

Exploring evolving H.R. and recruitment strategies in the age of technology advancements based on artificial intelligence



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Abstract With the advancement of Technology, it has become imperative for H.R. and recruitment strategies to adapt. This paper will highlight the emerging trends in H.R. and Recruitment driven by Technology. One prominent trend in H.R. Technology is the increasing prevalence of artificial intelligence (A.I.). A.I. is already utilized to streamline and automate H.R. processes like resume screening, interview scheduling, and performance reviews. Looking ahead, A.I. is anticipating a significant impact on H.R. by aiding organizations in making better hiring decisions, designing personalized training programs, and fostering more engaging employee experiences. Another notable trend in H.R. Technology revolves around the transition towards cloud-based platforms. These platforms offer advantages over on-premises systems, including scalability, flexibility, and cost-effectiveness. As a result of the various benefits brought by Technology, we would bring about the critical themes in the form of the strategies that the organizations should adopt to enhance their productivity in Recruitment and selection with the help of bibliometric analysis, thematic analysis, ISM (interpretive structuring model) and MICMAC analysis.

Keywords: artificial intelligence (A.I.), recruitment ISM, technology, MICMAC analysis, human resources (H.R.), AIHRMI

1. Introduction

Human Resources (H.R.) and recruitment tactics have been undertaking a revolutionary journey in the quickly changing business world, propelled by the relentless march of technological advancements. A new era of opportunities and difficulties has begun because of the blending of cutting-edge Technology like automation, big-data analytics, and artificial intelligence with the complexities of human resources and talent acquisition. This study examines how H.R. and Technology interact dynamically in the modern day, researching new trends, best practices, and potential traps that businesses may run into as they transition to the digital age. The digital revolution has drastically altered the traditional H.R. and recruitment paradigms, initially dominated by manual processes. This change affects businesses of all sizes and industries, and it goes beyond just cosmetics. Companies that effectively adapt to these changes will have a competitive advantage in attracting, keeping, and nurturing the best employees. At the same time, those who lag may find it challenging to navigate a talent landscape that is swiftly changing. This study attempts to elucidate the complex facets of the evolving H.R. and recruitment methods, providing information on technological advancements, their effect on the employee experience, and their implications for diversity and inclusion. Additionally, it will examine the ethical issues raised by automated H.R. procedures and the reskilling and upskilling needs of H.R. professionals to remain competitive in the digital world. The journey through this examination of human resources and hiring strategies in the age of technological innovations promises to be enlightening, shedding light on how businesses can use Technology to create a workforce that is preparing for the future, enhances their operational efficiency, and makes sure that H.R. practices are in alignment with the demands of a dynamic business environment.

1.1. A.I. Integration in H.R. Management

Wang and Li (2023) study explores the digital management of human resources within enterprises, focusing on data mining and integrating A.I. algorithms for personnel recruitment. This study emphasizes how crucial A.I. is becoming to H.R. procedures. AI-driven solutions can streamline the hiring process and improve applicant matching by effectively analyzing large



amounts of data to find suitable candidates. In their 2023 study, Kaushal and Ghalawat suggest a framework for AIHRMI (Artificial Intelligence in Human Resource Management Integration) for future use in HRM. The framework addresses vital H.R. functions like Recruitment, selection, talent management, and retention. It underscores the need for organizations to embrace A.I. technologies to remain competitive in attracting and retaining top talent. Indarapu et al. (2023): This study delves into the realm of HRM intelligence practices using machine learning models. It emphasizes the growing adoption of machine learning in H.R., specifically in Recruitment. The study explains how machine learning software enhances the effectiveness of H.R. procedures, highlighting the potential of these tools to automate repetitive operations and handle personnel profiles.

1.2. Recruitment Technologies

Yi et al. (2023) this research investigates the utilization of chatbots in fellowship recruitment processes. With the COVID-19 pandemic reshaping recruitment practices, innovative approaches like chatbots have emerged to enhance Recruitment. Chatbots offer real-time engagement and support to candidates, making the hiring procedure more effective and user-friendly. Musa (2023) Musa's study addresses youth unemployment in Brunei through apprenticeships, focusing on the role of online recruitment Technology. The research underscores the importance of program coordination and an inclusive regulatory framework in addressing unemployment challenges. Online recruitment platforms can bridge the gap between job seekers and employers, facilitating more efficient job matching. Zazen et al. (2023) Introducing a novel concept of neuro-based decision support systems for employee recruitment may be a new way. This study utilizes EEG Technology and data science methods to classify cognitive functions. This innovative approach has the potential to enrich the recruitment process by providing valuable insights into candidates' cognitive abilities, ultimately aiding in better candidate selection. Kaur and Kaur's study from 2023 looks into how e-recruitment adoption is affected by electronic word-of-mouth (eWOM). eWOM is essential in the digital age to influence perceptions and choices. The study emphasizes the importance of eWOM in adopting e-recruitment, highlighting its function in disseminating information about jobs and influencing job searchers' intentions. 2022: Ore and Sposato This qualitative study investigates the advantages and disadvantages of applying artificial intelligence (A.I.) to hiring and choosing candidates. A.I. technologies have the potential to automate and improve recruitment processes. However, the study reveals concerns about job losses due to automation, highlighting the need to balance A.I. and human expertise in Recruitment. Genin et al. (2023) This research delves into the corporate world to investigate the impact of board experiential diversity on corporate radical innovation. The study explores how diverse experiences within a board can stimulate innovation and value creation. It emphasizes the potential benefits of considering experiential diversity in director recruitment, advocating for more inclusive board composition to foster innovation.

1.3. Diversity and Inclusion in Recruitment

Kelan (2023) study focuses on algorithmic inclusion within the hiring process and its potential impact on promoting inclusive HRM strategies. In an era where diversity and inclusion are paramount, the research highlights how A.I. can perpetuate bias or be harnessed to advance diversity in Recruitment. Guillemin et al. (2023) conducted a study addressing the underrepresentation of women in STEM fields by examining an affirmative-action recruitment strategy for academic positions. The plan increased the number of recruited women by restricting applications to female candidates in a specific recruitment round. The research highlights the role of affirmative action recruitment in promoting gender balance in STEM disciplines. Graham et al. (2023) This qualitative exploration investigates the Recruitment and retention of scientists from Black, Indigenous, or People of Color (BIPOC) backgrounds in marine science. The study sheds light on interventions such as BIPOC-focused programs and mentorship that support BIPOC scientists' sense of belonging and self-efficacy. Jackson (2023) Jackson's study looks into repugnant market issues related to transactional methods of diversity hiring in a technological firm. The investigation uncovers how such concerns influence the choice of recruitment platforms and highlights the complex dynamics of diversity, equity, and inclusion initiatives in organizations. Blaique et al. (2023) To address the issue of recruiting and retaining women in STEM disciplines, Blaique et al. (2023) undertook a study.

