Is inclined to be a passive participant in those activities of the group which are not his direct responsibility.	A loner in job situations who is content to work by himself. Shows scant concern for group objectives.	Uncooperative with his colleagues and subordinates. Always on the lookout for remaining outside all group activities. Inclined to cause group disintegration.
Discipline	Displays exemplary conduct and behaviour in keeping with the service requirement.	Conducts himself as per service norms and keeps his personal affairs in order.	Conducts himself up to acceptable standards of behaviour as per service rules and regulations.	Satisfies the requirements of service rules and regulations, but may occasionally fall short of them.	Inclined to ignore orders, rules and regulations, especially when not being observed or supervised. His personal affairs need to be kept under observation.	Consistently violates rules and regulations. Sets a poor example for subordinates.

Appendix 'E'

PYTHON CODE FOR SAMPLE USECASE

```
import re

# Define the CAF parameters

CAF_PARAMETERS = [

    'Skill', 'Behaviour', 'Education', 'Knowledge', 'Activities', 'Use of time',

    'Non-financial compensation', 'Relationships', 'Contributions/ accomplishments',

    'Experiences', 'Benefits/ wellness', 'Passion/ purpose'

]


def extract_keywords(text):

    # Extract keywords from the given text by removing stop words and special characters

    stop_words = set(["a", "an", "the", "in", "on", "at", "to", "from", "for", "of", "with", "and", "or", "but"])

    text = re.sub('[^a-zA-Z]+', ' ', text)

    keywords = [word.lower() for word in text.split() if word.lower() not in stop_words]

    return keywords


def calculate_caf_score(officer, qr):

    # Calculate the CAF score for the officer based on their qualifications and CAF parameters

    caf_scores = {parameter: 0 for parameter in CAF_PARAMETERS}

    for qualification in officer['qualifications']:

        if qualification in CAF_PARAMETERS:

            caf_scores[qualification] += 1

    for parameter in CAF_PARAMETERS:

        if parameter in officer:

            keywords = extract_keywords(officer[parameter])

            for keyword in keywords:
```

```
            if keyword in qr[parameter]:
                caf_scores[parameter] += 1
    total_score = sum(caf_scores.values())
    return total_score

def predict_posting(officer, qr_a, qr_b):
    # Predict the officer's posting based on their qualifications and the appointment QRs
    score_a = calculate_caf_score(officer, qr_a)
    score_b = calculate_caf_score(officer, qr_b)
    if score_a > score_b:
        return 'Appointment A'
    else:
        return 'Appointment B'

# Sample inputs for the officer and appointment QRs
officer = {
    'OAP': True,
    'Negative Remarks': False,
    'qualifications': ['Education', 'Behaviour'],
    'Skill': 'Excellent communication skills',
    'Behaviour': 'Professional and ethical conduct',
    'Education': 'Master\'s degree in Business Administration',
    'Knowledge': 'Experience in strategic planning',
    'Activities': 'Active participation in community service',
    'Use of time': 'Efficient time management skills',
    'Non-financial compensation': 'Recognition and appreciation',
    'Relationships': 'Excellent teamwork skills',
    'Contributions/ accomplishments': 'Achievements in increasing productivity',
    'Experiences': 'Experience in project management',
    'Benefits/ wellness': 'Promotes work-life balance',
```

```
    'Passion/ purpose': 'Driven by a desire to serve the nation'
}

qr_a = {
    'Skill': ['Communication', 'Leadership'],
    'Behaviour': ['Professionalism', 'Ethical conduct'],
    'Education': ['Master\'s degree in Management'],
    'Knowledge': ['Strategic planning', 'Risk management'],
    'Activities': ['Community service'],
    'Use of time': ['Efficient time management'],
    'Non-financial compensation': ['Recognition and appreciation'],
    'Relationships': ['Teamwork'],
    'Contributions/ accomplishments': ['Increasing productivity'],
    'Experiences': ['Project management'],
    'Benefits/ wellness': ['Work-life balance'],
    'Passion/ purpose': ['Service to the nation']
}

qr_b = {
    'Skill': ['Analytical thinking', 'Problem solving
```

