The Explanatory Relationship Between Digital Leadership and Smart Human Resource Management Practices Supported by the Internet of Things – An analytical study of the opinions of a sample of employees in the General Directorate of Education in Baghdad Governorate, Al-Rusafa Third District

Dr .Luay Radhi khaleefah Al-rubaye

Ministry of Education / Directorate General of Cultural Relations

E-mail: Drluayradhialrubaye@gmail.com

With the tremendous advances in technology and the rapid digital transformations that the world is witnessing in business structures and organizational processes, there is a need to adopt modern leadership styles that leverage technological capabilities to develop and empower human resources. The research aimed to reveal the nature of the relationship between digital leadership (innovative digital behavior, digital support behavior, and organizational sustainability) and smart human resource management practices supported by the Internet of Things (smart recruitment and selection, human resource development, human resource performance, and human resource compensation) in the Third Rusafa Education Directorate in Baghdad. The research adopted a descriptive and analytical approach based on a questionnaire applied to a purposive sample of 120 managers, department heads, and division and unit officials at the Rusafa Third Education Directorate. Statistical procedures included the use of statistical software (SPSS V.28 & Smart Pls.4) to analyze the data. The results revealed that digital leadership has an impact on the adoption of smart human resource practices within the General Directorate of Education in the Rusafa Third District of Baghdad. The research conclude that digital leadership plays an important role in enhancing smart human resource management practices and the need to allocate a financial budget to build a digital transformation strategy to develop digital infrastructure, human resource activities, Internet of Things technologies, and adopt continuous improvements in resource management.

Keywords: Digital leadership, Smart human resource management practices, Internet of Things, General Directorate of Education in Baghdad Governorate, Al-Rusafa Third District.

العلاقة التفسيرية بين القيادة الرقمية وممارسات إدارة الموارد البشرية الذكية المدعومة بأنترنت الأشياء: دراسة تحليلية لآراء عينة من الموظفين في المديرية العامة للتربية في محافظة بغداد الرصافة الثالثة

د . لؤي راضي خليفة

وزارة التربية/ المديرية العامة للعلاقات الثقافية

البريد الإلكتروني: Drluayradhialrubaye@gmail.com

مع التقدم الهائل في التكنولوجيا والتحولات الرقمية السريعة التي يشهدها العالم في هياكل الأعمال والعمليات التنظيمية، تبرز الحاجة إلى تبني أنماط قيادة حديثة تستفيد من القدرات التكنولوجية لتطوير الموارد البشرية وتمكينها، وقد هدفت الدراسة إلى الكشف عن طبيعة العلاقة بين القيادة الرقمية (السلوك الرقمي المبتكر، وسلوك الدعم الرقمي، والاستدامة التنظيمية) وممارسات إدارة الموارد البشرية الذكية المدعومة بانترنت الأشياء (التوظيف والاختيار الذكي، وتطوير الموارد البشرية، وأداء الموارد البشرية، وتعويضات الموارد البشرية) في المديرية العامة للتربية في محافظة بغداد الرصافة الثالثة، إذ اعتمد البحث نهجًا وصفيًا وتحليليًا استند إلى استبيان، وتم تطبيقه على عينة من 120 مديرًا ورئيس قسم ومسؤولًا في الأقسام والوحدات في مديرية تربية الرصافة الثالثة، وشملت الإجراءات الإحصائية استخدام برامج إحصائية (SPSS V.28) و (Smart Pls.4) لتحليل البيانات، وظهرت النتائج أن القيادة الرقمية تؤثر في تبني ممارسات الموارد البشرية الذكية داخل المديرية العامة للتربية في محافظة بغداد الرصافة الثالثة .خلص البحث إلى أن القيادة الرقمية تلعب دورًا مهمًا في تعزيز ممارسات إدارة الموارد البشرية الذكية، وإلى ضرورة تخصيص ميزانية مالية لوضع استراتيجية للتحول الرقمي، تهدف إلى تطوير البنية التحتية الرقمية، وأنشطة الموارد البشرية، وتقنيات إنترنت الأشياء، وتبني التحسينات المستمرة في عمليات إدارة الموارد.

الكلمات المفتاحية: القيادة الرقمية، ممارسات إدارة الموارد البشرية الذكية، إنترنت الأشياء، المديرية العامة للتربية في محافظة بغداد، الرصافة الثالثة.

الاستلام	الإرجاع	القبول
2026/4/19	2026/4/27	2026/5/5

Introduction

The use of technology in digital reality has developed from merely a supporting tool for workers to be a key component in the way workers organize their tasks and make decisions now. This is why digital leadership has been established as a new model of leadership with four primary elements: empowering employees digitally, rapidly responding to change, using big-data to drive decision-making, and leading through

innovation by developing an employee's ability to innovate; therefore, leaders need to develop an understanding of how to utilize the advanced digital tools they will require to do so. Digital and other forms of intelligent HRM technologies have evolved to be at the center of all aspects of HRM operations with the introduction of IoT and AI, which has greatly expanded the number of ways that organizations can implement innovative practices of smart HRM, versus implementing outdated manual processes for HRM.

Although the number of investigations about digital leadership and smart HRM are increasing, few research have studied the structural relationship between these concepts, therefore we cannot fully understand how they affect each other. Literature lacks of conceptual framework explaining how the digital leadership skills can improve the human resources departments' preparedness to implement smart systems and to increase their operational performance through IoT technology. Therefore there is an evident research gap. Moreover, the lack of Arabic studies on this issue and the need to develop analytical models describing this relationship according to the specificities of organizations and the technologies involved, emphasize the need for conducting such research.

This study is important because it takes a scientific approach to fill this gap by conducting a comprehensive study of the concepts of digital leadership and smart human resource practices supported by the Internet of Things within a single analytical framework, and providing evidence of the nature of the explanatory relationship in government institutions, especially in the education sector, a context that remains limited in Arabic literature, making this research a qualitative addition that contributes to filling a knowledge gap by clarifying the elements of digital leadership that can improve the effectiveness of smart human resources and open new horizons for future research. The research addresses four main topics, the first of which is entitled (the methodological aspect), the second explains (the intellectual aspect) of the research variables, and the third addresss (the practical aspect), in which the results are explained and discussed. The fourth section presents conclusions and recommendations aimed at providing scientific and practical contributions to enhance digital work and improve institutional performance.

]- Research Methodology

]-[Research Problem

Digitization has brought about a profound revolution in various sectors as a result of technological advances in the Fourth Industrial Revolution, which includes artificial intelligence, smart robots, augmented and virtual reality, block chain, and the Internet of Things. This requires leaders to integrate digital competencies into traditional leadership approaches to achieve organizational achievements, as digital leadership has become a new necessity for organizations to operate effectively and efficiently. Iraqi organizations in general and the Baghdad Rusafa Third Education Directorate in particular, face a lack of interest and knowledge of digital developments and smart technical methods. This was the main motivation for the researcher to diagnose the extent of the research sample's awareness of these practices and their role in promoting digital transformation. The research problem was the existence of a knowledge gap between what digital leadership offers in terms of technological techniques and what smart human resource departments actually practice in the modern work environment. There is also an application gap represented by the need to study the relationship between digital leadership and smart human resource management practices supported by the Internet of Things in the researched organization, which is experiencing weakness in the application of these practices, as there is a noticeable shortcoming in the transition from traditional methods to modern digital practices. The research problem lies in addressing this gap through the following question: Does digital leadership contribute to the implementation of Smart human resource management practices supported by the Internet of Things in the Directorate of Education in the Rusafa III district of Baghdad? This question gave rise to a number of other questions, the most important of which are:

1. What is the level of digital leadership among leaders in the research sample?

2. What is the level of implementation of smart human resource management practices supported by the Internet of Things in the research sample?
3. What is the extent of the impact of digital leadership in promoting smart human resource management practices supported by the Internet of Things in the research sample?
4. What is the extent of the impact of digital leadership in its combined dimensions on the development of smart human resource management practices supported by the Internet of Things in the research sample?

1-2 Research Objectives

This research aims to achieve the following:

1. Determine the level of digital leadership adoption at the Ministry of Education/Baghdad Rusafa III Education Directorate.
2. Identify the level of implementation of smart human resource management practices supported by Internet of Things technologies.
3. Measure the impact of digital leadership on smart human resource management practices supported by the Internet of Things.
4. Provide an explanatory model that shows the role of digital leadership in its combined dimensions in the development of smart human resource management practices supported by the Internet of Things.

1-3 Research Importance

The importance of the research is determined by the following points:

1. Enriching Arab administrative literature by linking the concept of digital leadership with smart human resource management practices supported by the Internet of Things in Al-Rusafa III educational environment.