The study concentrated on individual and environmental elements that can improve the representation of women in STEM fields. It highlighted the value of mentoring for women in STEM by demonstrating the beneficial effects of mentorship and coping self-efficacy on affective occupational commitment. Bacci et al. (2023) This study analyzed the co-authorship network of Italian academic statisticians to understand collaborative styles among scholars from different sub-fields. It highlighted differences in collaboration that challenge their aggregation for Recruitment and career advancement. Lee and Cha (2023) In response to the growing adoption of artificial intelligence (A.I.) recruitment systems and concerns about discriminatory decision-making, this study explores the concept of explainability and augmentation in A.I. recruitment. The research introduces the FAT-CAT (Fairness, Accountability, and Transparency-Complexity, Anxiety, and Trust) model, emphasizing the significance of explainability and augmentation in ensuring equitable and trustworthy hiring processes. Lavanchy et al. (2023) This study investigates job applicants' perceptions of algorithm-driven hiring procedures, highlighting potential concerns about fairness in algorithmic decision-making. The findings emphasize balancing efficiency and fairness in algorithmic recruitment processes. Malhotra et al. (2023) The research proposes an alumni-based collaborative model to

strengthen industry-academia partnerships. It emphasizes the influential role of alums in enriching collaboration between academic institutions and industries, particularly in research, Recruitment, fundraising, and internship opportunities.

1.4. *Technology and Education*

Tuttle and Carter (2023) This study examined the impact of computer-assisted instruction (CAI) on students with visual impairment. The research found potential benefits in CAI interventions, emphasizing the importance of Technology skills, diverse participant recruitment, and educator involvement. Janahi et al. (2023) The study explores the role of artificial intelligence (A.I.) in higher education, particularly its use in student recruitment and classroom accessibility. It highlights the need for a resilient, data-integrated, and learning-focused technological ecosystem for higher education institutions. Rahimi (2023) research examines the capability of higher education lecturers to foster information literacy in college pupils.

The study emphasizes that lecturers' professional expertise and action-oriented abilities are vital in improving students' information literacy and suggests that hiring processes should assess lecturers' skills. Xia et al. (2023) this study addresses the teacher recruitment crisis in the United States, focusing on influential recruitment factors for Technology and engineering teacher preparation programs. The findings highlight the significance of face-to-face interactions and hands-on hobbies in attracting students to the teaching profession.

1.5. *ERD in Recruitment*

Entity-relationship diagrams (ERDs) are commonly used in various domains, including recruitment processes. ERDs represent the decomposition of a system's subject domain into entities, relationships, and attributes (Toshiyuki et al., 2021). In the context of Recruitment, ERDs can describe how applicant data is stored at a detailed level, showcasing the relationships between attributes such as English skills, academic credentials, and other qualifications (Wieringa, 2003). ERDs help visualize the structure of applicant data, enabling human resources (H.R.) specialists to analyze trends across multiple years and gain insights into the relationships among applicant qualifications. By using ERDs, HR specialists can better understand the flow of information and the connections between different attributes, facilitating a more effective recruitment strategy.

1.6. *Thematic Analysis in Recruitment*

Thematic analysis plays a crucial role in recruitment strategies by identifying key themes and patterns that influence participant enrolment (Rebecca et al., 2008; Kelsey and Bohnert, 2019; Jodi and Aronson, 1995). It helps in understanding factors such as participant risk assessment, recruitment processes, and participant understanding of research, which are essential in designing effective recruitment strategies (Andrew et al., 2015). The thematic analysis also highlights the importance of clear messaging, inclusive approaches, and personalized experiences in engaging participants, especially those from underrepresented populations like sexual and gender minorities (Majumdar, 2022). Additionally, it aids in determining the sample size required for studies, ensuring adequate power to uncover desired themes and patterns related to recruitment success. By providing a systematic approach to analyzing data and finding relevant themes, thematic analysis significantly enhances recruitment efforts in research studies.

1.7. *Interpretive Structural Equation Modelling in Recruitment*

Interpretive Structural Modeling (ISM) is utilized in the context of recruitment challenges in medical sciences universities to prioritize and develop a model illustrating the relationship between faculty recruitment issues (Akram et al., 2020). Warfield introduced ISM in 1974, simplifying complex problems by leveraging experts' knowledge and wisdom (Thakkar, 2021). This method deals with the complex relationships among identified factors related to the issue, generating a visual model of directly and indirectly linked factors (Kumar and Singh, 2019). ISM transforms unclear mental models into well-defined models that are useful for various purposes and crucial for decision-making in complex scenarios (Sushil, 2012). Despite its widespread application, ISM has limitations, especially when involving a group of analysts familiar with the problem, necessitating improvements to overcome these drawbacks (Jolhe and Babu, 2014).

1.8. *Innovative Recruitment Methods*

The study by Sandhu et al. (2023) examines the creative use of social media for recruiting participants from "invisible groups," with a particular emphasis on South Asian women who experience gender-related violence in the U.K. The study underscores the ethical challenges and advantages of leveraging social media in sensitive research, advocating for its integration into recruitment strategies. Glackin and Adivar (2023) This study employs predictive analytics to model independent sales representative performance in direct selling. The research identifies key factors influencing sales success and emphasizes the potential of machine learning to enhance Recruitment and retention strategies in sales organizations. Muranaka (2023): The research explores the role of intermediaries in the cross-border labor market between Japan and Vietnam. It sheds light on how different types of intermediaries shape early-career foreign skilled laborers' employment experiences, emphasizing the active role of temporary staffing firms in the employment process. Martin-de Castro et al., (2023) The study investigates the

role of corporate environmental commitment and science and Technology parks in attracting technological talent in service firms. Their findings emphasize the importance of these mechanisms in talent recruitment, though they uncover unexpected substitutive effects. Paaske et al., (2023) This research examines the preferences of academic employees for middle managers in academia. The study contrasts employee preferences for leaders with social skills and educational and professional awareness with university recruitment policies emphasizing formal competency and research experience. Table 1 below shows information about all the factors used in the study, along with the corresponding study from which factors were chosen.

Table 1 Factor name and its validity.

Factor Name	Authors and Year
A.I. Integration in H.R. Management	Chowdhury et al. (2023) Kaushal and Ghalawat (2023) Indarapu, Vodithala, Kumar, Kiran, Reddy, and Dorthi (2023)
Recruitment Technologies	Yi P.K., Segall N., and N. Ray (2023) Musa (2023) Zazon, Fink, Gordon, and Nissim (2023) Kaur and Kaur (2023) Ore and Sposato (2022)
Diversity and Inclusion in Recruitment	Kelan E.K. (2023) Guillemin et al. (2023) Graham, Hodsdon, Busse, and Crosby (2023) Jackson (2023) Blaique, Pinnington, and Aldabbas (2023) Bacci, Bertaccini, and Petrucci (2023) Lee & Cha (2023) Lavanchy, Reichert, Narayanan, and Savani (2023)
Technology and Education	Tuttle and Carter (2022) Janahi, AlDhaen, Hamdan, and Nureldeen (2023) Rahimi (2023) Love and Love (2023)
Innovative Recruitment Methods	Sandhu, Brady, and Barrett (2023) Glackin and Adivar (2023) Muranaka (2023) Martin-de Castro, González-Masip, and Fernández-Menéndez (2023) Paaske, Øhrn, Holm, and Walter (2023)

2. Methodology

The study undertakes various qualitative research approaches, which are exhibited below to answer the research questions (R.Q.):

1. We are examining how recruiting and selection are developing in modern Technology.
2. To determine the themes influencing recruitment and selection procedures in the technological era.
3. To find out the most impactful theme in the recruitment and selection process to be adopted by the organizations.
4. To identify the autonomous, linkage, dependent, and independent variables in the recruitment and selection process.

RQ1: The first study question was addressed by performing a bibliometric analysis using the VoSViewer tool to determine the crucial terms for Technology and Recruitment across various countries.

Using the VoSViewer program, we conducted a bibliometric analysis to address the first research question and determine the important keywords related to Technology and Recruitment in different countries.

