

HRM 4.0 in Talent Acquisition and Management System: ISM Approach

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Abstract

Purpose: The study aims to explore how HRM 4.0 technologies can be applied in talent acquisition and management systems using the Interpretive Structural Modelling (ISM) approach. It focuses on identifying the key factors and their relationships in shaping a modern HR system.

Design/Methodology/Approach: The research applies the ISM method to analyse the interactions among selected HRM 4.0 elements such as artificial intelligence, data-driven decision-making, automation, and digital tools. Expert opinions and literature review are used to build a structural model.

Findings: The results highlight that digital integration, AI, and real-time analytics are major drivers of HRM 4.0 in talent acquisition. These factors improve recruitment accuracy, employee engagement, and decision-making efficiency.

Research Limitations: The study is limited to selected factors and expert inputs, so the results may not represent all industries or regions.

Practical Implications : Organizations can use the findings to design better HR strategies, adopt suitable technologies, and improve workforce planning and retention.

Originality and Value: This study adds value by applying ISM to HRM 4.0, offering a structured framework that helps understand the cause-and-effect relationships among digital HR practices. It provides practical guidance for Organizations moving towards technology-driven HR systems.

Key Words: Data-driven decision making, Agility in HR Processes, HR-IT integration, Employee Engagement, Feedback Mechanism, Innovation support system.

Introduction

The Era of Digital Transformation includes various technologies such as artificial intelligence, robotics, cashless payment systems, big data, the Internet of Things, and block-chain, which are currently being

implemented across multiple levels in numerous sectors and global locations, leading to significant trans-formative changes. New-age technologies such as AI, machine learning, and IoT depend on the smart handling of vast amounts of data. Dua (2025).

The goal is to determine whether (and how) the HRM 4.0 scenario offers a chance to break free from ambiguities and vicious cycles, changing the way HR professionals affect individuals, businesses, and society as a whole while gaining authority and credibility. Industry 4.0, however, may prove to be yet another missed chance to show that HR can make a genuine, legitimate, and professional contribution. As the economy and workforce change, HR managers have failed to achieve this status of company partners and to promote balance among workers, firm and social demands, and interests. Employees are required to develop new skills and competencies, including technological expertise, emotional and social intelligence, as well as creative abilities. Imperatori et al. (2020).

By improving the effectiveness and standards of their manufacturing processes, developing nations can promote economic growth while maintaining a fair balance between environmental sustainability and industrial innovation. Joshi et al. (2024). Although the manufacturing sector has seen significant change as a result of innovation brought about by Industry 4.0 Technologies (I4Te), it is also true that this move has reduced the need for human resources. The sharing of information has significantly improved decision-making efficacy and efficiency. Sharma et al. (2022). By eliminating repetitive tasks, lowering errors, and expediting the completion of HR tasks, Smart HRM 4.0 is expanding HRM's capabilities. HR managers can compete in the market with the aid of Smart HRM 4.0. Pillai and Srivastava (2022).

Focusing research on areas like workforce oversight, quality assurance, safety protocols, equipment supervision, and environmental practices enables the application of artificial intelligence to enhance managerial efficiency in the construction industry. Zhang et al. (2024).

The study's primary focus is on how effective AI and HR automation are at engaging employees with data analytic, as measured by time consumption and error-free processes.

All fields, economies, and businesses will be impacted by these new developments, which will even challenge our conceptions of what it means to be human. HR pioneers should focus on identifying the new skills and capabilities that the company will need in the future. It is important to acknowledge the continued employees' ability to up-skill and their willingness to adapt. It is important to recruit, retain, and integrate new skills into the company. HR leaders should be prepared to rethink learning, reclassify enrollment and acquisition, coordinate computer-generated simulation in on boarding, and get rid of overt repetition in HR.

In the micro- and macro-context of societal and political-economic situations, HRM practice includes methods, activities, and tactics. It can be recognized as a result of human interpretations, disputes, and misunderstandings, including subjectivity and agency. Looking at human resource management as a collection of social behaviour that are a part of local and global sociocultural, political, and economic environments. Fregnan et al. (2020). Societal and organizational cultures reinforce each other, shaping how social norms surrounding patriarchal, gender-based leadership are interpreted in the U.S. context. Campuzano (2019).

Sociocultural factors refer to the customs, lifestyles, and values that define a society (Kozenkow, 2018). Individual differences are described as how individuals vary from one another. Banerjee-Batist et al. (2018.). Leadership expectations and societal stereotypes work together to shape the culture within organizations. Since gender norms and perceptions about women are learned through social interaction, they often carry over from broader cultural contexts into workplace settings. Campuzano (2019).

As the competition for skilled professionals intensifies across Organizations and countries, talent management has emerged as a crucial area within human resource practices. It is essential for aligning the supply of capable individuals with workforce needs and Optimizing their value as human capital. At a broader scale, Macro Talent Management (MTM) refers to various strategies and programs initiated by both government and non-government bodies aimed at attracting, nurturing, and retaining talent on a national level. This is aimed at enhancing productivity, fostering

innovation, improving performance, and securing a competitive edge for local businesses, alongside delivering social benefits. Latukha et al. (2021).

The management oversees both the production area and the research and development sector of the company. This oversight may be facilitated by a distinct surveillance method. It appears clear that a worker on the assembly line can be monitored more effectively, and their performance assessed with greater precision, compared to an engineer engaged in developing a new product or making minor enhancements to an existing one. Studies exploring how knowledge-driven leadership influences innovation outcomes via electronic knowledge management systems (e-KMS) are still relatively rare in the context of developing nations. Hamid et al. (2023).