2. Contributing to clarifying the role of digital transformation in leadership by enabling government institutions to apply smart and sustainable practices for managing their human resources.
3. Conducting research in one of the country's important sectors, namely the education sector, enabling it to benefit from digital leadership and smart human resource management technologies in developing its functional and administrative work methods.
4. Presenting a set of practical findings and recommendations to employees at Baghdad Rusafa III Education Directorate, which will help build digital leaders who are aware of modern technologies and capable of directing their human resources towards efficiency and digital innovation.

1-4 Research Model

The hypothetical research model illustrates the nature of the relationship between the research variables, represented by digital leadership as an independent variable and smart human resource management practices supported by the Internet of Things as a dependent variable, as shown in the figure below:

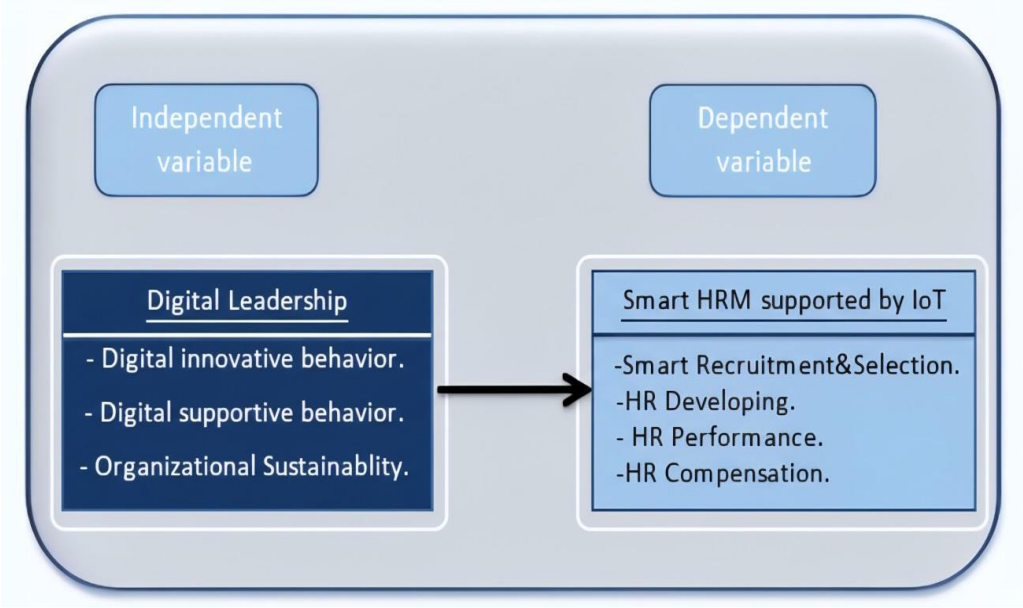

Figure (1) research conceptual model

1-5 Research hypotheses

The research began addressing the problem through the following hypotheses:

Ho.1: Digital leadership has no statistically significant impact on smart human resource management practices supported by the Internet of Things.

Ho.2: The dimensions of digital leadership do not have a statistically significant impact on smart human resource management practices supported by the Internet of Things.

1-6 Research Methodology

The research adopted a descriptive analytical approach and used a questionnaire to collect data, which included 28 items for the research variables (digital leadership and smart human resource management practices supported by the Internet of Things). In addition, measures from foreign and Arab sources were used, as well as a five-point Likert scale (strongly agree, agree, neutral, disagree, strongly disagree). Table (1) shows the research measures and terms.

Table (1) Scale and search terms

Variable	Dimension	Number of paragraphs	source
Digital Leadership	Digital innovative behavior	**4**	([1]),([2]), ([3]), ([4])
	Digital supportive behavior	**4**	
	Organizational Sustainability	**4**	
Smart HRM supported by IoT	Smart Recruitment & Selection	**4**	([5]), ([6]), ([7])
	HR Developing	**4**	
	HR Performance	**4**	
	HR Compensation	**4**	

Source: Prepared by the researcher.

1-7 Research community and sample

The education sector/General Directorate of Education in the Rusafa III district of Baghdad was selected as the research community. The sample was a stratified purposive sample consisting of directors, department heads, and division and unit managers. To determine the sample, the Krejcie and Morgan table (1970) table[8], which provides a sound statistical method for calculating sample size. A total of 130 questionnaires were distributed, 120 of which were valid for statistical analysis.

1-8 statistical tests

A set of statistical methods and programs were used to analyze the research data. These methods included(the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of to measure the homogeneity of the data and the validity of the sample size, construct validity to verify the validity and reliability of the scale and Cronbach's alpha coefficient, arithmetic mean, standard deviation, coefficient of variation, structural equation modeling, and path analysis to determine the effect).

2-Theoretical Framework

2-1 Digital Leadership concept

Beginning with the 4th industrial revolution and how it is transforming a wide range of industries through digitization, new technological development opportunities, including artificial intelligence, machine learning, cloud computing, blockchain, and the Internet of Things have evolved from being used simply for automation, and are now changing organizational structures, business models and consumer behaviors by adding digital competences to traditional leadership styles [9];[10]. This new form of leadership, which is referred to as "Digital Leadership" is seen as the most effective method of achieving digital transformation within an organization and refers to the strategic use of digital tools to improve organizational performance; educational quality; and the culture of digital innovation[11]. I view "digital leadership" as a more comprehensive and transformative concept than "e-leadership," "technology leadership," or "virtual leadership," since it has become more than just the technology and processes used in today's digital world - it is

the way one thinks and acts in the digital world[12] . The digital leadership concept describes those leaders who implement the appropriate measures for managing the transformation of an organization into a digitally based one through a combination of the digital aspects of both people and technologies and having a very clear vision of how information and communication technologies support the company's strategic objectives[13]. Therefore, these leaders must have developed a number of the necessary digital leadership skills and abilities to lead the team to reach the organization's objectives[14], including social, emotional, cognitive, interpersonal, and intrapersonal intelligence. Additionally, the digital leader will acknowledge that it is important for all of the members of the group to be knowledgeable about, and use, the appropriate technologies to enhance their own digital knowledge and practices[15]. Zhu et al., (2025)[16] views the development of digital leadership as an evolving process that develops over time to allow managers to develop their own, as well as their employees, attitudes, perceptions, and competences in the digital domain. Therefore, authors have presented multiple perspectives regarding the definitions of digital leadership. Claire (2025)[17] describes Digital Leadership as "an innovative advanced leadership practice" that emphasizes the utilization of technology in all aspects of the organization's strategy for driving change, adaptability and competitiveness. Alasqah & Noureldin (2025)[18] define it as "a modern leadership model" combining elements of technology, strategic thinking, and creativity to provide the necessary guidance for organizations to successfully transition to the digital age; it places emphasis on the leader's ability to utilize digital tools, adopt a digital mindset, and create an organizational culture that fosters the successful implementation of digital transformation. Digital Leadership is also described by Mahfuuzhoh et al. (2025)[19] as "the integration of knowledge of digital technology with the application of digital technology to successfully manage and lead an organization." Saeed (2024)[20] states that it is the ability of an individual or an organization to successfully lead and navigate through the digital landscape and ensure that the organization can understand, utilize and leverage the impact of digital technologies, data, and trends to enhance innovation and realize the organization's strategic objectives.

2-2 Dimensions of Digital Leadership

The following writers have made an effort to explain what aspects of digital leadership are important for the modern workplace ([21];[22]; [23]; [24]):

1. Innovative digital behavior: This is the ability of leaders to identify digital technology opportunities, and utilize those opportunities to find creative solutions for problems within their organizations[25]. Cui (2025)[26] states that digital innovations use digital technologies to produce new products, services, business models, or organizational processes, which includes numerous technologies such as artificial intelligence, blockchain, cloud computing, big data analytics, and the Internet of things (IoT). Digital leaders who support digital innovation are key to bridging the gap between technological development and integration of organizations[27].Yang (2025)[28] stated that digital leaders can improve the success of digital strategy by using digital tools to create a culture of innovation and redesign business processes. Kokot et al.,(2023)[29] further noted that leaders in today's competitive market need to be able to think globally to help foster digital innovation behaviors and culture.
2. Digital support behaviour: This is the leader's behaviour with an objective of improving the favourable attitude of workers and building confidence in them, and of acquiring and enhancing their competences through digital technologies[30].The supportive behaviours of a leader are developed through establishing relationships between employees and managers; it influences the attitudes and behaviours of employees; it involves them in making decisions; and encourages innovation and creativity[31]. The supportive behaviours of a leader are also described by Sadiq and Faridon (2023)[32], as the behaviour of a leader towards his followers where he respects them, meets their needs, and develops a supportive psychological and physically welcoming working environment. Digital support behaviour is considered as one of the most important drivers of the success of organizations and enables them to be successful over time, excellent and creative by focusing on the positive practices of leaders and leading them to achieve their objectives[33]. In addition, leaders should show behaviourally how

they will act as supportive leaders, whether this is positive or negative based on the leader's style.[34]

3. Organizational sustainability: Sustainability is a business activity that achieves social goals alongside generating economic profits for companies in management activities, and seeks to achieve sustainable growth for companies by preserving nature in environmental aspects[35]. Farhan (2024)[36] believes that it is the ability of an organization to survive, prosper, progress, and meet the needs of its beneficiaries without affecting its ability to meet future needs. The application of digital technologies in resource theory leads to improvements in commercial economic activities, reduced business costs, and enhanced sustainability of financial operations[37]. Sustainable competitive advantage and profit to be maintained by companies competing in competition; improving resource use and increasing environmental efficiency while achieving sustainability through a digital leader[38], is only possible when employees in an organization digitally transform their company and achieve sustainable organizational development for future generations[39].