A software program called VOSviewer exists to visualize and analyze bibliometric networks, particularly co-authorship networks, citation networks, and keyword co-occurrence networks. Researchers at the Dutch University of Leiden created it.

2.1. Search parameters

2.1.1. Search Criteria

TITLE-ABS-KEY (Recruitment AND technologies) AND PUBYEAR > 2018 AND PUBYEAR < 2024 AND (LIMIT-TO (SUBJAREA, "SOC") OR LIMIT-TO (SUBJAREA, "BUSI")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English"))
Researchers mounted a CSV file of Scopus on VOSviewer, including authors, titles, author keywords, indexed keywords, country, citations, publishing year, journal name, volume, issue, and funding agency details. The CSV file was prepared and limited with the following search query - TITLE-ABS-KEY (metaverse AND in AND education) AND (LIMIT-TO (SUBJAREA, "SOC"))

2.1.2. Technology configuration

On the other hand, the creators built VOSviewer using the Java programming language. This research utilizes the Java Universal Network/Graph Framework (JUNG) to create, manipulate, and visualize complex networks. The Java Topology Suite (JTS) performs geometric operations on spatial data, such as calculating the layout of nodes in the network. The research also uses the Prefuse Visualization Toolkit to design interactive visualizations and user interfaces. Finally, the researchers employ the Apache Lucene library for information retrieval and text analysis.

2.1.3. Algorithms development

Researchers discovered many bibliometric analysis algorithms. Co-authorship analysis, bibliographic coupling, co-citation analysis, and keyword analysis were all part of it. The most significant articles are determined through co-citation analysis, which counts how often two or more publications have cited one other. Similarly, bibliographic coupling analysis identifies articles that have cited the same set of articles and group them based on their citation patterns. Incongruence with these is co-authorship analysis, which identifies groups of authors who have collaborated on multiple papers and visualizes their network of relationships. Finally, Keyword analysis identifies the most important keywords associated with a particular set of documents and visualizes their relationships.

2.1.4. Network development

VOSviewer provided various options for configuring the network, such as selecting a period for the data and setting thresholds for minimum numbers of co-authorships or citations. VOSviewer analyzed the network to identify key features such as clusters of closely related authors or papers, highly cited articles or authors, and the most frequent keywords used in the literature. Using Vosviewer for network analysis can significantly improve the overall quality of literature reviews. By offering a graphic summary of the important figures, ideas, and connections in an area of Recruitment,

2.1.5. Visualization

VOSviewer offers various tools for visualizing the bibliometric network and associated analysis results. It generates a map that depicts clusters of authors or papers as nodes, with the thickness of the edges indicating the strength of the connections between them. The color and size of the nodes represent other features, such as the number of citations received by the papers.

2.2. Data analysis and reporting methods

2.2.1. Co-authorship analysis

It is a method used to study the collaborative behavior of researchers and scientists. The metaverse in the education discipline examined co-authorship patterns, research topics, and geographical regions. The analysis considered numerous factors, including the number of publications, the type of publications, the number of co-authors, the degree of collaboration, and the significance of the research. The main aim of this analysis was to identify critical authors or research groups within a specific field, to understand the relationships and collaborations between researchers, and to track the evolution of research over time.

The analysis helped researchers identify emerging research areas that they can use for future research. Researchers adopted the Full counting method here to develop co-authorship. The process is a straightforward approach to counting the frequency of term co-occurrence in a document set. It considered all possible pairs of words in a document set. The methodology is predicated on the idea that the frequency of two phrases occurring together indicates how closely related they are. To use the Full Counting method in VoSviewer, researchers first created a document-term matrix that represents the frequency of each term in each document. After that, VoSviewer calculated the frequency of co-occurrence of each pair of

terms in the document set. The strength of the relationship between the two terms is represented by the width of the link between the two terms in the visualization. The thicker the link, the stronger the relationship between the two terms.

Later, researchers selected 'Ignore documents with a large number of authors' in the Vosviewer. This was done with pros and cons, such as difficulty in determining individual contributions, reduced accountability, dilution of expertise, and potential for conflicts of interest. In this study, the maximum number of authors per document was limited to 5, and the minimum number of records for one author was set at 2, with the restriction that the author's minimum number of citations was also set at 2.

2.2.2. Co-Occurrence analysis

Co-occurrence analysis is a method for identifying relationships between terms or concepts based on their co-occurrence within a given corpus of documents, such as academic publications or web pages. VOSviewer was particularly useful for visualizing the results of co-occurrence analysis, as it can create network diagrams and heat maps that show the relationships between terms. Here, researchers adopted two different methods: Author keywords and index-based keywords. The authors themselves select author keywords and represent their research's main themes and concepts. They are intended to provide additional information about the article's content and include specialized terminology or jargon. These keywords are often listed in the article's abstract or at the end of the article. Researchers connected 74 links with a total link strength of 126. The alternative method of indexing keywords is based on researchers assigned by Scopus indexers who read the article and assign standardized terms to describe its content. Index keywords are drawn from a controlled vocabulary or thesaurus and are intended to provide a consistent way to describe the article's content. This helped researchers ensure that articles were accurately categorized and easily searchable within the database. In this method, researchers adopted 254 links with a total strength of 434. The author keyword and index keyword search adopted the 'Full counting method'. In the case of author keyword analysis, the minimum number of keyword occurrences was limited to 2. Here, researchers identified out of 243 keywords, 25 meet the threshold with 25 numbers of keywords selected. Similarly, in index keyword analysis, the minimum number of keyword occurrences was forced to have two words. The research generated 288 keywords, and 41 met the threshold with 41.

2.2.3. Bibliographic coupling:

A technique used in bibliometrics called "bibliographic coupling" gauges how closely two or more scientific papers are related based on the references they share. In VOSviewer, a bibliographic coupling analysis is performed on a set of articles to visualize the relatedness of the articles. In the resulting visualization, more closely related articles were clustered together, and the thickness of the lines between the circles indicated the strength of the bibliographic coupling between the articles. Further, researchers adopted documents as a unit of analysis and selected a complete counting method. Researchers set the minimum number of documents as 2. This resulted in the production of 71 documents, out of which 24 met the threshold

2.3. Normalization using association method

Normalization organizes data in a database to lessen duplication and enhance data integrity. In a database context, association refers to the relationship between tables. Normalization by association method is a type of normalization that focuses on the relationships between tables. It involves creating new tables and modifying existing ones to ensure that each table represents a single entity type and that the relationships between entities are properly represented. The association method of normalization involves identifying the relationships between tables and creating new tables to describe those relationships. Normalization by association method is a common way to improve data integrity and reduce data redundancy in a database. Creating tables representing relationships between entities can help ensure that data is consistent and accurate throughout the database.