Productive workers, in general, engaged in the production process, are expected to perform their duties in accordance with directives issued by management. However, within the production process, there exists an additional hierarchy between foremen and workers, with the former directly overseeing the latter. Their efforts can only be assessed to a certain extent. This situation provides them with the motivation to reduce their effort while still receiving the same wages. Ekkehard Ernst (2014). To infer a solution for rescue from Schumpeter's (1985) "exchange economy," it is understood that economic transformations arise from innovative combinations of knowledge and expertise that facilitate novel methods of producing goods and services. Liboni et al. (2019).

Two crucial HR responsibilities that are frequently impacted by system anomalies are performance management and talent acquisition. Members may feel valued and need to learn how to perform better if they receive regular, unambiguous feedback. Savandha et al. (2024). Factors that affect an Organization's ability to retain talent are employee engagement and satisfaction. Through the provision of suitable development opportunities, Organizations can boost employee engagement and foster loyalty. Setyawan et al. (2024).

Creating and executing innovative business processes, strategies, and concepts enables Organizations to compete and thrive in this ever-changing environment, thereby

attaining outstanding Organizational performance. Moreover, Organizational performance is characterized by the achievement of employee retention, superior product and service quality, as well as enhanced profitability and productivity. Pillai and Srivastava (2023).

Interpretive Structural Modelling (ISM) is a recognized approach that helps in examining and structuring the interconnections among various factors related to a particular issue or scenario. The overall structure of the complex set of variables is extracted using the ISM structure based on these relationships. Although ISM is meant to be a group learning process, it is occasionally used alone. John Patsavellas Konstantinos Salonitis (2021).

Employees can improve creative ideas and collective knowledge through human resource practices. Workforce planning determines a likely workforce with the highest level of accuracy to cover the anticipated gap by taking into account the needs of the entire stock of employees, possible layoffs, and exodus. Pandey et al. (2021).

Human resource development (HRD) professionals are often responsible for designing programs that evaluate and impact leadership development based on the needs of the Organization. Furthermore, HRD practice highlights the trans-formative learning experiences and identity formation of leaders. (Shuck & Herd, 2012). The exploration of leadership research and practice investigates the leadership styles (behavioural patterns) that are most effective under different circumstances, their connection to the personalities of leaders, and the training and performance initiatives aimed at nurturing and enhancing leadership styles in accordance with Organizational expectations and culture. (Hunt & Fedynich, 2018; Yukl & Gardner, 2020). London and Sherman (2021).

Literature Review

The necessity for TM was highlighted by Chitsaz-Isfahani and Boustani (2014), who noted that the influx of young people into the human resource sector has increased the competitiveness and strategy-based nature of modern businesses. In the Nigerian state of Delta, Onwuka et al. (2015) investigated the connection between TM and worker performance in a few public area businesses. In specific private Organizations, it has been established that a

notable relationship exists between TM and employee performance. Talent management pertains to the strategies involved in attracting, recruiting, and retaining academic personnel, and is increasingly recognized as vital within Higher Education Institutions (HEIs). The quality of faculty at any institution significantly influences its future trajectory. The ability of an educational institution to attract and retain talented individuals is influenced by several Organizational factors, including infrastructure, faculty development initiatives, and performance management systems. Huda Elmughrabi (2023).

Artificial intelligence (AI) can be seen in applications such as expert systems, speech recognition, and computer vision. It refers to the simulation of human-like cognitive abilities by machines, particularly computers, which include functions like learning, reasoning, and the ability to improve through self-correction. Senthur Pandian (2018).

Talent management is recognized as an essential component of human resource practices, contributing notably to the achievement of an Organization's goals. Usanova et al. (2021). Addressing the skills gap is a key focus within talent management (McDonnell, 2011). Research highlights a noticeable mismatch between the soft skills employers expect and those demonstrated by new workforce entrants (Jackson & Bridgstock, 2018). Bridging this gap is essential, as it impacts both individual employ-ability and the future supply of skilled talent. Singh Dubey et al. (2021).

The key elements of the 'new career' concept specifically examine how they affect employee behaviour that are significant to Organizational performance. Rodrigues et al. (2021). Talent Management is typically examined as a collection of interconnected processes that Organizations employ to cultivate their human capital in accordance with their requirements. The research framework is outlined, detailing the criteria for selecting companies and informants, along with the phases of data analysis. D'Armagnac et al. (2021).

Organizations are becoming more involved in talent management as it enables companies to expand swiftly by utilizing human capital. Managing talent has become a prominent issue in the area of Personnel Management,

largely due to the crucial role human capital plays in enhancing Organizational advantage. Orlando et al. (2021). This document presents the notion of 'value' to comprehend the knowledge, skills, and attributes of employees, and it defines 'value flows' as the way in which these resources are employed. Pham and Dang (2021).

Workers' Formal and informal learning participation is critical to an Organization's competitive edge and financial sustainability. As a result, it's critical to evaluate the results of competence development activities. Wallo et al. (2020). Human Resource Development (HRD) is no longer seen as the sole entity responsible for fostering employee growth and learning. Today, various leadership and managerial roles contribute to HRD initiatives. This discussion explores how HRD is adapting to five major forces driving change in its environment—technological advancements, economic and financial shifts, globalization, equity and inclusion, and the evolving nature and structure of work. These dynamics have led HRD to reshape its identity through continuous innovation and strategic adaptation. Torraco and Lundgren (2019).