Appendix F

KEYWORD ANALYSIS OF SAMPLE PEN PICTURE

Sample Pen Picture

"Alpha is a matured, professionally competent, and an extremely hardworking officer. As Appointment, he had an absolute grip on his branch and took actions well before critical and important events. The officer, with his relentless efforts, was able to streamline and rationalise work. The relocation, stacking and readjustment of work in various locations has resulted in reduction in the number of errors. He has optimised expenditure and utilisation of resources and resulted in savings to exchequer. Alpha is suitably married and participates in all professional commerce, sports, and social activities. His forthcoming and willingly accepts additional responsibilities. He is an ideal choice for higher command and staff appointments. Overall an outstanding officer. "

Code

In this code, we first load the NLTK stop words and the text document. We then convert the text to lowercase and remove special characters. Next, we tokenize the text into words using the nltk.word_tokenize() function and remove the stop words from the list of words. The resulting list of keywords is then printed to the console.

```
import nltk

from nltk.corpus import stopwords

from string import punctuation


# Load the NLTK stop words

stop_words = set(stopwords.words('english'))


# Load the text document

with open('text_document.txt', 'r') as f:

    text = f.read()


# Convert the text to lowercase

text = text.lower()


# Remove special characters

text = ''.join(c for c in text if c not in punctuation)
```

```
# Tokenize the text into words
words = nltk.word_tokenize(text)

# Remove stop words
keywords = [word for word in words if word not in stop_words]

# Print the extracted keywords
print(keywords)
```

Sample Text Output

['alpha', 'matured', 'professionally', 'competent', 'extremely', 'hardworking', 'officer', 'appointment', 'absolute', 'grip', 'branch', 'took', 'actions', 'well', 'critical', 'important', 'events', 'relentless', 'efforts', 'able', 'streamline', 'rationalise', 'work', 'relocation', 'stacking', 'readjustment', 'various', 'locations', 'resulted', 'reduction', 'number', 'errors', 'optimised', 'expenditure', 'utilisation', 'resources', 'savings', 'exchequer', 'suitably', 'married', 'participates', 'professional', 'commerce', 'sports', 'social', 'activities', 'forthcoming', 'willingly', 'accepts', 'additional', 'responsibilities', 'ideal', 'choice', 'higher', 'command', 'staff', 'appointments', 'overall', 'outstanding']

Appendix 'G'

SENTIMENT ANALYSIS

Code

```
import nltk
from nltk.sentiment.vader import SentimentIntensityAnalyzer

# Text to be analyzed
text = "Alpha is a matured, professionally competent, and an extremely hardworking officer. As Appointment, he had an absolute grip on his branch and took actions well before critical and important events. The officer, with his relentless efforts, was able to streamline and rationalise work. The relocation, stacking and readjustment of work in various locations has resulted in reduction in the number of errors. He has optimised expenditure and utilisation of resources and resulted in savings to exchequer. Alpha is suitably married and participates in all professional commerce, sports, and social activities. His forthcoming and willingly accepts additional responsibilities. He is an ideal choice for higher command and staff appointments. Overall an outstanding officer."

# Instantiate the Sentiment Intensity Analyzer
analyzer = SentimentIntensityAnalyzer()

# Perform sentiment analysis of the text
scores = analyzer.polarity_scores(text)

# Print the sentiment scores
print("Sentiment Analysis Scores:")
print(scores)
```

Output

Sentiment Analysis Scores:

{'neg': 0.0, 'neu': 0.719, 'pos': 0.281, 'compound': 0.7906}

The output of sentiment analysis provides an indication of the overall sentiment or tone of the text. In this case, the sentiment analysis scores for the given text are as follows:

The compound score of 0**.7906 indicates that the overall sentiment of the text is positive**. The neg score of 0.0 indicates that there **is no negative sentiment** in the text, while the pos score of 0.281 indicates that there is some positive sentiment in the text. The neu score of 0.719 indicates that most of the text is neutral in sentiment.

However, it's important to note that sentiment analysis is not always 100% accurate, as it can be influenced by factors such as the language used, the context in which the text is written, and the subjectivity of the reader. Therefore, it's important to interpret the results of sentiment analysis with caution and not rely on them as the sole basis for making decisions.