2.4. Layout parameters

When creating visualization in VoSviewer, Researchers set various layout parameters that control how the nodes and edges in the network are positioned and displayed. In this research, a Force-directed layout was applied. This is the default layout algorithm in VoSviewer, which positions the nodes in the network based on the attractive and repulsive forces between them. Here, researchers adjusted various parameters, such as the strength of the attractive and repulsive forces, the maximum number of iterations, and the cooling factor to control how the nodes are positioned. The data layout was rotated to 90 degrees in 1000 iterations with an initial step size 1.0. Further, step size convergence set at 0.01

2.5. Clustering parameters

In VoSviewer, clustering group's similar nodes in a bibliometric network based on their co-occurrence patterns, citation links, or other bibliometric indicators. Clustering reveals underlying structures in the network and identifies essential research topics or subfields. VoSviewer provides several clustering algorithms and parameters that can be adjusted to achieve optimal

results. VoSviewer offers several clustering algorithms, including modularity-based clustering, leading eigenvector clustering, and label propagation clustering. Each algorithm has its strengths and weaknesses. Researchers adopted the modularity threshold. Here, modularity is a measure of the quality of a clustering solution, and it indicates the degree to which the nodes in a cluster are more densely connected than to nodes outside the cluster. The modularity threshold is a parameter that determines the minimum increase in modularity required for a new cluster to be created. A higher threshold value will lead to fewer, larger clusters, while a lower threshold value will lead to more, smaller clusters.

Further, researchers set the minimum cluster size to 2 as a higher minimum cluster will lead to fewer, larger clusters, while a lower minimum cluster size will lead to smaller clusters. The subject is in its nascent stage and could extract very few articles. Thus, researchers decided to go with a minimum cluster size. Apart from this, researchers set the clustering resolution to 1, 0 with random starts of 10 and random iteration of 10.

2.6. Citation analysis

Citation analysis examines the relationships between references cited in published research and the published study. It uses the analysis unit. The single object being examined or analyzed in a research study is referred to as the unit of analysis. Researchers concentrate on and gather data from this fundamental unit. The research question, the level of analysis, and the data available all have a role in the unit of analysis decision. In this research, the authors used documents and countries as the unit of analysis. In the case of a unit of analysis concerning documents, the maximum number of citations per document is set at 2. The analysis of 71 documents meets the 24-document threshold. Thus, researchers selected 24 documents for the analysis. In the second unit of analysis, countries were taken as the basis. Here, researchers set the minimum number of documents by country at two and restricted the minimum number of citations by country to 1. Out of 38 countries, 22 meet the threshold. Thus, researchers did a citation analysis on 22 documents.

2.7. Bibliometric analysis

Search Criteria:

TITLE-ABS-KEY (Recruitment AND technologies) AND PUBYEAR > 2018 AND PUBYEAR < 2024 AND (LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "BUSI")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English"))

The text in the figure 1 provides more information about the connections. For example, the text "artificial intelligence" is next to the line connecting the circles for "talent management" and "Technology." This suggests a strong connection between artificial intelligence and talent management.

Figure 1 suggests a complex and interconnected network of relationships between people and organizations in talent management. This network constantly evolves as new research is conducted, new technologies are developed, and new practices are adopted.

Figure 1 can be interpreted in many ways. One interpretation is that it shows the importance of collaboration and cooperation in talent management. The different people and organizations are all interconnected, and no one person or organization can master all the knowledge and expertise required to manage talent effectively. Working together allows people to share knowledge and expertise and create a more comprehensive and effective talent management system.

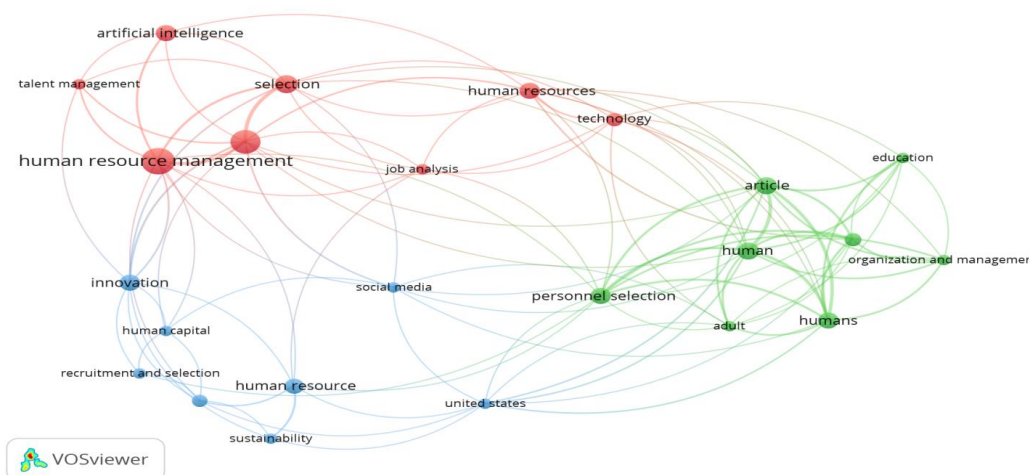


Figure 1 Network diagram.

Another interpretation is that figure 1 shows the challenges of talent management. The network is complex and ever-changing, and keeping up with the latest developments can be challenging. However, figure 1 also shows the potential of talent



management. Understanding the connections between different people and organizations and working together can create a more effective and efficient way to manage talent.

1. The application of A.I. to talent management is increasing, as shown in Figure 2. A.I. is becoming increasingly comfortable with automating procedures like interview and resume screening. Human resources professionals can benefit further with more time dedicated to strategic tasks like talent development and retention.
2. Social media's expanding role in talent management and engaging with prospective applicants on social media can help evaluate their qualifications and experience and uncover more about their character and suitability for the position.
3. The significance of inclusion and diversity in managing talent is essential, as shown in Figure 3. A varied workforce fosters innovation and increases productivity. Talent management experts should establish an inclusive and friendly work environment.
4. The necessity of continuous education for talent management in different sectors is gaining importance. Talent management specialists must learn new skills and information because the workplace constantly changes. They ought to be open to experimenting with novel concepts and methods.

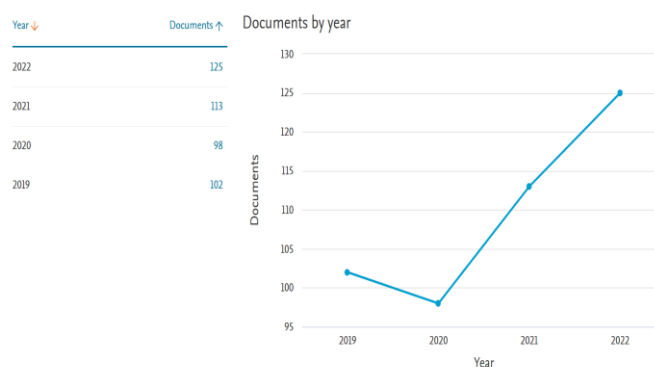


Figure 2 Year-wise application of A.I. to talent management and Recruitment.

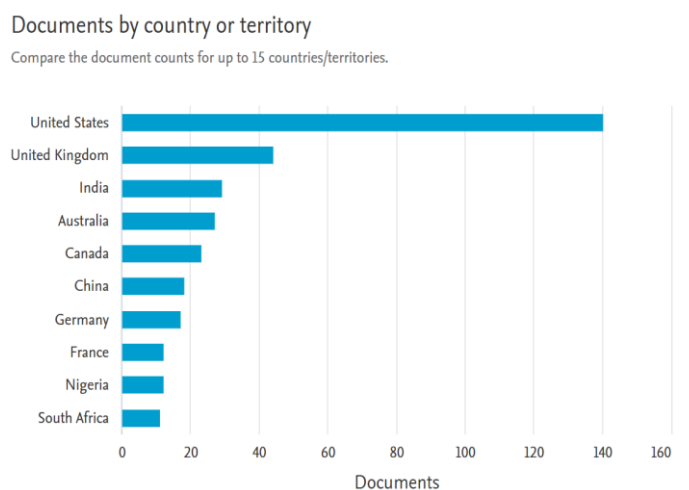


Figure 3 Country-wise research of A.I. to talent management and Recruitment.