- Learning should be obtained through active engagement and focused on the current task.
- Participants should address challenges that promote both Organizational and personal growth, as well as the connections between the two.
- Learners ought to collaborate in peer learning groups to provide support and stimulate each other's thinking.
- Users must exhibit a learning-to-learn mindset, which involves seeking new inquiries rather than relying solely on established expertise. Raelin (2021).

The unique value generated by skilled employees and their impact on Organizations within the highly competitive and intricate global economy has elevated talent management to a strategic priority for businesses. It has been emphasized that talent management is a crucial strategy for retaining skilled employees. The exit of a regular employee can incur significant costs for any Organization, stemming from the expenses related to finding a replacement as well as the concealed costs like decreased productivity and negative impacts on morale. (O'Connell & Kung, 2007; Tracey & Hinkin, 2008). The financial implications of losing skilled

employees can be significantly greater. The "millennials," who make up a substantial segment of the global workforce, are often viewed as job-hoppers. Narayanan et al. (2018).

Scholars in leadership studies have highlighted the growing importance of exploring leadership across different cultures and generations. This is largely attributed to the increasing diversity in age groups within modern workplaces and the globalized, interconnected nature of today's world. These factors are believed to play a significant role in shaping and influencing the context of women in leadership roles. Chaudhuri et al. (2018).

Figure Number 1 - Flowchart Representing HRM 4.0 using ISM Methodology



The figure shows how HRM 4.0 (Human Resource Management in the digital age) is built step-by-step using the ISM (Interpretive Structural Modelling) approach.

It has three levels:

Management System (Bottom Layer): This is the foundation. It includes digital tools, processes, and structures that support HR activities (like databases, automation systems, etc.).

Talent Management (Middle Layer): With a strong management system, Organizations can manage talent effectively—this means attracting, developing, and retaining skilled employees.

HRM 4.0 (Top Layer): When the management system and talent management are well integrated, Organizations can achieve HRM 4.0. This means using smart technologies

(AI, analytics, automation) to make HR strategic, digital, and future-ready.

In short:

The figure shows that a digital Management System supports effective Talent Management, which together lead to the success of HRM 4.0, all structured logically using the ISM approach.

Organizational development refers to the strategic utilization of a company's resources and funds to enhance efficiency and productivity. It is a systematic approach aimed at transforming Organizational systems. This process facilitates the creation of improved methods for managing an Organization. Various strategies can be employed, including communication processes and applications designed to boost employee output. An employee's behaviour during assessments and their responses provide valuable insights to professionals, which can subsequently be leveraged to implement Organizational change. Singh and Singh (2019).

Retaining an employee plays a crucial role in any Organization as it pertains to keeping the employee within the Organization. The idea of retention is closely linked to this concept. It refers to the various approaches and practices that Organizations use to encourage employees to remain with the company over an extended period. To ensure employee retention and uphold representation, the Organization must adopt suitable human resource practices, including compensation, training and development, and support for performance appraisal. Mishra et al. (2021).

In a competitive and dynamic environment, it is essential to harness and engage human resources to enhance their contributions towards improving the qualitative advantage of the Organization (Chakraborty and Biswas, 2019). Employee Satisfaction, also referred to as Work Satisfaction, is an activity that includes a particular degree of pride that employees feel regarding various aspects of their job. Al-Sadaet et al. (2017) discuss work contentment, which signifies a healthy psychological state that emerges from evaluating work experiences. In particular, high levels of job satisfaction among employees lead to the success of an Organization, whereas low levels of job satisfaction can

hinder Organizational processes (Al-Sadaet et al., 2017). Each person possesses distinct characteristics and personalities, influenced by a range of factors that impact their behaviour. Singh et al. (2022).

Leadership is crucial in promoting innovation performance, which encompasses product, process, marketing, and Organizational innovation. Strategic leadership is recognized as a vital facilitator of innovation performance. By incorporating leadership strategies that emphasize human capital development, Organizational alignment, and strategic execution, pharmaceutical companies can cultivate a culture of innovation and resilience. For instance, establishing a strategic direction enables Organizations to prioritize research and development initiatives, while the development of human capital guarantees that employees have the necessary skills for innovative problem-solving. These leadership practices not only propel innovation outcomes but also tackle industry-wide challenges such as resource inefficiencies and global competition. Abdulaal and Zoubi (2025).

The human resources department within Organizations serves as the most efficient sector for promoting sustainability and assisting Organizations in achieving their goals (Liu and Liu, Yaoping, 2022; Noe et al., 2017). In order to enhance efficiency and performance, Organizations endeavour to find a balance between their requirements and those of their employees (Cainarca et al., 2019). Employees who are dedicated to their work significantly contribute to enhancing performance. The notion of competence, recognized as one of the most widely used terms in management, encompasses six essential skills: effective leadership, problem-solving, communication, customer orientation, results orientation, and team orientation. Arshad et al. (2025).

The connection between employee engagement and creativity is highlighted by the componential theory of creativity (Amabile, 1988 and 1996), which posits that autonomy in the workplace has a significant impact on employee creativity. Pattnaik and Sahoo (2020).