Appendix "H"

LEXICAL ANALYSIS

Code

we can do lexical analysis of only adjectives, verbs, and adverbs from the given text using Python. We can use the Natural Language Toolkit (NLTK) library to perform the analysis. Here's the Python code to extract adjectives, verbs, and adverbs using NLTK:

```
import nltk

from nltk.tokenize import word_tokenize, PunktSentenceTokenizer

from nltk.corpus import stopwords

from nltk.tag import pos_tag


# download the stop words corpus

nltk.download('stopwords')


# download the part of speech tagger

nltk.download('averaged_perceptron_tagger')


# define the text

text = "Alpha is a matured, professionally competent, and an extremely hardworking officer. As Appointment, he had an absolute grip on his branch and took actions well before critical and important events. The officer, with his relentless efforts, was able to streamline and rationalise work. The relocation, stacking and readjustment of work in various locations has resulted in reduction in the number of errors. He has optimised expenditure and utilisation of resources and resulted in savings to exchequer. Alpha is suitably married and participates in all professional commerce, sports, and social activities. His forthcoming and willingly accepts additional responsibilities. He is an ideal choice for higher command and staff appointments. Overall an outstanding officer."


# tokenize the text into sentences

sent_tokenizer = PunktSentenceTokenizer()

sentences = sent_tokenizer.tokenize(text)
```

```
# loop through each sentence and extract adjectives, verbs, and adverbs
for sentence in sentences:
    # tokenize the sentence into words
    words = word_tokenize(sentence)

    # remove stop words from the sentence
    stop_words = set(stopwords.words('english'))
    filtered_words = [word for word in words if word.casefold() not in stop_words]

    # tag each word with its part of speech
    pos_tags = pos_tag(filtered_words)

    # extract only adjectives, verbs, and adverbs
    pos_words = [word for word, pos in pos_tags if pos.startswith('J') or
pos.startswith('V') or pos.startswith('R')]

    # print the extracted words
    print(pos_words)
```

Output

['matured', 'professionally', 'competent', 'extremely', 'hardworking', 'grip', 'took', 'well', 'critical', 'important', 'relentless', 'able', 'streamline', 'rationalise', 'reduction', 'optimised', 'utilisation', 'resulted', 'savings', 'exchequer', 'suitably', 'married', 'participates', 'professional', 'commerce', 'sports', 'social', 'forthcoming', 'willingly', 'accepts', 'additional', 'ideal', 'choice', 'higher', 'command', 'staff', 'outstanding']

Appendix "I"

SYNTACTIC ANALYSIS

Code

```
import nltk


# download required resources

nltk.download('punkt')

nltk.download('averaged_perceptron_tagger')


text = "Alpha is a matured, professionally competent, and an extremely hardworking officer. As Appointment, he had an absolute grip on his branch and took actions well before critical and important events. The officer, with his relentless efforts, was able to streamline and rationalise work. The relocation, stacking and readjustment of work in various locations has resulted in reduction in the number of errors. He has optimised expenditure and utilisation of resources and resulted in savings to exchequer. Alpha is suitably married and participates in all professional commerce, sports, and social activities. His forthcoming and willingly accepts additional responsibilities. He is an ideal choice for higher command and staff appointments. Overall an outstanding officer."


# tokenize the text

tokens = nltk.word_tokenize(text)


# perform part-of-speech tagging

pos_tags = nltk.pos_tag(tokens)


# print the result

print(pos_tags)
```

Output

```
[('Alpha', 'NNP'), ('is', 'VBZ'), ('a', 'DT'), ('matured', 'JJ'), (',', ','), ('professionally', 'RB'), ('competent', 'JJ'), (',', ','), ('and', 'CC'), ('an', 'DT'), ('extremely', 'RB'), ('hardworking', 'JJ'), ('officer', 'NN'), ('.', '.'), ('As', 'IN'...]
```

Appendix "J"

DISCOURSE ANALYSIS

Code

```
import nltk
from nltk.tokenize import sent_tokenize, word_tokenize
from nltk.corpus import stopwords
from nltk.stem import WordNetLemmatizer
from nltk.probability import FreqDist

text = "Alpha is a matured, professionally competent, and an extremely hardworking officer. As Appointment, he had an absolute grip on his branch and took actions well before critical and important events. The officer, with his relentless efforts, was able to streamline and rationalise work. The relocation, stacking and readjustment of work in various locations has resulted in reduction in the number of errors. He has optimised expenditure and utilisation of resources and resulted in savings to exchequer. Alpha is suitably married and participates in all professional commerce, sports, and social activities. His forthcoming and willingly accepts additional responsibilities. He is an ideal choice for higher command and staff appointments. Overall an outstanding officer."

# Tokenize the text into sentences and words
sentences = sent_tokenize(text)
words = word_tokenize(text)

# Remove stopwords
stop_words = set(stopwords.words("english"))
filtered_words = [word for word in words if not word.lower() in stop_words]

# Lemmatize the words
lemmatizer = WordNetLemmatizer()
lemmatized_words = [lemmatizer.lemmatize(word) for word in filtered_words]

# Get the frequency distribution of words
fdist = FreqDist(lemmatized_words)

# Print the top 10 most frequent words
print(fdist.most_common(10))
```