2-3 Smart (HRM) Supported by Internet of Things

Smart HRM is an approach to HRM using both technology and data analysis to improve many of the different areas of HRM. Smart HRM is the most recent technological advancement that was largely driven by the Fourth Industrial Revolution. The Fourth Industrial Revolution represents the next generation of industrial revolutions and it will be defined by the combination of all advanced digital technologies, such as artificial intelligence, robots, big data, machine learning, and the internet of things ([40];[41];[42]). As a result of the integration of digital technologies into human resource management there have been significant transformations in the operational processes of organizations[43]. The transformation of organizational operational processes is represented by smart HRM, which is a strategic approach that utilizes technology to improve human capital, and therefore, increase organizational performance[44]. In addition, technology has produced some scenarios for applying the Internet of Things (IoT) in human resource management as the IoT solutions for human resource management, which involve connecting computers via the Internet and devices embedded in everyday objects[45]. The Internet of

Things represents a network of physical entities, devices, structures, vehicles, and various elements integrated with sensors, software, and communication mechanisms. Applications include employee tracking and scheduling, task management, and streamlining processes such as attendance monitoring, task time tracking, and automated scheduling. Such applications help organizations enhance resource efficiency, streamline administrative procedures, and improve human resources[46]. In 2012, the International Telecommunication Union defined the Internet of Things as including all objects in the virtual or physical world that can be identified and integrated into communication networks. The application of the Internet of Things in human resource management involves the use of many smart objects to automate certain human resource practices[47]. The Internet of Things (IoT), according to Naidu & Hemalatha, (2022)[48] & Lhakard (2025)[49], will change how HR professionals make decisions about their jobs as well as affect employee empowerment and self-service capabilities in future. The IoT has already been reported to have changed how employees experience their workplaces, how workplaces operate, and how HRM can monitor their workplace with remote access to devices and systems by Ulfa (2024)[50]:

1. Making better decisions: Companies will be able to track their employees' performance, productivity and quality of work in real-time using IoT sensor data.
2. Reducing costs: Tracking employee availability during working hours allows organizations to prevent being either under-staffed (over-staffed), resulting in considerable cost savings.
3. Employee experience improvement: The IoT provides companies with the ability to track employee health by tracking employee stress levels in real-time.
4. Fast decision making: IoT data will allow companies to make fast and accurate decisions regarding a variety of HR operation aspects.
5. More efficient work experiences: The IoT can assist companies in streamlining HR processes and improving the efficiency of the employee work experience through real-time monitoring of employee productivity, enabling organizations to recognize areas where employees are experiencing difficulties and providing them with additional training or assistance.

Therefore, the researcher is confident that Smart Human Resource Management, as it relates to IoT Technology, means applying IoT Technologies to Human Resources activities and functions to promote Digital Transformation and to develop HR management practices for achieving Sustainable Innovative Performance.

2-4 Dimensions of Smart Human Resource Management practices supported by Internet of Things

Smart human resource management practices that use advanced technologies such as artificial intelligence, machine learning, the Internet of Things, chatbots, and big data analytics play an important role in managing human resources effectively and efficiently and developing an organizational culture conducive to innovation by empowering employees, knowledge sharing, and facilitating cross-functional collaboration by aligning human resource strategies with innovation goals and providing employees with support and incentives, thereby driving sustainable growth [51];[52]. Researchers have differed in describing the dimensions of human resource practices supported by Internet of Things technologies due to the rarity and novelty of the subject. The dimensions defined by ([53];[54];[55]) have been used as a basis, as follows:

1. Smart Recruitment and Selection: The latest Internet of Things application in the recruitment process is revolutionizing the traditional way of recruiting, as it offers numerous benefits for using the Internet of Things in the recruitment process, including helping to select the best applicants for the job, receiving notifications about employees interested in the job, selecting them remotely, and obtaining data on the best candidates via smartphones thanks to the Internet of Things[56]. Recruitment using technology and data analysis aims to simplify and improve the recruitment process and can include the use of online job portals, social media recruitment, applicant tracking systems (ATS), data analytics, virtual interviews, and automated resume screening[57]. One of the developments facilitated by intelligent human resource management systems is the use of machine learning, a subset of artificial intelligence that is revolutionizing the talent acquisition process. The speed of candidate selection can be greatly improved by machine learning techniques for forecasting a candidate's probability of success[58], and with

the advent of the Internet of Things (IoT), new flexible recruitment systems are being developed for organizations to respond more quickly to changes in the marketplace as well as to better recruit and evaluate applicants, and onboard new hires[59]. IoT implementations will enable greater recruitment process efficiencies; improved performance at each stage of the recruitment process; and better quality recruitment decisions[60].

2 .Human Resource Development: The application of the IoT can be an efficient method for organizations to create customized and planned and organized and coordinated training programs that are based on additional data that is being collected by Internet of Things devices through sensors that are connected to smart objects used by employees. Organizations can continue to develop training curricula in a timely and timely fashion, continuously assess the effectiveness of the training, and provide employees with timely training and feedback[61],[62]. The application of smart human resource management to employee training and development involves utilizing technology and data to determine the training and development requirements of employees and providing them with the necessary resources and support to enhance their job skills and career advancement[63]. Employees may lack the skills and competences needed to utilize the Internet of Things; however, ongoing training and development will reduce the skill gap within organizations as employees increasingly work remotely[64]. Human Resources training and education contribute to the preparation of the workforce and its utilization of the large amounts of data that can be generated from the Internet of Things (IoT), and the potential to dramatically change how we interact with the work environment[65].

3. Human Resource Performance: Smart HRM creates a platform to improve institutional business performance by creating a methodical approach to continuously evaluate employees and promote their performance in order to achieve corporate objectives, and it has proven to be very beneficial when making decisions about whether to transfer an employee, promote an employee or provide an employee with a raise based on their performance. The introduction of smart HRM into performance management has created a new way for companies to evaluate employee performance through machine learning and IoT models, which allow companies to make informed decisions using data

collected from employees' performance information. Therefore, digital technology has transformed how performance management is performed, including the ability to collect data in real time, utilize big data, and create predictive models to help businesses forecast, assess, and ultimately develop their performance management system to better meet business needs[66];[67],[68].

4. Human Resource Compensation: Compensation is part of the technology that tracks employee income and benefits information, helping to analyze the reliability and impact of current incentive systems[69].The Internet of Things is a global computerized arrangement of various tools and sensors, capable of connecting different tools with each other and with individuals. It affects human compensation management in that it accommodates the massive amount of information required for human resource management[70]. Timely and unbiased rewards are facilitated by new technologies that monitor the performance of all employees and alert managers when someone performs exceptionally well and deserves recognition, or when performance is below expectations and action is needed to improve performance[71]. Compensation management using Internet of Things technologies aims to achieve the following:(attracting and retaining talent, retaining outstanding employees, paying fair compensation, keeping compensation costs in line with regulatory changes, providing employee benefits, and dealing with legal compliance)[72].

2-5 Previous Research on Digital Leadership and Smart Human Resource Management practices supported by Internet of Things

The Fourth Industrial Revolution has reshaped the concept of leadership, shifting from traditional, hierarchy-based leadership to data-driven digital leadership that relies on artificial intelligence. A study by Abbu et al. (2022)[73] confirmed that digital leadership is based on measuring the human dimensions of digital leaders and developing a scale that enables leaders to assess their digital readiness and accelerate the pace of organizational transformation. This approach aligns with the findings of the current study, which showed that digital leadership represents the fundamental driver of smart human resource management processes in the Arab context.