Employees who are emotionally reactive exhibit a strong attachment to their work. They strive for perfection in their tasks. Their focus on their responsibilities is intense, and

they maintain a close connection to the assignments they are given. Rawat et al. (2020).

In the international work environment, cultural values and acquired behaviours can significantly influence an individual's leadership approach and managerial perspective. As workplaces become increasingly global, understanding how leaders from diverse cultural and national backgrounds create effective management strategies and implement policies is vital. These efforts should aim to engage employees and foster unity, rather than reinforcing cultural divides or stereotypes. Hutt and Gopalakrishnan (2020).

Organizations develop the ability to assess and understand both their internal culture and the importance of their unique values and orientations. The culture within an Organization is made up of shared beliefs and fundamental expectations, which are influenced by the Organization's day-to-day practices. These practices include routines, symbolic elements, behavioral standards, rules, language, stories, rituals, and the distribution of power, among other factors. Soomro and Shah (2019).

A well-structured work-life balance policy established by an Organization should offer its employees the chance to maintain social connections with the community, while also managing costs, reducing turnover, and enhancing productivity. A. A. Soomro et al. (2018).

The abilities, expertise, and understanding of individuals are fundamental factors in fostering sustainable and long-lasting economic growth. Should a significant portion of these abilities remain underdeveloped or not fully utilized, both growth and sustainability will be hindered. Chakravarty and Bhatnagar (2017).

Employees play a crucial role in providing a competitive edge to Organizations, as the way customers perceive a company is often shaped by their direct interactions with its staff members. Nazir and Islam (2017)

The greater the level of employee engagement, the higher the likelihood that they maintain a positive outlook towards their Organizations, thus contributing to the development of a robust employer brand (Hughes and Rog, 2008). This, in turn, enables an Organization to draw in potential candidates and perceive itself as an "employer of choice"

that embodies its fundamental values, policies, and practices. Tiwari and Lenka (2019).

Employee voice behaviour demonstrates the dedication of employees to the Organization. Such behaviour is considered beneficial and has been associated with positive effects across individual and Organizational domains, such as fostering innovation and enhancing adaptability in rapidly changing business settings. Jha and Singh (2019).

Researchers in strategic human resource management (SHRM) suggest that the way Organizations manage their human resources directly influences employee attitudes and behaviours, which in turn play a key role in shaping overall Organizational effectiveness. Rubel et al. (2018).

One of an Organization's most important assets for long-term success is its human capital. (Khurana, Khurana, & Sharma, 2010). Healthy and motivated employees exhibit enhanced performance in the workplace, thereby consistently aiding in the attainment of Organizational objectives. Self-directed or intrinsic motivation in the workplace is positively correlated with work performance as an outcome. Adil and Baig (2018).

Research Objectives

- To explore how HRM 4.0 can be used with talent acquisition and management systems by using the ISM approach, and to find the main factors that support or hinder best HR practices in an Organization.
- To validate the ISM-based model through expert feedback and assess its applicability in real-world HRM contexts.

Research Methodology

Employees experience satisfaction when their performance is directly associated with the growth and development opportunities of the Organization. The research indicated that the integration of talent management and succession planning is the initial step in fostering engaged and satisfied employees. Employees derive the greatest satisfaction when their skills and abilities are recognized and effectively utilized. Customer happiness and company image are dependent on other practices, according to the results of ISM.

Interpretive Structural Modelling

- ISM organises intricate issues into a coherent pattern.
- ISM employs expert insights to gather the necessary data for establishing connections among the factors analysed.
- Notably, it assists human cognition in addressing challenging issues related to various components and their interrelations.

ISM was developed by Warfield in 1974, and Malone later explored its application in 1975.. ISM is a systematic approach that integrates various distinct or related components into a coherent and organised framework. Consequently, ISM serves as a methodology aimed at identifying the interconnections among different elements, providing a hierarchical and multi-tiered structure. This essential technique aids managers, researchers, and individuals by transforming a complex network of elements into a clear, comprehensible, and well-defined model.

The following decision-making stages have been undertaken for the implementation of ISM:

- Determine the objectives an Organization intends to accomplish using the ISM approach.
- Identify and select key factors or attributes relevant to the analysis.
- Investigate how these elements are interrelated.
- Construct the Systematic Self-Interaction Layout to capture these connections.
- Translate the Systematic Self-Interaction Layout into the Base-Level Reach Matrix.
- Develop the Completed Access Matrix and classify the factors within the matrix.
- Build the Canonical Matrix (CM) based on the classified data.
- Design a graphical model to represent the structure.
- Evaluate and interpret the final ISM model.

Factor Identification

- Data-driven decision-making.
- Agility in HR Processes
- Real-time Performance Monitoring

- HR-IT Integration
- Employee Engagement
- Retention Mechanism
- Leadership Development
- Feedback Mechanisms
- Organizational Culture
- Innovation Support System.

Experimentation

1. Development of Systematic Self-Interaction Layout

It is a key step in the ISM (Interpretive Structural Modelling) process. It helps us understand how different elements (like factors, variables, or enablers) are related to each other. The Systematic self-interaction Layout is a table where we compare each element with every other element one by one to decide if and how they are connected.

Steps to Develop Systematic Self-Interaction Layout

1. List all elements

First, we identify all the factors involved in the study (e.g., factors of HRM 4.0, talent management enablers, etc.).