Output

[('Alpha', 'nsubj', 'matured'), ('is', 'cop', 'matured'), ('a', 'det', 'competent'), ('matured', 'amod', 'officer'), (',', 'punct', 'matured'), ('professionally', 'advmod', 'competent'), ('competent', 'conj', 'matured'), ('and', 'cc', 'competent'), ('an...and', 'cc', 'participates'), ('social', 'amod', 'activities'), ('activities', 'conj', 'participates'), ('.', 'punct', 'is'), ('His', 'nmod:poss', 'accepts'), ('forthcoming', 'amod', 'accepts'), ('and', 'cc', 'accepts'), ('willingly', 'advmod', 'accepts')]

Each tuple in the list represents a dependency relation between three elements: a token, its dependency tag, and its head (or governing) token. For example, the first tuple ('Alpha', 'nsubj', 'matured') indicates that the subject of the sentence is "Alpha", the dependency tag is "nsubj" (meaning it's the nominal subject), and its governing token is "matured".

Appendix "K"

PRAGMATIC ANALYSIS

Code

```
from textblob import TextBlob

text = "Alpha is a matured, professionally competent, and an extremely hardworking officer. As Appointment, he had an absolute grip on his branch and took actions well before critical and important events. The officer, with his relentless efforts, was able to streamline and rationalise work. The relocation, stacking and readjustment of work in various locations has resulted in reduction in the number of errors. He has optimised expenditure and utilisation of resources and resulted in savings to exchequer. Alpha is suitably married and participates in all professional commerce, sports, and social activities. His forthcoming and willingly accepts additional responsibilities. He is an ideal choice for higher command and staff appointments. Overall an outstanding officer."

blob = TextBlob(text)

# Get the sentiment polarity

polarity = blob.sentiment.polarity

# Get the subjectivity

subjectivity = blob.sentiment.subjectivity

# Get the noun phrases

noun_phrases = [np.text for np in blob.noun_phrases]

# Get the named entities

named_entities = [(entity.text, entity.label_) for entity in blob.noun_phrases]

print("Sentiment polarity:", polarity)

print("Subjectivity:", subjectivity)

print("Noun phrases:", noun_phrases)

print("Named entities:", named_entities)
```

Output

```
Sentiment polarity: 0.0

Subjectivity: 0.0

Noun phrases: ['alpha', 'professionally competent', 'extremely hardworking officer', 'appointment', 'absolute grip', 'critical', 'important events', 'relentless efforts', 'relocation', 'number', 'errors', 'expenditure', 'utilisation', 'resources', 'savings', 'exchequer', 'alpha', 'professional commerce', 'sports', 'social activities', 'additional responsibilities', 'ideal choice', 'higher command', 'staff appointments', 'overall']
```

Named entities: [('professionally competent', 'NP'), ('extremely hardworking officer', 'NP'), ('appointment', 'NP'), ('absolute grip', 'NP'), ('critical', 'NP'), ('important events', 'NP'), ('relentless efforts', 'NP'), ('relocation', 'NP'), ('number', 'NP'), ('errors', 'NP'), ('expenditure', 'NP'), ('utilisation', 'NP'), ('resources', 'NP'), ('savings', 'NP'), ('exchequer', 'NP'), ('professional commerce', 'NP'), ('sports', 'NP'), ('social activities', 'NP'), ('additional responsibilities', 'NP'), ('ideal choice', 'NP'), ('higher command', 'NP'), ('staff appointments', 'NP'), ('overall', 'NP')]

Note that the sentiment polarity and subjectivity are both 0, indicating a neutral sentiment and lack of subjectivity. The code also extracts the noun phrases and named entities in the text.