The Internet of Things (IoT) is also considered one of the most prominent technologies supporting the transformation of human resource management toward smarter, more responsive, and effective models. In his study, Strohmeier (2018)[74] concluded that the concept of "Smart Human Resource Management" represents the systematic application of the Internet of Things in human resources functions, and he reviewed its main areas, such as smart recruitment, performance measurement, and the creation of adaptive work environments.

A study by Budhwar et al. (2019)[75] indicates that human resource management research in the Middle East continues to suffer from significant research gaps, particularly regarding the exploration of the digital transformation of human resource functions in Arab and government contexts.

Meanwhile, a study by Rinto (2025)[76] noted that the adoption of digitalization in human resource management faces structural challenges, including low digital literacy and limited digital infrastructure, pointing out that supportive digital leadership is a prerequisite for the success of any digital transformation in human resources.

3 Practical framework of the research

This study aims, through its dimensions, variables, and paragraphs, to present descriptive statistics of the practical results, interpret and analyze them, and identify strengths and weaknesses in terms of the implementation and adoption of the paragraph. The study is divided into the following sections:

3-1 Sample Size Adequacy Test

To verify sample adequacy and data suitability for structural analysis, I used the Kaiser-Meyer-Olkin (KMO) and Bartlett tests for matrix equivalence, which are two essential tests prior to applying factor analysis. The KMO test measures data homogeneity and validity, while the Bartlett test measures data sphericity. (KMO) and Bartlett's test for sphericity, which are two basic tests before applying factor analysis. The KMO test measures the homogeneity of the data and the validity of the sample size, with values ranging from 0 to 1. Values higher than 0.50 are considered acceptable and indicate that the data is suitable for analysis .

Bartlett's test examines the existence of significant correlations between variables, and the null hypothesis is rejected if the probability value is less than (0.05). This indicates that the data is valid for conducting factorial or confirmatory analysis. The results of these two tests form the basis for ensuring data quality and the validity of the measurement tool before moving on to advanced analytical stages, as shown in the table.

Table (1) KMO Bartlett's test for search variables

Research variables	Number of questions	KMO	Standard	Bartlett	Sig	Result	Decision and interpretation
Digital leadership	12	0.920	50 ≤	855.878	0.000	significance	Sample size is adequate
Smart Hrm practices supported by the IOT	16	0.953	50 ≤	1921.238	0.000	significance	Sample size is adequate

Source: SPSS V.28 output.

The results in Table (1) show that the KMO test values for the study variables (digital leadership and smart human resource management practices supported by the Internet of Things) were 0.920 and 0.953, respectively. 0.953), which are high values exceeding the acceptable limit (0.50), confirming the suitability of the sample size for factor analysis. The Bartlett's test values were 855.878 1921.238, respectively, at a significance level (Sig = 0.000 < 0.05), indicating the existence of significant correlations between the variables and the validity of the data for structural analysis. Based on this, the sample is considered appropriate, and the test indicators support the quality and accuracy of the data in subsequent analyses.

3-2 Testing the Structural Model of the Research

Figure (2) illustrates the questions and dimensions of the research model, where the independent variable of digital leadership consists of three main dimensions (innovative digital behavior, digital support behavior, and organizational sustainability) with total of (12) questions. The variable of smart human resource management practices supported by the Internet of Things consists of four main dimensions (smart recruitment and selection, human resource development, human resource performance, and human resource compensation), with a total of 16 questions, as shown in Table (2)shows the results of the analysis of all composite reliability (CR) values for the dimensions of the model, which exceeded the minimum acceptable limit (0.70), reflecting a high level of internal reliability of the scale and the quality of the indicators used. The Cronbach's alpha values were higher than the standard value (0.70), reflecting high internal consistency among the items for each dimension of the model. In addition, the results of the average variance extracted (AVE) for all variables and dimensions exceeded the minimum required threshold (0.50), which confirms the achievement of convergent validity and reflects the ability of the items to explain the underlying theoretical dimensions.

These findings support that the research instrument is reliable, consistent, and all the subscales of each dimension are significant in terms of their contribution to the explanation of the overall variance of the primary dimensions, thereby supporting the use of this model as an appropriate method for testing the relationship between Digital Leadership and Smart Human Resource Practices.

Table (2) Model Conformity Indicators

Research variables and dimensions	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
DL	0.927	0.930	0.937	0.557
SHSI	0.969	0.970	0.972	0.685
DIB	0.797	0.803	0.869	0.624
DSB	0.823	0.825	0.883	0.654
HC	0.925	0.925	0.946	0.816
HD	0.929	0.931	0.949	0.825
HP	0.931	0.933	0.951	0.829
OS	0.870	0.876	0.911	0.720
SRS	0.893	0.898	0.926	0.758
Standard	0.70 ≤	0.70 ≤	0.70 ≤	0.50 ≤
decision	within standard	within standard	within standard	within standard

Source: "Smart Pls.4 Program".

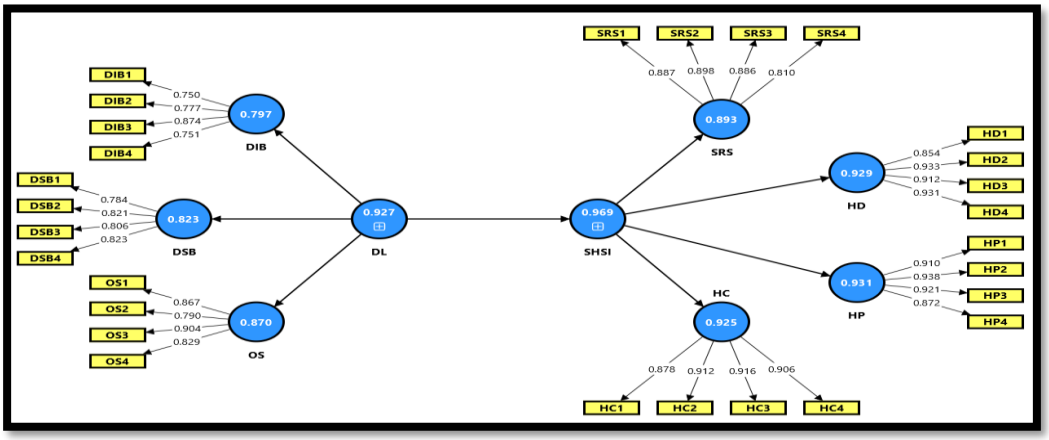

Figure (2) Research model

Source: "Smart Pls.4 ".

The results in Table 3 show that the loading on all items is greater than or equal to .693 for the item SRS4 and less than or equal to .938 for the item HP2. All of these values are above the accepted minimum of .40,

which indicates that each of the items are measuring their theoretical dimension(s) very accurately. The t-test statistic values for the items are as follows: OS2 = 12.125; HD4 = 87.892; and for all items, the t-test statistics are all larger than 1.984 at a $p < 0.05$ significance level. Additionally, for all items, the P values are all less than 0.001. These results indicate that the relationship between each of the items and their respective dimensions is both statistically and significantly interpretable. These results indicate that the research tool was robustly formulated and accurately reflects the dimensions of digital leadership (innovative digital behavior, digital support behavior, and organizational sustainability) and the dimensions of smart human resource management practices supported by the Internet of Things (smart recruitment and selection, human resource development, human resource performance, and compensation). The high global load values for human resource development and performance reflect the organization's interest in linking training and evaluation to smart solutions, while the strength of innovative digital behavior and organizational sustainability indicates that digital leadership has become part of the institutional practice of digital transformation.

