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Structural Equation Modeling of AI Adoption and HR Effectiveness

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Abstract

This study investigates the transformative impact of Artificial Intelligence (AI) on Human Resource Management (HRM) within the IT sector of Tiruchirappalli, focusing on its ability to drive Time Saving and Cost Reduction (TSCR). Utilizing a structural model analysis, the research evaluates five critical AI dimensions—Attendance, Real-Time Experience, Accuracy, Computing Power & Capacity, and Automation—to determine their influence on operational efficiency. The findings indicate that while **Real-Time Experience** and **Computing Power** are the primary drivers of significant cost and time gains, and **Attendance** provides a minor but statistically significant benefit, both **Accuracy** and **Automation** failed to show a significant direct impact on TSCR. These results suggest that for Indian IT firms, the true value of AI currently lies in infrastructure strength and data immediacy rather than autonomous workflows alone. Consequently, the study concludes that AI-driven HRM is a strategic evolution that requires robust computational capacity and organizational readiness to translate technological potential into measurable financial and temporal advantages.

Keywords: Real-Time Experience , Computing Power, Accuracy , Automation

1. Introduction

As a futuristic technological dream, artificial intelligence (AI) has quickly transformed into a disruptive force reshaping contemporary organisations. Businesses are incorporating AI-driven systems across all industries to improve operational effectiveness, reduce expenses, and facilitate data-driven, real-time decision-making. Predictive analytics, robotic process automation, machine learning, and natural language processing are examples of technologies that are becoming more and more integrated into essential business operations. In addition to enhancing customer-facing services like recommendation engines, chatbots, and personalised marketing, these technologies revolutionise internal organisational systems like operations, finance, and human resource management. According to Wamba-Taguimdje et al. (2020), gaining a sustained competitive edge in digital economies now requires the strategic application of AI. Businesses that successfully use AI can increase agility, innovate more quickly, and add value through better analytics and intelligent automation.The IT industry in India is a particularly pertinent setting for studying AI-driven change. People have long praised India's IT sector for its early adoption of new technologies, global service

delivery model, and technological innovation. Not only do large companies like Tata Consultancy Services, Infosys, Wipro, and HCL Technologies offer AI-based solutions to clients around the world, but they also internally implement AI systems to optimise their own HR procedures. The Indian IT sector is a unique and dynamic context for researching the organisational impact of artificial intelligence because of its dual role as AI innovators and AI users. Its significance is further reinforced by the IT sector's contribution to India's economic expansion. The industry makes a substantial contribution to the GDP, export revenue, and creation of jobs in the nation. HR departments in IT companies oversee a sizable, geographically scattered, and culturally diverse workforce of millions of professionals working in a variety of positions ranging from software development to data science and project management. Traditional HR procedures have been redefined by the use of AI for HR functions, including digital performance management, automated learning platforms, predictive attrition modelling, recruitment analytics, and AI-powered applicant tracking systems. Faster candidate screenings, data-driven hiring decisions, individualised staff training, and better workforce planning are all made possible by these technologies. However, incorporating AI into HR tasks is a strategic and cultural shift rather than just a technical one. By using AI-generated insights to support organisational decision-making, HR departments are evolving from administrative roles to strategic partnerships. Simultaneously, ethical issues pertaining to algorithmic bias, data privacy, transparency, and employee trust have become important factors. Indian IT companies that operate in international markets have to take into account local workforce expectations and sociocultural dynamics while also adhering to international regulatory frameworks. Additionally, firms are depending more and more on AI-enabled HR systems to draw in, keep, and nurture top talent as digital competition heats up. Predictive analytics assists businesses in anticipating future skill requirements and creating focused reskilling initiatives in a field marked by high employee mobility and rapid skill obsolescence. AI-driven learning management systems allow for continuous learning that is in line with changing technological demands by personalising training programmes. Maintaining long-term competitiveness requires this alignment between the development of human capital and the adoption of AI.