2. Create a comparison table.

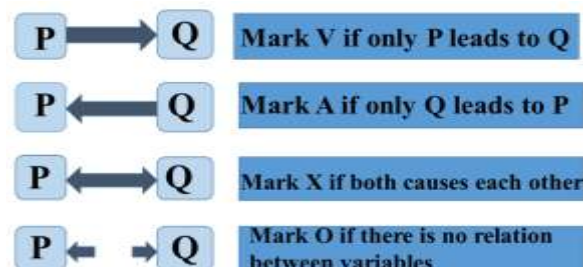
Make a square matrix (table) where rows and columns have the same list of elements.

3. Pairwise comparison

Now, take two elements at a time (for example, A and B) and ask: “Does A lead to B?” or “Does B lead to A?”

4. Use symbols to record relationships.

Figure 2 shows the rule of SIM.



5. Complete the matrix

Repeat the comparison for all pairs until the matrix is filled.

Example:

If we have 2 elements:

1. Leadership
2. Employee Engagement

We compare each pair:

- Does Leadership affect Employee Engagement? → V
- Does Employee Engagement affect Innovation? → V

Purpose of Systematic Structural Self-Interaction Layout:

- Helps in structuring complex systems.
- Identify which elements influence others.
- Forms the base for the next ISM steps, like the reachability matrix.

Table 1 Systematic Structural Self-Interaction Matrix

According to the table, data-driven decision making Influences Organizational culture (V under column 9). Also, it is influenced by Real-time Performance Monitoring, Agility, and Innovation Support System (A under columns 8, 9, and 10). It has mutual influence with HR, IT Integration, Agility, Real-time Monitoring, and Employee Engagement (X under respective columns).

Table 1

S.No	Variables	10	9	8	7	6	5	4	3	2	1
1	Data Driven Decision Making	V	A	X	A	A	X	X	X	V	
2	Agility in HR Processes	V	A	X	X	X	X	X	X		
3	Real-time Performance Monitoring	X	A	V	V	V	V	A			
4	HR IT Integration	V	A	V	A	V	V				

S.No	Variables	10	9	8	7	6	5	4	3	2	1
5	Employee Engagement	V	A	A	A	V					
6	Retention Mechanism	A	A	A	A						
7	Leadership Mechanism	V	V	A							
8	Feedback Mechanism	V	A								
9	Organizational Culture	V									
10	Innovation Support System										

Source: Author's Computation

2. Reachability Matrix

A tool for comprehending the relationships or influences between various components in a system, particularly in the context of the Interpretative Structural Modelling (ISM) approach, is a reachability matrix.

Imagine you have a list of items or factors, and you want to know which item can lead to or affect another. The reachability matrix helps you find and display all these possible connections.

- If one factor directly or indirectly affects another, you mark it as 1 (yes).
- If it does not, you mark it as 0 (no).

This way, you get a table (matrix) that shows which items are connected and which are not.

It helps researchers or decision-makers:

- Visualize influence or dependency among elements.
- Identify key drivers (elements that affect many others).
- Build a structured model of relationships.

Rule: -

Table 2: Reachability Matrix

	Marked	$P \rightarrow Q$	$Q \rightarrow P$
From P to Q	V	1	0
From P to Q	A	0	1
From P to Q	X	1	1
From P to Q	O	0	0

This table shows the reachability relationships between ten variables used in the study, often part of an Interpretive Structural Modelling (ISM) approach. Each row represents how one variable affects or is connected to the others.

In the matrix:

- Each row represents a source variable (i.e., the one exerting influence).
- Each column represents a target variable (i.e., the one being influenced).
- A value of 1 indicates a direct or indirect influence from the row variable to the column variable.

- A value of 0 means no influence.

Data-driven decision making (Row 1) influences variables: 3 (Real-Time Performance), 5 (Employee Engagement), 4 (HR IT Integration), 8 (Feedback), 2 (Agility), and 10 (Innovation). It involves a total of 6 connections. It suggests that decisions based on data have a broad impact on HR functions.

Agility in HR processes (Row 2) influences: 3, 4, 5, 7, 8, and 10. It includes a total of 6 connections. Indicates that flexible and responsive HR processes significantly affect various areas like innovation, performance, and integration.

Table 2

S.No	Variables	10	9	8	7	6	5	4	3	2	1
1	Data-Driven Decision	1	0	1	0	0	1	1	1	1	0
2	Agility in HR Processes	1	0	1	1	0	1	1	1	0	0
3	Real-time Performance Monitoring	1	0	1	1	1	1	0	0	1	1
4	HR IT Integration	1	0	1	0	1	1	0	1	1	1
5	Employee Engagement	1	0	0	0	1	0	0	0	1	1
6	Retention Mechanism	0	0	0	0	0	0	0	0	1	1
7	Leadership development	1	1	0	0	1	1	1	0	1	1
8	Feedback Mechanism	1	0	0	1	1	1	0	0	1	1
9	Organizational Culture	1	0	1	0	1	1	1	1	1	1
10	Innovation Support System	0	0	0	0	1	0	0	1	0	0

Source: Author's Computation

3. Final Reachability Matrix

A Final reachability matrix is a refined version of the initial reachability matrix used in ISM (Interpretive Structural Modelling). It shows all the direct and indirect relationships between the elements in a system.

When we first make a reachability matrix, we usually show only the direct connections (who influences whom directly). But in real situations, some elements might affect others indirectly, too.