RQ2: Thematic analysis is used in the second study question to identify the key themes influencing Recruitment and selection in the age of technological innovation.

2.8. Thematic Analysis

Thematic analysis is a qualitative research method that involves identifying, analyzing, and reporting patterns (themes) within data Vaismoradi et al. (2016). Thematic analysis is often used to answer research questions about people's experiences, perceptions, and opinions Smith et al. (2016).

RQ3: The RQ1 and RO2 have successfully identified keywords (as shown in Figure 1) and themes (as shown in Figures 4 & 5). In the third study question, we employ the ISM technique to determine which theme, out of the many that have been found, has the most impact on Recruitment and selection in the technologically driven environment. To complete this research, a survey method was adopted: a questionnaire was created with an open-ended, multiple-choice question and a rating scale



from 1 to 4 (comparative scale) to learn the responses of the respondents who were chosen using the non-probability, convenience sampling method with a sample size of 15. These respondents included company human resources department’s officials, college placement officers, and faculty teaching H.R. subjects in management colleges. SmartISM software was employed to obtain the final ISM model.

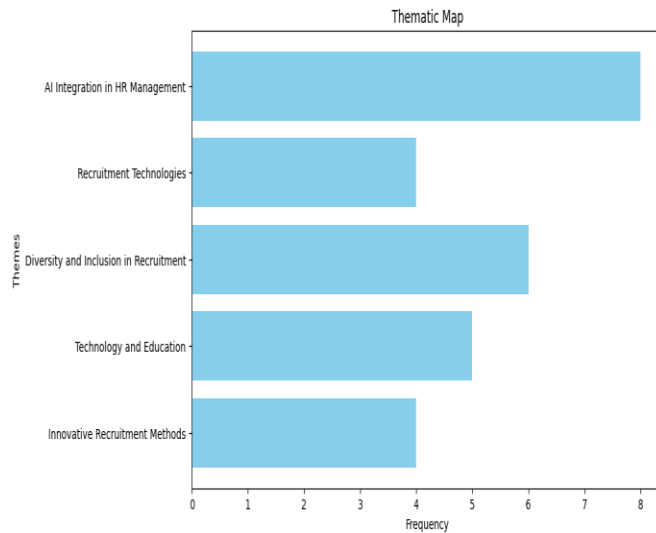


Figure 4 Thematic Maps.

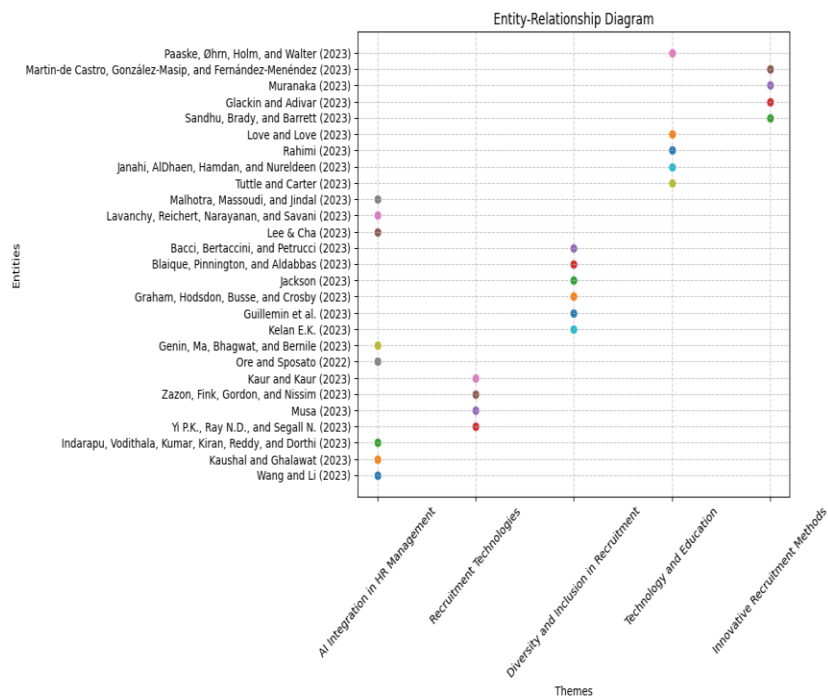


Figure 5 Entity-Relationship Diagram.

2.9. Interpretive Structural Modeling (ISM)

ISM is defined as a technique designed to aid individuals in understanding the crucial concerns that must be prioritized. ISM is the most important factor in the growth and success of an organization. The process adds no new information. The ISM process transforms hazy, vague mental models of systems into precise, well-defined models. Below is an explanation of the ISM’s procedural phases from Attri et al. (2013).

2.10. Procedural Steps of ISM



Step 1: The factors influencing the system under evaluation are described in step one. These factors can include drivers, objectives, activities, individuals, etc. The four common symbols used to indicate the direction of the relationship between the variables, which are used as a guide, are given below.

- V: Criterion i will assist in reaching Criterion j.
- A: Criterion j will assist in reaching criterion i.
- X: Criteria i and j will assist each other.
- O: Criterion j and i are unrelated.

The V (4-Strong Influences other), A (3- Been Influenced Strongly), X (2- Both Influence equally), and O (1- No influence) are determined using the structured questionnaire, and responses are obtained by human resources departments officials from companies, college placement officers, and faculty who teach H.R. subjects in management colleges. Since there is enough literature review to compare the themes obtained in the thematic analysis.

STEP 2: A structural self-interaction matrix (SSIM), which depicts the relationships between the variables pair-wise, is generated for each variable in the system under consideration.

STEP 3: Using the SSIM, a reachability matrix is created and transitivity-checked. The contextual relation is transitive, which is the core principle of ISM. This rule states that if a variable A is related to a variable B and a variable B is associated with a variable C, then A must also be related to C.

STEP 5: The reachability matrix obtained in Step 4 is divided into various levels.

STEP 6: A directed graph is created based on the relationships shown in the reachability matrix above, and transitive linkages are eliminated.

STEP 7: The resulting digraph transforms into an ISM by substituting statements for the variable nodes.

3. ISM Analysis

To establish relationships among the themes as shown in Figure 5, a structured survey form was developed and circulated among H.R. managers (who are into Recruitment and selection), academicians, and technological experts. The collected data, the analysis of the responses obtained through a structured questionnaire, and the comparison of each theme with others and its corresponding results are shown in Board 1.

3.1. Comparison analysis of the themes

Board 1 Comparison result.