Table (3) Statistical Indicators of the Model

Questions	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
DIB1 <- DIB	0.750	0.749	0.048	15.679	0.000
DIB1 <- DL	0.691	0.689	0.053	13.091	0.000
DIB2 <- DIB	0.777	0.775	0.037	20.932	0.000
DIB2 <- DL	0.619	0.617	0.056	11.026	0.000
DIB3 <- DIB	0.874	0.873	0.024	36.021	0.000
DIB3 <- DL	0.757	0.755	0.041	18.554	0.000
DIB4 <- DIB	0.751	0.751	0.044	17.066	0.000
DIB4 <- DL	0.682	0.681	0.047	14.481	0.000
DSB1 <- DL	0.736	0.735	0.043	17.310	0.000
DSB1 <- DSB	0.784	0.783	0.038	20.701	0.000
DSB2 <- DL	0.728	0.728	0.053	13.857	0.000
DSB2 <- DSB	0.821	0.821	0.033	24.968	0.000
DSB3 <- DL	0.736	0.735	0.048	15.448	0.000

DSB3 <- DSB	0.806	0.805	0.034	23.590	0.000
DSB4 <- DL	0.817	0.817	0.026	30.871	0.000
DSB4 <- DSB	0.823	0.824	0.028	29.746	0.000
HC1 <- HC	0.878	0.876	0.026	34.386	0.000
HC1 <- SHSI	0.816	0.814	0.036	22.786	0.000
HC2 <- HC	0.912	0.912	0.022	41.802	0.000
HC2 <- SHSI	0.869	0.868	0.025	34.236	0.000
HC3 <- HC	0.916	0.916	0.016	57.327	0.000
HC3 <- SHSI	0.832	0.832	0.024	34.637	0.000
HC4 <- HC	0.906	0.905	0.021	42.439	0.000
HC4 <- SHSI	0.817	0.816	0.032	25.226	0.000
HD1 <- HD	0.854	0.853	0.026	32.540	0.000
HD1 <- SHSI	0.786	0.785	0.036	21.868	0.000
HD2 <- HD	0.933	0.932	0.012	77.904	0.000
HD2 <- SHSI	0.859	0.858	0.027	32.334	0.000
HD3 <- HD	0.912	0.911	0.018	49.742	0.000
HD3 <- SHSI	0.842	0.841	0.028	29.776	0.000
HD4 <- HD	0.931	0.931	0.011	87.892	0.000
HD4 <- SHSI	0.890	0.889	0.018	50.143	0.000
HP1 <- HP	0.910	0.909	0.017	54.457	0.000
HP1 <- SHSI	0.852	0.851	0.027	31.107	0.000
HP2 <- HP	0.938	0.938	0.011	86.144	0.000
HP2 <- SHSI	0.884	0.884	0.021	42.055	0.000
HP3 <- HP	0.921	0.921	0.014	66.665	0.000
HP3 <- SHSI	0.873	0.873	0.022	39.005	0.000
HP4 <- HP	0.872	0.871	0.027	32.345	0.000
HP4 <- SHSI	0.798	0.798	0.035	22.577	0.000
OS1 <- DL	0.840	0.840	0.026	32.096	0.000
OS1 <- OS	0.867	0.867	0.026	33.154	0.000
OS2 <- DL	0.706	0.705	0.058	12.125	0.000
OS2 <- OS	0.790	0.788	0.044	17.832	0.000
OS3 <- DL	0.849	0.848	0.027	31.937	0.000
OS3 <- OS	0.904	0.904	0.019	47.044	0.000

OS4 <- DL	0.761	0.760	0.043	17.569	0.000
OS4 <- OS	0.829	0.828	0.039	21.530	0.000
SRS1 <- SHSI	0.806	0.804	0.039	20.867	0.000
SRS1 <- SRS	0.887	0.887	0.024	37.388	0.000
SRS2 <- SHSI	0.795	0.795	0.035	22.908	0.000
SRS2 <- SRS	0.898	0.897	0.019	48.305	0.000
SRS3 <- SHSI	0.809	0.808	0.042	19.457	0.000
SRS3 <- SRS	0.886	0.885	0.024	36.225	0.000
SRS4 <- SHSI	0.693	0.691	0.055	12.552	0.000
SRS4 <- SRS	0.810	0.808	0.040	20.323	0.000

Source: "Smart Pls.4 ".

3-3 Statistical description, interpretation, and analysis of the sample responses

This section includes the analysis and interpretation of the data results for the sample responses to the digital leadership and smart human resource management practices supported by the Internet of Things, as follows:

1. Digital leadership variable

Table (4) shows the results of the descriptive analysis of the dimensions of digital leadership, where the arithmetic mean of the innovative digital behavior dimension was (3.673) with a standard deviation of (0.762) and a coefficient of variation of (20.75%), ranking first in terms of relative importance, which reflects leaders' possession of up-to-date knowledge and skills in the field of digital technologies and their ability to guide the digital transformation process in a proactive and creative manner. This indicates that leaders have a solid knowledge base that forms the foundation for building a modern digital orientation. However, translating this knowledge into integrated practical policies still needs to be further developed to ensure sustainability. Organizational Sustainability was ranked second (average score of 3.65) and had a low standard deviation of 0.89 and a coefficient of variation of 24.49%. The standard deviation shows how much the average scores varied among all respondents. This indicates that there is some consistency in organizations developing and using digital communications and monitoring/evaluation

systems, however, the large range in the average scores also highlights the different levels of understanding and/or confidence among respondents as to whether this will be effective. Philosophically, the challenge is that just having digital tools does not make an organisation sustainably flexible; the tools need to become part of organisational culture based on flexibility and adaptability to change.

This was followed by the average digital support behavior at (3.617), with a standard deviation of (0.833) and a coefficient of variation of (23.04%) with the third rank. This shows that management has focused on creating the technological base for the company's employees, as well as providing them with the capability to use the electronic application; however, there is still a need to increase the company's efforts to improve the actual effect of these initiatives. The fact that digital support is necessary does not mean it can be judged solely based on whether or not the appropriate tools have been provided; it will depend upon how effectively the management empowers the employees to change their roles and to embrace a digital philosophy.

At the total variable of digital leadership level, the arithmetic mean was 3.647, the standard deviation was .757, and the coefficient of variation was 20.75% and ranked second in the study variables; this indicates that digital leadership in the directorate is practiced on average at a level that is generally satisfactory. Thus, an administrative and philosophical field of action for digital leadership is opened, and that it is not merely about managing the technology or transforming into digital, but rather a vision of strategy that changes organizational mentalities and the leader is a catalyst for innovation, a guarantee of sustainability and a support for the intelligent transformation of an organization in a rapidly evolving and changing environment.

2. Variables of smart human resource management practices supported by the Internet of Things

Table (4), represents the Descriptive Statistics for the Dimensions of Smart Human Resource Management Practices Supported by The Internet of Things; the dimension of Human Resource Development received the highest Mean Score (3.735) with the lowest Standard Deviation (0.888); and the Coefficient of Variation (23.77%) of this dimension indicates that

there was strong agreement among respondents about the importance of smart training programs and digital competency development as an essential means to improve employees' performance and make work environments more attractive and responsive to rapid technological changes. Thus, the philosophical basis of our study suggests that the primary gateway to enhance organizational adaptability to the demands of digital transformation is to invest in the development of human capital through smart technology.

Human resource performance was ranked second by average with a score of 3.763 and is therefore the highest rated across all four of the identified areas. The coefficient of variation for this area is 24.01% indicating variability in how effective respondents believe smart tools have been in enhancing both employee and institutional performance. In terms of administration, the use of the Internet of Things to develop smart systems contributes to better goal-setting processes as well as improved monitoring of employees; however, the variability of the respondents' beliefs indicates that it would be beneficial to promote a unifying organizational awareness of common digital-based performance measurement methods.

After smart technology based selection and recruitment, the third place was achieved by average (3.656) and standard deviation (0.885) and Coefficient of Variation (24.20%). It is also indicated that in terms of the use of smart technology for the purpose of attracting and recruiting appropriate personnel, the Directorate is at the average stage. In terms of administration, this highlights the challenges that have occurred with the transition from using traditional methods for recruitment and appointment to completely relying on data and the use of smart analytical techniques as a strategic tool to attract the very best in talent.

Compensation by Human Resources was ranked as number four on the list; it had an arithmetic mean (average) of 3.667, a standard deviation of 0.988, and a coefficient of variation of 26.95 percent, which indicates the greatest variation among respondent's opinions. Therefore, smart compensation mechanisms have not been clearly or fairly developed in the eyes of the respondents. Philosophically, compensation is not only financial; it can be seen as a key instrument to construct digital justice and increase institutional loyalty when facing changes in technology.

At the aggregate level of smart human resource management practices supported by the Internet of Things, the arithmetic mean was (3.705) with a standard deviation of (0.843). and a coefficient of variation (22.76%), ranking first among the study variables with an average level tending towards acceptable, which indicates that this area is considered an important trend in the directorate and reveals a growing awareness of the importance of integrating IoT technologies into human resource activities. However, these practices still need to be more clearly institutionalized in order to transform them from isolated initiatives into an integrated management philosophy that redefines the relationship between people and technology within the organization.