So, we update the matrix to include:

- Direct reachability (e.g., A affects B),
- Indirect reachability (e.g., A affects B, and B affects C, so A also affects C indirectly).

This updated and complete version is called the Final Reachability Matrix.

Steps

1. Start with the initial reachability matrix (based on expert opinion or data).

2. Apply the transitivity rule:

If $A \rightarrow B$ and $B \rightarrow C$, then $A \rightarrow C$.

3. Update the matrix to reflect all these indirect relationships.

4. Include a '1' where there's a connection (direct or indirect), and a '0' where there isn't.

Importance

- It helps to identify the complete influence structure among all elements.
- It allows better classification of elements (like which ones are dependent, independent, or linkage factors).
- It prepares the ground for level partitioning, which is the next step in the ISM process.

Table 3 Final Reachability Matrix

This matrix outlines the final relationships between various HR-related variables after applying Interpretive Structural Modelling (ISM). Each row indicates how much a variable affects the others (known as Driving Power). Each column shows how much a variable is affected by others (called Dependency). The values in the cells (1 or 0) show whether a relationship exists between the variable in the row and the one in the column:

- 1 = a relationship exists (direct or transitive).
- 0 = no direct relationship.

1. Data-Driven Decision Making

- o Influences 6 other variables (8, 6, 5, 4, 3, 2).
- o Driving Power: 6
- o Suggests it's an important enabler, impacting many other areas.

2. Agility in HR Processes

- o Impacts 6 variables.
- o Driving Power: 6
- o Flexibility in HR operations significantly influences overall system behaviour.

3. Real-Time Performance Monitoring

- o Affects 7 variables.
- o Driving Power: 7
- o A critical factor in performance-based decision-making and responsiveness.

4. HR IT Integration

- o Also influences 7 other variables.
- o Driving Power: 7
- o Integration of technology is a key enabler across HR functions.

5. Employee Engagement

- o Impacts only 4 other variables.
- o Driving Power: 4
- o A mid-level influencer; mostly impacted by others rather than driving change alone.

6. Retention Mechanism

- o Influences only 2 variables.
- o Driving Power: 2

- o Largely dependent on other initiatives like leadership and engagement.

7. Leadership Development

- o Affects 7 variables.
- o Driving Power: 7
- o A strong driver of organizational and cultural change.

8. Feedback Mechanism

- o Influences 6 variables.
- o Driving Power: 6
- o Acts as a connecting tool for development and performance adjustments.

9. Organizational Culture

- o Has the highest Driving Power: 8
- o This implies it is the most influential factor in the system, shaping nearly all other variables.

10. Innovation Support System

- o Drives only 2 other variables.
- o Driving Power: 2
- o Limited influence—may be more of an outcome of other processes rather than a driver.

Dependency Analysis (Column Totals)

- **Highest Dependent Variables:** Variables 1 (Data-Driven), 2 (Agility), and 9 (Organizational Culture) have the highest dependencies (value 8), meaning they are highly influenced by other variables.
- **Least Dependent Variable:** Variable 9 (Organizational Culture) also has low dependency (1), despite high influence—suggesting it's a root-level driver in the HR system.

Table 3

S.No.	Variables	10	9	8	7	6	5	4	3	2	1	Driving Power
1	Data-driven decision making	1	0	1	0	0	1	1	1	1	0	6
2	Agility in HR Processes	1	0	1	1	0	1	1	1	0	0	6
3	Real-time performance making	1	0	1	1	1	1	0	0	1	1	7
4	HR IT Integration	1	0	1	0	1	1	0	1	1	1	7
5	Employee Engagement	1	0	0	0	1	0	0	0	1	1	4

S.No.	Variables	10	9	8	7	6	5	4	3	2	1	Driving Power
6	Retention Mechanism	0	0	0	0	0	0	0	0	1	1	2
7	Leadership development	1	1	0	0	1	1	1	0	1	1	7
8	Feedback Mechanism	1	0	0	1	1	1	0	0	1	1	6
9	Organizational Culture	1	0	1	0	1	1	1	1	1	1	8
10	Innovation Support System	0	0	0	0	1	0	0	1	0	0	2
	Dependency	8	1	5	3	7	7	4	5	8	7	55=55

Source: Author's Computation

4.Level Partitioning

It is a step in the Interpretive Structural Modelling process. It helps us organize different elements (like factors or concepts) into levels based on their influence and dependency on each other.

Level partitioning tells us:

- Which factors should be placed at the bottom level (the most influential ones)?
- Which ones should come above (less influential, more dependent)?
- And finally, which are at the top (most dependent, least influential).

This is done by looking at the Final Reachability Matrix and identifying:

- Reachability Set: What factors can influence?
- Antecedent Set: What influences that factor?
- If both sets are the same, that factor is placed at the top level because it doesn't influence anything else beyond itself.

We repeat this process, removing each top-level factor, to uncover the next level, and so on. Short-level partitioning helps us arrange the factors in a hierarchy, from the most foundational (bottom) to the most dependent (top), making complex relationships easier to understand.

Table 4.1 Level Partitioning

These tables show how each HR factor is broken down step-by-step using the ISM method to identify its hierarchical level (Rank). The process involves checking who influences whom (row and column sets) and separating factor levels by level in multiple iterations.