Sl.No	Comparison Set	Analysis	Final Result	Symbol										
1	A.I. Integration in H.R. Management & Recruitment Technologies	<table border="1"> <tr> <th>Category</th> <th>Count</th> </tr> <tr> <td>No Influence</td> <td>3</td> </tr> <tr> <td>Both influence equally</td> <td>4</td> </tr> <tr> <td>Been influenced strongly</td> <td>7</td> </tr> <tr> <td>Strong Influences other</td> <td>1</td> </tr> </table>	Category	Count	No Influence	3	Both influence equally	4	Been influenced strongly	7	Strong Influences other	1	3- Been Influenced Strongly	A
Category	Count													
No Influence	3													
Both influence equally	4													
Been influenced strongly	7													
Strong Influences other	1													
2	A.I. Integration in H.R. Management & Diversity and Inclusion in Recruitment	<table border="1"> <tr> <th>Category</th> <th>Count</th> </tr> <tr> <td>No Influence</td> <td>2</td> </tr> <tr> <td>Both influence equally</td> <td>7</td> </tr> <tr> <td>Been influenced strongly</td> <td>5</td> </tr> <tr> <td>Strong Influences other</td> <td>1</td> </tr> </table>	Category	Count	No Influence	2	Both influence equally	7	Been influenced strongly	5	Strong Influences other	1	2- Both Influence equally	X
Category	Count													
No Influence	2													
Both influence equally	7													
Been influenced strongly	5													
Strong Influences other	1													
3	A.I. Integration in H.R. Management & Technology and Education	<table border="1"> <tr> <th>Category</th> <th>Count</th> </tr> <tr> <td>No Influence</td> <td>2</td> </tr> <tr> <td>Both influence equally</td> <td>4</td> </tr> <tr> <td>Been influenced strongly</td> <td>7</td> </tr> <tr> <td>Strong Influences other</td> <td>2</td> </tr> </table>	Category	Count	No Influence	2	Both influence equally	4	Been influenced strongly	7	Strong Influences other	2	3- Been Influenced Strongly	A
Category	Count													
No Influence	2													
Both influence equally	4													
Been influenced strongly	7													
Strong Influences other	2													



<p>4 A.I. Integration in H.R. Management & Innovative Recruitment Methods</p>	<table border="1"> <thead> <tr> <th>Influence Level</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>No Influence</td> <td>3</td> </tr> <tr> <td>Both influence equally</td> <td>3</td> </tr> <tr> <td>Been influenced strongly</td> <td>3</td> </tr> <tr> <td>Strong Influences other</td> <td>6</td> </tr> </tbody> </table>	Influence Level	Count	No Influence	3	Both influence equally	3	Been influenced strongly	3	Strong Influences other	6	<p>4-Strongly influences others V</p>
Influence Level	Count											
No Influence	3											
Both influence equally	3											
Been influenced strongly	3											
Strong Influences other	6											
<p>5 Recruitment Technologies & Diversity and Inclusion in Recruitment</p>	<table border="1"> <thead> <tr> <th>Influence Level</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>No Influence</td> <td>2</td> </tr> <tr> <td>Both influence equally</td> <td>7</td> </tr> <tr> <td>Been influenced strongly</td> <td>5</td> </tr> <tr> <td>Strong Influences other</td> <td>1</td> </tr> </tbody> </table>	Influence Level	Count	No Influence	2	Both influence equally	7	Been influenced strongly	5	Strong Influences other	1	<p>2- Both Influence equally X</p>
Influence Level	Count											
No Influence	2											
Both influence equally	7											
Been influenced strongly	5											
Strong Influences other	1											
<p>6 Recruitment Technologies & Technology and Education</p>	<table border="1"> <thead> <tr> <th>Influence Level</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>No Influence</td> <td>6</td> </tr> <tr> <td>Both influence equally</td> <td>1</td> </tr> <tr> <td>Been influenced strongly</td> <td>4</td> </tr> <tr> <td>Strong Influences other</td> <td>4</td> </tr> </tbody> </table>	Influence Level	Count	No Influence	6	Both influence equally	1	Been influenced strongly	4	Strong Influences other	4	<p>1-No Influence O</p>
Influence Level	Count											
No Influence	6											
Both influence equally	1											
Been influenced strongly	4											
Strong Influences other	4											
<p>7 Recruitment Technologies & Innovative Recruitment Methods</p>	<table border="1"> <thead> <tr> <th>Influence Level</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>No Influence</td> <td>6</td> </tr> <tr> <td>Both influence equally</td> <td>2</td> </tr> <tr> <td>Been influenced strongly</td> <td>5</td> </tr> <tr> <td>Strong Influences other</td> <td>2</td> </tr> </tbody> </table>	Influence Level	Count	No Influence	6	Both influence equally	2	Been influenced strongly	5	Strong Influences other	2	<p>1-No Influence O</p>
Influence Level	Count											
No Influence	6											
Both influence equally	2											
Been influenced strongly	5											
Strong Influences other	2											
<p>8 Diversity and Inclusion in Recruitment & Technology and Education</p>	<table border="1"> <thead> <tr> <th>Influence Level</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>No Influence</td> <td>0</td> </tr> <tr> <td>Both influence equally</td> <td>5</td> </tr> <tr> <td>Been influenced strongly</td> <td>9</td> </tr> <tr> <td>Strong Influences other</td> <td>1</td> </tr> </tbody> </table>	Influence Level	Count	No Influence	0	Both influence equally	5	Been influenced strongly	9	Strong Influences other	1	<p>3- Been Influenced Strongly A</p>
Influence Level	Count											
No Influence	0											
Both influence equally	5											
Been influenced strongly	9											
Strong Influences other	1											
<p>9 Diversity and Inclusion in Recruitment & Innovative Recruitment Methods</p>	<table border="1"> <thead> <tr> <th>Influence Level</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>No Influence</td> <td>0</td> </tr> <tr> <td>Both influence equally</td> <td>5</td> </tr> <tr> <td>Been influenced strongly</td> <td>3</td> </tr> <tr> <td>Strong Influences other</td> <td>7</td> </tr> </tbody> </table>	Influence Level	Count	No Influence	0	Both influence equally	5	Been influenced strongly	3	Strong Influences other	7	<p>4-Strongly influences others V</p>
Influence Level	Count											
No Influence	0											
Both influence equally	5											
Been influenced strongly	3											
Strong Influences other	7											
<p>10 Technology and Education & Innovative Recruitment Methods</p>	<table border="1"> <thead> <tr> <th>Influence Level</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>No Influence</td> <td>7</td> </tr> <tr> <td>Both influence equally</td> <td>3</td> </tr> <tr> <td>Been influenced strongly</td> <td>4</td> </tr> <tr> <td>Strong Influences other</td> <td>1</td> </tr> </tbody> </table>	Influence Level	Count	No Influence	7	Both influence equally	3	Been influenced strongly	4	Strong Influences other	1	<p>1-No Influence O</p>
Influence Level	Count											
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Table 2 depicts the result of the comparison of themes; the graph shows the opinions of the respondents, which are obtained with the help of a structured questionnaire; the highest response in each comparison is considered the overall opinion of the comparison; and the symbols V, A, X, and O are designated based on the highest opinions.

3.2. Structural Self-Interaction Matrix (SSIM)

The Structural Self-Interaction Matrix (SSIM) provides multiple insights into the complex interrelationships between the five variables. From Table 2 & 3, Recruitment Technologies and Diversity and Inclusion in Recruitment have a high influence (V) on A.I. integration in H.R. management, whereas Recruitment Technologies impact the opposite. This mutual reinforcement emphasizes how crucial it is to consider these two factors together when developing and implementing the H.R. strategy. Additionally, A.I. integration in H.R. Management and Recruitment Technologies is considered equally advantageous (X) for Innovative Recruitment Methods. These findings can be interpreted in various ways, showing a system of connected elements influencing one another. The SSIM might also provide a sequential viewpoint, where A.I. integration in H.R. Management is a crucial prerequisite.

3.3. Reachability Matrix (R.M.)

Table 2 SSIM. Source: Primary Data.

Variables	1	2	3	4	5
1. AI Integration in H.R. Management		A	X	A	V
2. Recruitment Technologies			A	O	O
3. Diversity and Inclusion in Recruitment				A	V
4. Technology and Education					O
5. Innovative Recruitment Methods					

Table 3 Reachability Matrix.