Table (4) Descriptive statistics for research variables and dimensions

Research variables dimensions	Mean	deviation	coefficient of variation	Arranging dimensions and variables
Innovative digital behavior	3.673	0.762	20.75	**3**
Digital support behavior	3.617	0.833	23.04	**1**
Organizational sustainability	3.650	0.894	24.49	**2**
Digital leadership	3.647	0.757	20.75	**second**
Smart recruitment and selection	3.656	0.885	24.20	**3**
Human resource development	3.735	0.888	23.77	**1**
Human resource performance	3.763	0.903	24.01	**2**
Human resource compensation	3.667	0.988	26.95	**4**
Smart HR practices supported by the Internet of Things	3.705	0.843	22.76	**first**

Source: SPSS V.28.

3-4 Testing research hypotheses

1. Testing the first main hypothesis

There is a statistically no significant effect of digital leadership on smart human resource management practices supported by the Internet of Things

Table (5) shows the results of the impact analysis between digital leadership and smart human resource management practices supported by the Internet of Things, where the impact coefficient (β = 0.867) is positive and high, indicating that digital leadership has a strong and direct impact on the adoption of smart practices in human resource management. The statistical test also showed a value (t = 29.282) and statistical significance at the level (P = 0.000), which is less than (0.05), confirming that the relationship is statistically significant and cannot be attributed to chance. The results also showed that the effect size (F^2 = 3.029) was very large, while the coefficient of determination (R^2 = 0.752) was high, meaning that digital leadership explains 75.2% of the variance in smart human resource management practices. The results show that digital leadership will be a critical driver in creating successful "smart HR" as it can not only support but also drive the effectiveness of smart HR practices. This means a leader has to lead the transformation of their organization by empowering their employees to use technology, using data to create effective recruitment strategies, using data to create training programs, using data to determine how to measure employee performance, and using data to develop fair and competitive compensation packages based on the use of the Internet of Things. From a philosophical perspective, the results also reveal a shift in the concept of leadership from human resource management to redefining its relationship with technology, where digital leadership becomes a new philosophy that makes human resources a renewable digital resource, in which humans integrate with IoT technologies in a smart work environment, so that organizational efficiency becomes a reflection of the ability to adapt sustainably to rapid digital transformations.

Table (5) Impact Analysis of Digital Leadership in Smart HR Practices Supported by the Internet of Things

Paths of Influence	β	t	P values	F^2	R^2	Q^2
DL -> SHSI	0.867	29.282	0.000	3.029	0.752	0.751

Source: SPSS V.28.

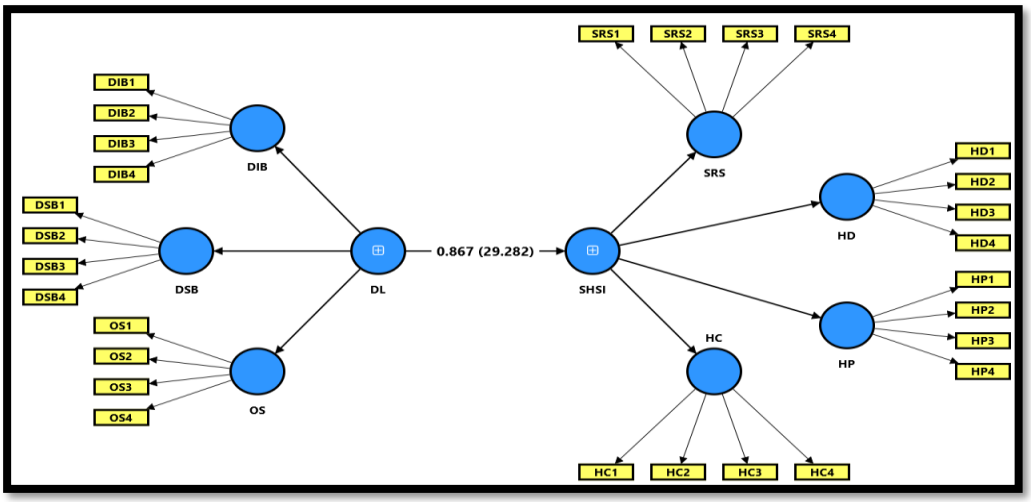

Figure (3) shows the impact analysis between digital leadership and smart HR practices supported by the Internet of Things.
Source: "Smart Pls.4 ".

2.Second main hypothesis

There is a statistically no significant effect of digital leadership on smart human resource management practices supported by the Internet of Things.

Table (6) shows the results of the impact analysis of the dimensions of digital leadership together in smart human resource management practices supported by the Internet of Things, showing that the innovative digital behavior (DIB) dimension reached an impact coefficient (β = 0.215) with a value of (t = 2.455) and statistical significance (P = 0.014), indicating that leaders' digital knowledge and proactive behavior contribute to enhancing smart human resource practices, although its impact is relatively limited compared to other dimensions (F^2 = 0.083). Digital support behavior (DSB) had the highest impact (β = 0.390) with a value of (t = 4.423), a significance level (P = 0.000), and an effect size (F^2 = 0.171), reflecting that providing technological infrastructure, empowering employees, and supporting electronic applications represent the strongest pillar in driving human resources toward adopting smart practices.

The organizational sustainability (OS) demonstrated a statistically significant effect with (β = 0.338), a t-statistic of (t = 4.349), and p-value (p = 0.000) along with an effect size of (f^2 = 0.137) indicating that developing a flexible digital platform to track employee performance and maintain open lines of communication among all employees is key to the success of Smart HRM strategies. On a larger scale, the R^2 of .775 demonstrates that the combined dimensions of digital leadership explained 77.5% of the variance in Smart Human Resource Management (HRM) practices. The Q^2 for this model was .739; this suggests that this model has good predictive power and can be applied as such. The findings demonstrate that Digital Leadership is not just adopting new technologies, but rather it represents an integrated system in which there are institutional supports, sustainability, and conversion of digital knowledge to tangible practical applications in the areas of recruitment, training, performance, and compensation. The findings of this research also illustrate an important paradigmatic change in how we think about leadership and what it means to be a leader, with an increasing emphasis on the integration of technology (Internet of Things) into how we understand the human component of work and leadership. Thus, HR will become hybrid, consisting of both human and digital intelligence, and "digital" or "internet-based" leadership will become a strategic philosophy for organizations, that will redefine their competencies as their ability to adapt and innovate sustainably in a rapidly changing world.

Table (6) Impact Analysis of Digital Leadership Dimensions Together in Smart HR Practices Supported by the Internet of Things

Paths of Influence	β	t	P values	F^2	decision	R^2	Q^2
DIB -> SHSI	0.215	2.455	0.014	0.083	statistical function	0.775	0.739
DSB -> SHSI	0.390	4.423	0.000	0.171	statistical function		
OS -> SHSI	0.338	4.349	0.000	0.137	statistical function		

Source: SPSS V.28.

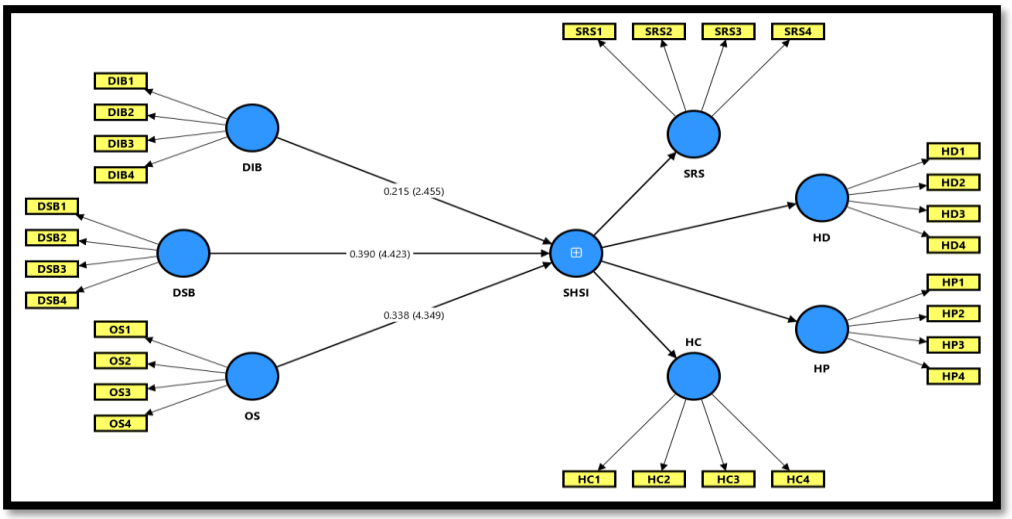

Figure (4) shows the impact analysis of the dimensions of digital leadership together in smart human resource management practices supported by the Internet of Things.

Source: Smart PLS 4.