- Table 4.1 (Initial): All 10 factors are analyzed. Levels start getting identified. Example: Variables 3, 4, 5 are assigned Rank 4, being at the top.
- Table 4.2 (Iteration 1): Factor 10 removed. Further matching of sets shows new levels (like 7 and 8).
- Table 4.3 (Iteration 2): Factor 8 removed. Some variables (1, 2, 3) reappear with new groupings.
- Table 4.4 (Iteration 3): Factors 7, 3, 4, 5 gradually removed. Lower-level factors start showing up (e.g., 2, 1).
- Table 4.5 (Iteration 4): Variables 5, 4, and 3 are removed. The remaining ones are mostly dependent and foundational (like 1 and 2).
- Table 4.6 (Iteration 5): Final core variables (1, 2) removed. Retention (6) and Culture (9) appear as the deepest-level drivers.

Higher Rank = More influenced (e.g., 5, 4, 3 – result-oriented). Lower Rank = More influential (e.g., 9 – culture, 6 – retention). This layered structure helps build the ISM model by identifying which variables to act on first.

Table 4.1 Level Partitioning

Factors	Network Access Set (Row)	Causal Element Set(Column)	Mutual Elements Group	Rank
1	10,8,5,4,3,2	3,4,5,6,7,8,9	5,4,3	4
2	10,8,7,5,4,3	1,3,4,5,6,7,8,9	8,7,5,4,3	2,3,4
3	10,8,7,6,5,2,1	1,2,4,9,10	10,2,1	1,5
4	10,8,6,5,3,2,1	1,2,7,9	2,1	5
5	10,6,2,1	1,2,3,4,7,8,9	2,1	5
6	2,1	3,4,5,7,8,9,10		
7	10,9,6,5,4,2,1	2,3,8	2	5
8	10,7,6,5,2,1	1,2,3,4,9	2,1	5
9	10,8,6,5,4,3,2,1	7		
10	6,3	1,2,3,4,5,7,8,9	3	

Source: Author's Computation

Table 4.2 Level Partitioning Iteration 1 (10 removed from entire table)

Factors	Network Access Set (Row)	Causal Element Set (Column)	Mutual Elements Group
1	8,5,4,3,2	3,4,5,6,7,8,9	5,4,3
2	8,7,5,4,3	1,3,4,5,6,7,8,9	8,7,5,4,3
3	8,7,6,5,2,1	1,2,4,9	2,1
4	8,6,5,3,2,1	1,2,7,9	2,1
5	6,2,1	1,2,3,4,7,8,9	2,1
6	2,1	3,4,5,7,8,9	
7	9,6,5,4,2,1	2,3,8	2
8	7,6,5,2,1	1,2,3,4,9	2,1
9	8,6,5,4,3,2,1	7	
10	6,3	1,2,3,4,5,7,8,9	3

Source: Author's Computation

Table 4.3 Level Partitioning Iteration 2 (8 removed from entire table)

Factors	Network Access Set (Row)	Causal Element Set(Column)	Mutual Elements Group
1	5,4,3,2	3,4,5,6,7,9	5,4,3
2	7,5,4,3	1,3,4,5,6,7,9	7,5,4,3
3	7,6,5,2,1	1,2,4,9	2,1
4	6,5,3,2,1	1,2,7,9	2,1
5	6,2,1	1,2,3,4,7,9	2,1
6	2,1	3,4,5,7,9	
7	9,6,5,4,2,1	2,3	2
8	7,6,5,2,1	1,2,3,4,9	2,1
9	6,5,4,3,2,1	7	
10	6,3	1,2,3,4,5,7,9	3

Source: Author's Computation

Table 4.4 Level Partitioning Iteration 3 (7 removed from entire table)

Factors	Network Access Set (Row)	Causal Element Set(Column)	Mutual Elements Group
1	5,4,3,2	3,4,5,6,9	5,4,3
2	5,4,3	1,3,4,5,6,9	5,4,3
3	6,5,2,1	1,2,4,9	2,1
4	6,5,3,2,1	1,2,9	2,1
5	6,2,1	1,2,3,4,9	2,1

Factors	Network Access Set (Row)	Causal Element Set(Column)	Mutual Elements Group
6	2,1	3,4,5,9	
7	9,6,5,4,2,1	2,3	2
8	6,5,2,1	1,2,3,4,9	2,1
9	6,5,4,3,2,1		
10	6,3	1,2,3,4,5,9	3

Source: Author's Computation

Table 4.5 Level Partitioning Iteration 4 (5,4,3 removed from entire table)

Factors	Network Access Set (Row)	Causal Element Set (Column)	Mutual Elements Group
1	2	6,9	
2		1,6,9	
3	6,2,1	1,2,9	2,1
4	6,2,1	1,2,9	2,1
5	6,2,1	1,2,9	2,1
6	2,1	9	
7	9,6,2,1	2	2
8	6,2,1	1,2,9	2,1
9	6,2,1		
10	6	1,2,9	

Source: Author's Computation

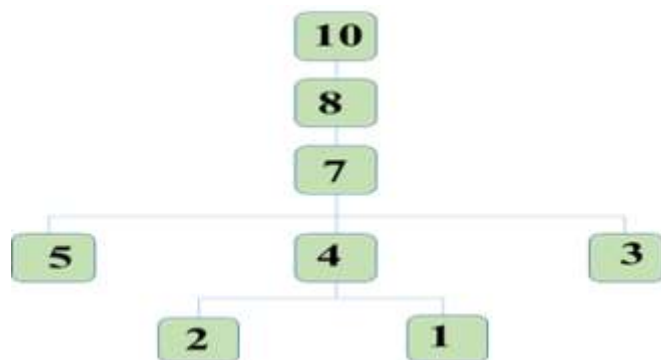
Table 4.6 Level Partitioning Iteration 5 (2,1 removed from entire table)