Variables	1	2	3	4	5	Driving Power
A.I. Integration in H.R. Management	1	0	1	0	1	3
Recruitment Technologies	1	1	0	0	0	2
Diversity and Inclusion in Recruitment	1	1	1	0	1	4
Technology and Education	1	0	1	1	0	3
Innovative Recruitment Methods	0	0	0	0	1	1
Dependence Power	4	2	3	1	3	

3.4. Final Reachability Matrix (FRM)

All five variables are shown to be interrelated in the Final Reachability Matrix (FRM). Table 4 indicates that they have some degree of Influence over one another, but this Influence differs among the variables. Diversity and Inclusion in Recruitment, Recruitment Technologies, and A.I. integration in H.R. management are the three variables with the highest driving power. This indicates that these three variables have the most significant Influence on the other variables, underscoring their significance in H.R. management. Technology and education, on the other hand, have the highest level of reliance, showing that other factors heavily influence it. On the other hand, innovative recruitment methods exhibit the lowest driving and dependent power, indicating they have the most negligible impact on and Influence over other factors.

Table 4 Final Reachability Matrix.

Variables	1	2	3	4	5	Driving Power
A.I. Integration in H.R. Management	1	1*	1	0	1	4
Recruitment Technologies	1	1	1*	0	1*	4
Diversity and Inclusion in Recruitment	1	1	1	0	1	4
Technology and Education	1	1*	1	1	1*	5
Innovative Recruitment Methods	0	0	0	0	1	1
Dependence Power						

3.5. Level Partitioning Iterations

The table 5 clearly shows how the five variables are divided into three different levels:

1. Diversity and Inclusion in Recruitment, Recruitment Technologies, and A.I. integration in H.R. management are all included in Level 1. These factors are considered the most significant since they significantly influence the other factors. Their ranking at Level 1 says that H.R. managers should prioritize these factors since changes in these areas will probably result in the most significant gains in H.R. management results.



2. Technology and education are included in Level 2, indicating its significance, even if given less weight than the factors at Level 1. This classification emphasizes its importance in the H.R. context while acknowledging that it supports Level 1 factors.
3. Innovative Recruitment Methods, which represent the variable of Level 3.

Table 5 Level Partitioning.

Elements (Mi)	Reachability Set R(Mi)	Antecedent Set A(Ni)	Intersection Set $R(Mi) \cap A(Ni)$	Level
1	1, 2, 3, 5,	1, 2, 3, 4,	1, 2, 3,	
2	1, 2, 3, 5,	1, 2, 3, 4,	1, 2, 3,	
3	1, 2, 3, 5,	1, 2, 3, 4,	1, 2, 3,	
4	1, 2, 3, 4, 5,	4,	4,	
5	5,	1, 2, 3, 4, 5,	5,	1

Elements (Mi)	Reachability Set R (Mi)	Antecedent Set A (Ni)	Intersection Set $R(Mi) \cap A(Ni)$	Level
1	1, 2, 3,	1, 2, 3, 4,	1, 2, 3,	2
2	1, 2, 3,	1, 2, 3, 4,	1, 2, 3,	2
3	1, 2, 3,	1, 2, 3, 4,	1, 2, 3,	2
4	4,	4,	4,	3
5	5,	1, 2, 3, 4, 5,	5,	1

3.6. Digraph analysis

The digraph's directed edges act as visual cues for the direction of Influence between nodes, shedding light on the intricate interplay of the variables. Notably, the edge from node A to node B indicates that the perception of A.I. integration in H.R. Management influences Recruitment Technologies, as shown in Figure 6. The digraph reveals several interpretations and primarily provides information about the relative importance of each variable in the context of H.R. management. The variables with the most outstanding incoming edges suggest that they play a crucial role and should receive the attention of H.R. managers first and foremost.

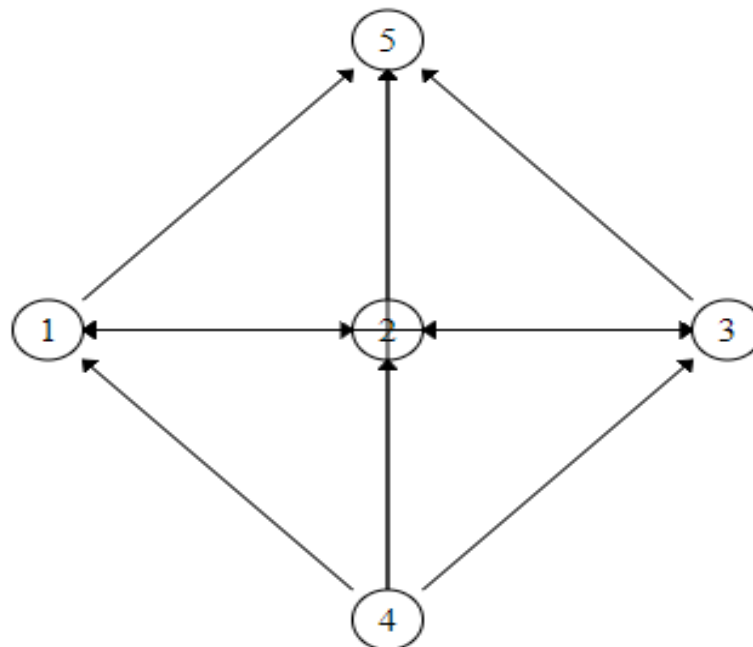


Figure 6 Digraphs of the Themes.

Organizations can use the digraph diagram in Figure 6 and the ISM diagram in Figure 7 to comprehend the connections between the crucial elements of the hiring process and to spot places where it can be strengthened. The ISM and Digraph mention that technological education is the primary factor contributing to developing AI-based recruitment tools based on diversity, which helps the company's H.R. department find innovative methods to recruit and select people. An organization could use the diagram to determine how to screen and recruit people more efficiently using Technology. A company could also use the graphic to determine how to enhance diversity and inclusion throughout the hiring process.

R.Q. 4: Once we have the digraph, we can see the crucial factors influencing Recruitment and selection. Then, using the MICMAC analysis, we determine which factors in the recruiting and selection process are autonomous, linkage, dependent, and independent.



3.7. MICMAC analysis

MICMAC (Cross-Impact Matrix Multiplication) analysis is used to identify the autonomous, linkage, dependent, and independent variables in the recruitment and selection process, performed with the help of the SmartISM tool.

The result of the MICMAC analysis is shown in Figure 8. It reveals that there are no autonomous variables but rather just one linkage variable (Innovative Recruitment Methods), three dependent variables (A.I. integration in H.R. Management, Recruitment Technologies, and Diversity and Inclusion in Recruitment), and one independent variable (Technology and Education). This analysis will aid researchers in developing a proper methodology and research design for the same study in quantitative terms.