3-5: Unique Contributions of the Current Study

The findings of this study are consistent with the conclusions reached by (Alnuaimi et al., 2022)[77] that successful digital transformation relies on leadership, organizational agility, and digital strategy. In the current study, digital leadership emerged as the primary driver of smart human resources operations, reflecting the same perspective in the context of Arab government administration—a topic rarely addressed by scientific research.

The current study also differs from many international studies in that it adopts an integrative model linking digital leadership to smart human resource management practices supported by the Internet of Things within the framework of an explanatory relationship, whereas most international studies address these variables individually or within mediation models. Dash et al. (2019)[78] noted that the Internet of Things represents a new model for human resource management in the context of the Fourth Industrial Revolution; however, studies linking this trend to digital leadership in the Arab context are virtually nonexistent, which underscores the originality of the current study.

The current study made a qualitative contribution in two main dimensions: first, the Arab governmental context, which lacks adequate representation in the global literature; as most studies have focused on the private sector in Asian economies. Second, it examined digital leadership and smart human resource management practices in an educational context, a context characterized by institutional and cultural specificities that differ fundamentally from those in foreign studies, thereby lending its findings added value.

4-Conclusions and Recommendations

4-1 Conclusions

1. The results of this study showed there is a statistical significance of how digital leadership can positively influence the adoption of smart HR practices through using IoT. Digital knowledge held by leaders shows the way in which they can lead the strategic integration of technology into their organizations and therefore enhance both the efficiency of their human capital and organizational resilience.
2. There is an identification of moderate levels of engagement of digital leadership. Therefore, there is evidence that there are discrepancies between investments made in IT and the needs of the digital revolution. In turn, there is evidence that due to the absence of technical support (regardless of whether or not such resources exist) will hinder the organization from keeping up with advancements being made in smart systems.
3. It appears from the findings that there exists a modest disposition towards the utilization of intelligent methods or approaches as it relates to Human Resources (HR) while simultaneously developing a strategic trend toward utilizing the Internet of Things (IoT) to support HR functions. Additionally, it was determined through this research that integrating IoT technology into HR processes could serve as a primary means to enhance service delivery for the Education Directorate located in Rusafa III."
4. Analysis also revealed that the statistical evidence supports the premise that digital leadership is one of the principal pillars supporting smart human resource management practices implemented by the Rasafa III Director-General of Education.

The results further indicated that an organization's ability to develop its organizational capacity, i.e., its ability to grow and improve, is significantly impacted positively by leadership orientation, which may include use of Internet of Things technology.

5. The results from regression show that Digital Leadership (innovative behaviours, digital support and organisation's sustainable), is responsible for 77.5% of the explained variation in Smart Human Resources Practices. The strong explanatory power of this model also indicates that leadership is an important enabler to achieve high level of maturation in recruitment, training and performance management with the use of smart technologies.

4-2 Recommendations

1. Promoting a culture of strategic awareness among managerial leaders within the Third Rusafa Education Directorate about the practical advantages that come with adopting Digital Leadership. Specifically, this will be centered around how Digital Leadership can serve as a requirement for successful Digital Transformation, and the need to maintain Institutional Competitiveness.
2. To institutionalize digital innovation methods, develop a framework of structured leadership support to encourage an effective digital work environment. The study also recommends developing a long-range organizational vision centered on Sustainability (based on international standards and best practices in digital excellence).
3. Design and implement customized capacity building programs for managers that are focused on the development of specialized technical competency related to the use of internet of things (IoT) artificial intelligence (ai), big data management and cybersecurity in order to address the present gap in digital skills.
4. Create an economic plan to help support a total digital transformation strategy that is to be lead by top management; this will be done with the goal of creating modernized digital platforms and incorporating ongoing improvements in smart HR processes.

5. In order to understand how digital leaders are using technology with the Internet of things (IoT) in different sectors such as the industrial, banking and health care sectors we need to conduct more prospective research that is comparative to establish a broader understanding of digital synergies between these sectors.

References

(1) Jalad, A. A. H. "Digital leadership and its role in digital transformation in the Palestinian sector." Master's thesis, Al-Quds University, 2023.

(2) Sabr, R. N. "The role of digital leadership in achieving organizational pride." Al-Ghari *Journal of Economics and Management Sciences* 20 (2024): 1624–1658.

(3) Al-Damati, Hamada A.-S. A. "The impact of digital leadership on strategic improvisation." *Arab Journal of Management* (2023): 1–19.

(4) Momani, K., A. M. Al Badarneh, R. Shishakly, B. M. Hamadneh, and M. A. Almaiah. "The effect of digital leadership in creating smart organizations in the Jordanian private universities." *International Journal of Innovative Research and Scientific Studies* 8, no. 2 (2025): 3364–3374.

(5) Strohmeier, S. "Smart HRM – a Delphi study on the application and consequences of the Internet of Things in human resource management." *The International Journal of Human Resource Management* (2018): 1–31.

(6) Zuchri, A., I. T. Agyei, E. S. Döngül, J. Abdussamadd, R. Raje, and F. Effendy. "Impact of Internet of Things (IoT) on human resource management: A review." Materials Today: Proceedings 56 (2022): 3534–3543.

(7) Kremer, K. "HR practices in the context of the Internet of Things." Strategic Management 27, no. 1 (2022): 34–42.

(8) Krejcie, Robert V., and Daryle W. Morgan. "Determining sample size for research activities." Educational and Psychological Measurement 30, no. 3 (1970): 607-610.

(9) Okunlola, J. O., and S. R. Naicker. "Digital leadership in education: A bibliometric analysis of research trends from 2010 to 2024." F1000Research 14 (2025): 2-18.

(10)Deshpande, B., and A. Beharay. "Leadership and management in the digital age." International Journal of Scientific Research in Engineering and Management (IJSREM) 9, no. 7 (2025): 1–8.

(11) Ming, G. K. "Assessing digital leadership of middle leaders in Malaysian primary schools." Journal of Research, Innovation, and Strategies for Education 2, no. 2 (2025): 1–10.

(12) Liu, Y., X. Li, J. C.-K. Lee, and J. Chen. "A bibliometric review of research on digital leadership, 1991–2025: Implications for digital leadership in education." Educational Management Administration & Leadership (2025): 1–22.

(13) Mieszajkina, E., and A. Myśliwiecka. "Digitization of small enterprises: Digital leadership." Scientific Papers of Silesian University of Technology: Organization and Management Series, no. 212 (2024): 383–401.

(14) Mohamad, N. I., A. S. Othman, N. Ibrahim, H. Hasan, and N. Dzulkalnine. "Digital leadership and job motivation: The mediating role of digital strategy in the public sector." *Journal of Southwest Jiaotong University* 60, no. 2 (2025): 142–161.

(15) Sagheem, M., S. Hassan, and Z. Latif. "The impact of digital leadership and digital resources on innovative working behavior." *Journal of Economics and Management Sciences* 5, no. 2 (2024): 80–96.

(16) Zhu, R., B. S. Alias, M. I. M. Hamzah, and J. A. Wahab. "Digital leadership in education." *Journal of Education and Learning* 19, no. 3 (2025): 1474–1483.

(17) Claire, J. "Impact of digital leadership on organizational resilience in the face of crisis: A study of the Netherlands." *International Journal of Leadership and Governance* 5, no. 3 (2025): 35–46.

(18) Alasqah, Wafa A., and Noureldin, Ahmed."The role of digital leadership in fostering innovation: A study on digital organizational culture as a mediator in Saudi higher education." *Journal of Commercial and Financial Research* 26, no. 3 (2025): 69–96.