Factors	Network Access Set (Row)	Causal Element Set(Column)	Mutual Elements Group
1		6,9	
2		6,9	
3	6	9	
4	6	9	
5	6	9	
6		9	
7	9,6		
8	6	9	
9	6		
10	6	9	

Source: Author's Computation

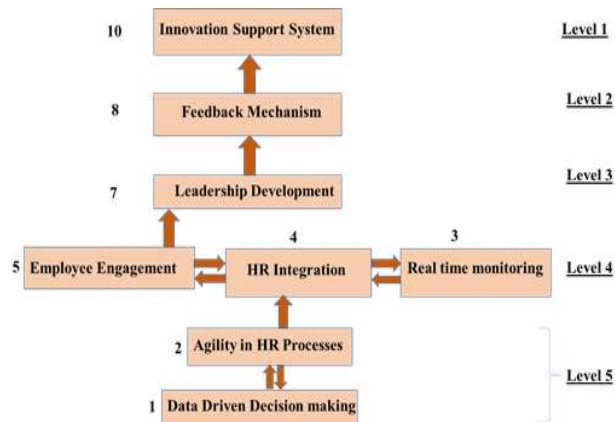
Diagram: It is a directional diagram that visually maps out how different components within a system are connected. It uses arrows to indicate how one element influences or contributes to another.

Figure 3 shows the Diagram.



Conceptual Model: The conceptual model of the ISM approach is a structured method that helps in identifying and organising the relationships among key elements involved in a complex issue or system. It provides a framework to understand which elements influence others and how they are connected in a hierarchical order. It helps break down a complex problem into smaller, manageable parts and arranges them in levels according to their influence.

Figure 4: Showing Conceptual Model of ISM Approach



Result and Discussion

The study used the Interpretive Structural Modelling (ISM) approach to identify and analyse the key factors influencing talent acquisition and management in the context of HRM 4.0. After collecting expert input and building a structured model, several important findings were revealed.

The final ISM model showed a clear hierarchy among the factors. At the bottom level, foundational elements like Agility in HR Processes and data-driven decision-making were identified. These factors play a basic role in supporting and enabling other advanced HR functions. Their placement at the base of the model shows they act as drivers in the system.

In the middle levels, factors like employee engagement, HR Integration, real-time monitoring, and leadership development appeared. These are influenced by the foundational digital tools and, in turn, support higher-level goals. They act as linking elements—they are influenced by technological foundations but also influence strategic HR outcomes.

At the top of the hierarchy, factors such as innovation support systems and Feedback mechanisms were found. These are considered dependent factors because they rely on the effective functioning of the underlying levels.

The discussion highlights how HRM 4.0 goes beyond using just digital tools—it promotes a systematic and integrated approach where every factor is connected. The ISM model helped show which elements should be prioritized first to ensure the smooth functioning of the entire talent

acquisition and management system. For instance, without a proper digital backbone (like automation or analytic), higher goals like innovation may not be achieved effectively.

Moreover, the model emphasizes the importance of interdependence among HR elements. It becomes clear that technology alone is not enough; it must be combined with leadership, feedback, and strategic engagement to create a forward-looking HR system.

In short, this ISM-based research shows how HRM 4.0 transforms talent management into a more connected, technology-enabled, and strategically aligned system. It also provides practical guidance for HR leaders, suggesting that improvements should begin with technological readiness and move upward toward innovation.

Conclusion

The research paper "HRM 4.0 in Talent Acquisition and Management System: ISM Approach" provides a structured understanding of how digital transformation and intelligent systems are reshaping modern human resource practices. Using the Interpretive Structural Modelling (ISM) methodology, the study successfully identifies the key enablers and their inter-dependencies in the effective implementation of HRM 4.0.

At the core, foundational elements such as data-driven decision-making, agility in HR processes, and HR-IT integration emerged as the primary drivers. These digital capabilities set the stage for advanced HR functions by streamlining operations and enabling real-time performance tracking. Mid-level enablers like leadership development, employee engagement, and feedback mechanisms were found to act as crucial connectors—both receiving influence from foundational technologies and enabling more strategic outcomes.

Higher-level dependent factors, including innovation support systems and Organizational culture, highlight the ultimate goals of HRM 4.0—creating a dynamic, innovative, and people-centric Organization. These are not standalone outcomes but are built upon the consistent integration and interaction of various foundational and operational elements.

The ISM-based model illustrates that a successful transition to HRM 4.0 is not just about technology adoption but requires a coherent strategy that aligns digital tools with people-focused processes. Talent acquisition and management practices must evolve to meet the expectations of a rapidly changing workforce and business landscape. HR professionals need to take an active role in enhancing employee skills, promoting engagement, developing leadership qualities, and encouraging a workplace culture that supports ongoing innovation.

In conclusion, the research highlights the crucial role of adopting a systems-oriented approach within contemporary HR practices. By adopting ISM, Organizations can better understand the layered nature of HR transformation, identify key leverage points, and implement targeted strategies that ensure sustainable growth, workforce adaptability, and competitive advantage in the Industry 4.0 era.

Conflict of Interest

There is no conflict of interest among authors.

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