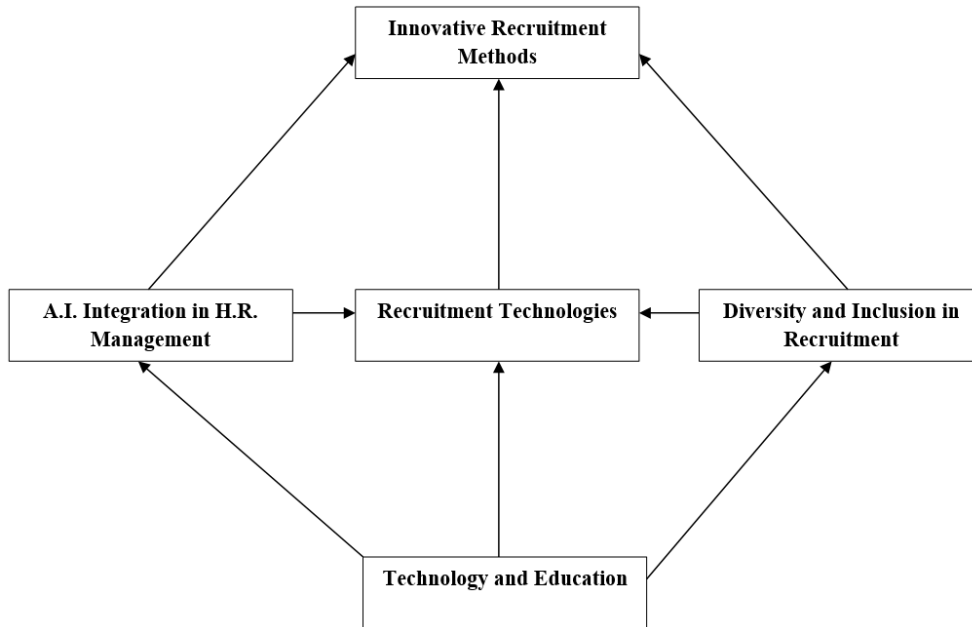


Figure 7 ISM diagrams of the Themes.

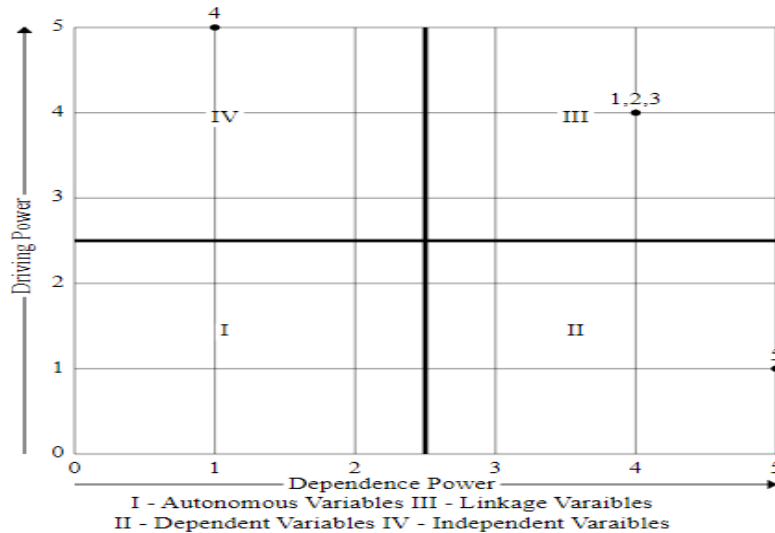


Figure 8 MICMAC analysis.

4. Discussion

The MICMAC analysis from Figure 8 reveals a single linkage variable, Innovative Recruitment Methods, with three dependent variables (A.I. integration in H.R. management, Recruitment Technologies, and Diversity and Inclusion in Recruitment) and one independent variable (Technology and Education). This analysis can help researchers develop a quantitative research design. Organizations can use the digraph diagram and the ISM diagram from Figures 6 and 7 to understand the connections between critical elements of the hiring process and identify areas for improvement. Technological education is a key factor in developing AI-based recruitment tools based on diversity. This helps H.R. departments find



innovative recruitment methods and enhances diversity and inclusion throughout the hiring process. Studies by Chowdhury et al. (2023) propose an A.I. capability framework, integrating resource-based and knowledge-based view theories, to help managers assess organizational readiness and develop strategies for AI-enabled practices and processes. Kaur and Kaur (2023) Recruitment Technologies The study investigates job-seekers intentions and gender differences in e-recruitment adoption in India. Sandhu et al. (2023) suggest that social media should be an integral part of research recruitment, alongside non-digital methods, to prevent creating "invisible groups" without access to Technology. Tuttle and Carter (2022) speak about innovative ways of training students with visual impairments, which in turn help companies hire physically abled candidates. The few studies above shed light on different dimensions in the field of Recruitment, but they need to speak about the consolidated approach to what themes or factors are to be taken up to improve Recruitment using Technology.

5. Conclusions

5.1. Managerial Implications

Integrating A.I. into H.R. management is essential for businesses looking to improve recruitment procedures. H.R. workers may free up critical time by implementing AI-driven solutions for jobs like resume screening and early interviews, allowing them to concentrate on strategic initiatives like talent development and retention. This strategic change can improve operational effectiveness, which will benefit H.R. departments greatly; for businesses looking to improve recruitment procedures, integrating A.I. into H.R. management becomes essential. H.R. workers may free up critical time by implementing AI-driven solutions for jobs like resume screening and early interviews, allowing them to concentrate on strategic initiatives like talent development and retention. This strategic change has the potential to significantly improve operational effectiveness, which will benefit H.R. departments as a whole. Inclusivity and diversity are essential catalysts for creativity and productivity within the workforce. As a result, H.R. departments should prioritize diversity and inclusion during the hiring process. This calls for establishing rules that support diversity and fostering an inclusive working culture. A more dynamic and effective workforce may result from the strategic alignment of H.R. strategies with these concepts. The modern employment market's dynamic character emphasizes the need for lifelong learning for H.R. professionals. Given the steady evolution of technological advancements, creative recruitment techniques, and evolving best practices, H.R. professionals must commit to ongoing education and flexibility. For the H.R. field to remain relevant and practical, lifelong learning must be embraced.

5.2. Research Implications

Using thematic analysis in this study provides researchers with a methodological framework for recognizing and comprehending essential topics at the interface of recruiting and Technology. This qualitative technique can help researchers interested in related fields find complex connections and links within their chosen themes.

The Interpretive Structural Modeling (ISM) technique prioritizes themes in intricate, interrelated systems. This method can be used in future research projects to evaluate the Influence and interdependencies of themes across many research fields, providing a systematic manner to comprehend these relationships. By differentiating them based on their autonomy, linkage, reliance, and independence levels, the MICMAC analysis has shed light on the characteristics of factors used in the recruitment and selection process. This analysis provides a valuable foundation for researchers to understand the dynamics within their selected research topics and decide how to approach their investigations statistically.

5.3. Future scope

A.I. usage in H.R. is a trend that is still developing. Future studies might go further into the ramifications of A.I. in H.R. management, looking at how it affects job positions, moral dilemmas, and the general working environment. An intriguing opportunity for additional research exists in this area. Future research might examine the changing social media landscape and its impact on hiring talent as social media's significance in Recruitment continues to rise. This study can explain how businesses might use social media to improve their hiring procedures. There is a lot of room for additional research in the area of diversity and inclusion in H.R. Future research can go into the precise tactics and guidelines that promote inclusion and diversity and look at how they affect the performance and culture of a business. Given the changing nature of the H.R. field, research on the best ways for H.R. professionals to engage in lifelong learning and adopt new Technology will be of great relevance. Being at the forefront of H.R. practices requires constant evaluation and adjustment.

Ethical considerations

Since the study was based on qualitative survey of the company officials, Placement officers and teachers, the consent of the participants was obtained before the data collection.

Conflict of Interest

The authors declare no conflicts of interest.

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