(19) Mahfuuzhoh, M. N., B. T. Bisri, H. Risa, and M. A. Wardhana. "Leadership di era digital." Riset Ilmu Manajemen Bisnis dan Akuntansi 3, no. 3 (2025): 170–179.
(20) Saeed, Z. M. H. "A theoretical study of digital leadership and its role in enhancing job performance at the Islamic University in Najaf Governorate." *International Journal of Social Science Humanity & Management Research* 3, no. 12 (2024): 1626–1633.
(21) Jalad,op.cit.,17.
(22) Al-Damati, op.cit.,2.
(23) Sabr,op.cit.,1633.
(24) Momani et al.,op.cit.,3365.
(25) Sahaw, A. K. H. "Digital leadership as an approach to implementing e-human resource management practices: An analytical study." *European Journal of Management, Economics and Business* 2, no. 1 (2025): 83–111.
(26) Cui, J. "Empirical analysis of digital innovation's impact on corporate ESG performance: The mediating role of GAI technology." Manuscript (2025): 1–19.
(27) Tunaboylu, A., and C. Cubukcu Cerasi. "The impact of digital leadership on innovation performance: The mediating role of digitalization capability." WSEAS Transactions on Business and Economics 22 (2025): 1471–1481.
(28) Yang, M., M. Talha, S. Zhang, and Y. Zhang. "Exploring the mechanisms linking digital leadership to employee creativity: A moderated mediation model." Behavioral Sciences 15, no. 8 (2025): 2-22.
(29) Kokot, K., I. Đunđek Kokotec, and M. Klačmer Čalopa. "Digital leadership and maturity as a key to successful digital transformation: Country case study of Croatia." *TEM Journal* 12, no. 1 (2023): 192–199.
(30) Sabr,op.cit.,1633.
(31) Jalad,op.cit.,18.
(32) Sadiq, Z. M., and A. D. Faridon. "The role of supportive leadership in promoting job enrichment." *Journal of Kuwait University for Humanities and Social Sciences* 6, no. 2 (2023): 169–191.
(33) Oudat, W. A. K. "The impact of supportive leadership on institutional excellence." Master's thesis, Middle East University, 2024.
(34) Sagbas, M., O. Oktaysoy, E. Topcuoglu, E. Kaygin, and F. A. Erdogan. "The mediating role of innovative behavior on the effect of digital leadership on intrapreneurship intention and job performance." Behavioral Sciences 13 (2023): 2-20.
(35) Qing, C., and S. Jin. "Does ESG and digital transformation affect corporate sustainability? The moderating role of green innovation." Manuscript (2023): 1–24.
(36) Farhan, Abdulkareem T. "The impact of strategic agility on achieving organizational sustainability: An applied study in Yemeni private universities in Amanat Al-Asimah." Sana'a University *Journal of Human Sciences* 3, no. 5 (2024): 27–49.
(37) Ying, Y., and S. Jin. "Digital transformation and corporate sustainability: The moderating effect of ambidextrous innovation." Systems 11 (2023): 2-19.
(38) Büyükbeşe, T., T. Dikbaş, M. Klein, and S. Batuk Unlü. "A study on digital leadership scale (DLS) development." Kahramanmaraş Sütçü Imam Universities Sosyal Bilimler Dergisi 19, no. 2 (2022): 740–760.
(39) Fathony, H. A., and A. F. Hendarman. "The relationship between digital leadership and digital culture towards human capital readiness in the Industry 4.0 era." *American International Journal of Business Management* 6, no. 7 (2023): 123–135.
(40) Mithun, R., and Roopadarshini. "A study on impact of smart HRM in Bengaluru Smart City." *International Journal of Applied and Scientific Research* (IJASR) 1, no. 4 (2023): 417–426.

(41)Rusdi, S. D., I. R. Ismail, and R. M. Isa. "Unravelling smart HRM 4.0: A narrative review of progressive 4.0 technology integration in human resource management." Information Management and Business Review 16, no. 3S (2024): 415–423.
(42)Siddiqui, S., S. M. F. E. A. Siddiqui, and H. Zafar. "Clear HRM 4.0 for achieving organizational performance: A dynamic capability view perspective." *Journal of Asian Development Studies* 13, no. 4 (2024): 762–777.
(43) Zervas, I., and S. Triantari. "Digital HRM practices and perceived digital competence: An analysis of organizational culture's role." Digital 5 (2025): 2–37.
(44) Al-Faouri, Ehab H., Y. Abu Huson, Nidal M. Aljawarneh, and T. J. Alqmool. "The role of smart human resource management in the relationship between technology application and innovation performance." Sustainability 16 (2024): 2–15.
(45) Hussein, Luay K., and N. H. Abdullah. "Technology readiness of smart human resource management in Malaysia." Research in Management of Technology and Business 4, no. 1 (2023): 526–537.
(46) Sun, Y., and H. Jung. "Machine learning (ML) modeling, IoT, and optimizing organizational operations through integrated strategies: The role of technology and human resource management." Sustainability 16 (2024): 2–27.
(47) Kremer,op.cit.,38.
(48) Naidu, and T. Hemalatha. "Digital HRM and its significance in enhancing organizational performance through innovation." *IJFANS International Journal of Food and Nutritional Sciences* (2022): 1947–1954.
(49) Lhakard, P. "The wired workplace: Analyzing IoT's role in shaping the future of human resource management." Interdisciplinary Research Review 20, no. 2 (2025): 11–22.
(50) Ulfa, O. N. "The role of Internet of Things (IoT) on human resources in Industry 4.0." Formosa Journal of Science and Technology (FJST) 3, no. 11 (2024): 2515–2526.
(51)Pillai, R., and K. B. L. Srivastava. "Smart HRM 4.0 for achieving organizational performance: A dynamic capability view perspective." *International Journal of Productivity and Performance Management* (2022): 1–22.
(52) Al-Faouri et al.,op.cit.,3.
(53) Strohmeier,op.cit.,4.
(54) Zuchri et al.,op.cit.3536.
(55) Kremer,op.cit.,38.
(56) Ghosh, Prolay, and H. K. Manjula. IOT's contribution to an organization's overall recruitment and human resources management system. Bilaspur, India: Booksclinic Publishing, 2023.
(57) Mithun & Roopadarshini,op.cit.,418.
(58) Rusdi et al.,op.cit.,416.
(59) Padhye, P., N. Pandey, C. Mahaur, A. Gupta, R. Raj, and C. R. Mohan. "The role of the Internet of Things in improving human resource management practices in marketing companies." *Journal of Informatics Education and Research* 4, no. 2 (2024): 1175–1185.
(60) Kremer,op.cit.,39.
(61) lbid.,39.
(62) Rusdi et al.,op.cit.,416.
(63)Mithun & Roopadarshini, op.cit.,419.
(64) Mtotywa, M., and Z. Gamede. "Leveraging the Internet of Things to enhance employee productivity in operations: A conceptualization." *Expert Journal of Business and Management* 10, no. 2 (2022): 102–114.
(65) Yawson, R. M., D. Woldeab, and E. Osafo. "Human resource development and the Internet of Things." In Proceedings of the 25th Annual Academy of Human Resource Development International Research Conference in the Americas, Richmond, VA, USA, 2018, 1-25.

(66)Ahmić, A., and M. Ćosić. "Digital human resource management influence on the organizational resilience." Organization Management Journal 22, no. 2 (2025): 111-125.
(67) Rusdi et al.,op.cit.,92.
(68) El Saeed, M., H. M. Maarouf, and R. A. A. Younis. "The role of HRM service quality in the relationship between electronic human resource management and perceived performance." Future Business Journal (2025): 2–13.
(69) lbid.,3.
(70) Zuchri et al.,op.cit.3536.
(71) Seočanac, M. "SMART HRM 4.0: The digital transformation of human resource management in tourism." EJAE 22, no. 1 (2025): 18–31.
(72)Abed, Ahmed H., and Hadeel F. Abdel-Elaah. "Measuring the activities of human resources systems based on IoT using machine learning techniques." *Al-Ryada Journal for Computational Intelligence and Technology* (ARJCIT) 1, no. 1 (2024): 65–85.
(73)Abbu, Haroon, Paul Mugge, Gerhard Gudergan, Gerrit Hoeborn, and Alexander Kwiatkowski. "Measuring the Human Dimensions of Digital Leadership for Successful Digital Transformation." Research-Technology Management 65 (3):2022. 39–49. doi:10.1080/08956308.2022.2048588.
(74) Strohmeier, op.cit.16.
(75) Budhwar, Pawan, and Kamel Mellahi. "The State of HRM in the Middle East: Challenges and Future Research Agenda." Asia Pacific Journal of Management 37 (2019): 1–19,https://doi.org/10.1007/s10490-018-9587-7.
(76) Alexandro, Rinto. "Strategic Human Resource Management in the Digital Economy Era: An Empirical Study of Challenges and Opportunities among MSMEs and Startups in Indonesia." Cogent Business & Management .2025.12 (1). doi:10.1080/23311975.2025.2528436.
(77) AlNuaimi, Bader K., Sanjay Kumar Singh, Shengbin Ren, Pawan Budhwar, and Dmitri Vorobyev. "Mastering Digital Transformation: The Nexus between Leadership, Agility, and Digital Strategy." *Journal of Business Research* 145 (2022): 636–648 . https://doi.org/10.1016/j.jbusres.2022.03.038.
(78) Dash, Debabrata, Raouf Farooq, Jnyana Sunder Panda, and K. V. Sandhyavani. "Internet of Things (IoT): The New Paradigm of HRM and Skill Development in the Fourth Industrial Revolution (Industry 4.0)." *IUP Journal of Information Technology* 15, no. 4 (2019): 7–30.