2.Theoretical background of study

After nearly sixty years of development, artificial intelligence (AI) has progressed from experimental laboratories to integral components of organisational and social life. AI has become more and more common over the past twenty years, changing the way people live and the way businesses work (Morgenstern et al., 2021). Artificial intelligence (AI) technologies are no longer just for research; they are now used in many fields, including medicine, engineering, agriculture, tourism, transportation, and business management (Mintz & Brodie, 2019). Haenlein and Kaplan (2019) point out that AI has firmly entered both public institutions and private businesses, and it is now a key driver of digital transformation. It's important to note that modern AI applications are not a universal or one-size-fits-all solution. Instead, AI is a "toolkit" or workshop made up of many different technologies, like machine learning, natural language processing, robotic process automation, computer vision, and predictive analytics. Each of these technologies is made to do a certain job or task. These tools are built into software systems, intelligent platforms, and smart devices

that have easy-to-use interfaces that make them accessible and scalable in all industries. Companies only use AI when it fits with their goals, needs, and level of technological readiness. This approach renders AI a versatile tool rather than a universally applicable solution. AI is changing both personal and professional life in a big way, and it's happening very quickly. AI affects people's daily lives by using digital assistants, recommendation systems, and automated services. AI is changing the way companies interact with their employees and customers on a larger scale. It is changing business models, workflows, and ways of communicating. This tech revolution is changing when, where, how, and by whom people work (Ravin, 2017). Digital innovation is changing the way we work by making remote work technologies, smart scheduling systems, and AI-driven collaboration platforms more common.

Industries all over the world are going through big changes in how they use digital technology. One of these changes is a strategic shift toward decision-making processes that use AI. More and more businesses are using AI-powered analytics to make their predictions more accurate, make better use of their resources, make the customer experience better, and drive long-term growth (Varsha, 2023). In this situation, AI is not just a tool for getting things done; it is also a strategic asset that can give a company an edge over its competitors. As a result, businesses must improve their digital infrastructure, structural frameworks, and management skills to keep up with AI-driven environments. A key part of this change has to do with human resources and workforce development. Integrating AI requires employees to make big changes to their skills, abilities, and adaptability. Companies need to invest money in programs that teach employees new skills and improve their current ones so that they can work well with smart systems (Wiradendi Wolor, 2020). Skills like being able to read and understand data, think critically, adapt to new technologies, and solve problems are becoming more and more important. For AI to work well, the company needs to be able to balance technological progress with the growth of its employees. Even though there are problems like algorithmic bias, worries about data privacy, resistance to change, and high costs of implementation, companies are still very interested in using AI in their Human Resource (HR) functions. Studies show that the perceived benefits of using AI, like better hiring, data-driven performance management, predictive workforce planning, and higher employee engagement, often outweigh the risks and problems that come with it (George & Thomas, 2019). AI-enabled HR systems make administrative tasks easier, cut down on mistakes made by people, and give useful information that helps with strategic decision-making. For AI to reach its full potential, businesses need to go through a slow but thorough change process that gets workers ready to work well with smart machines. This change will take a lot of time and will require careful planning, adapting to new cultures, and ongoing learning efforts. Mathipriya et al. (2019) stress that the long-term benefits, such as higher productivity, more innovation, and more flexibility in the workplace, are very important. In the end, the success of AI in HR and other parts of the organization depends on finding a balance between new technology and management practices that put people first. Intelligent automation should enhance, not replace, human potential. Artificial Intelligence (AI) has become a much bigger part of Human Resource Management (HRM), changing how companies plan, carry out, and judge HR processes. HRM used to be seen as a way to help with administrative tasks, but it has now become a strategic partner that directly affects the performance and long-term viability of organisations. At the same time, AI has

changed from a simple tool for calculations or searches into a complex set of smart technologies that can imitate some parts of how people think and make decisions. The combination of these two fields has led to the development of AI-powered HR systems that improve efficiency, accuracy, the creation of strategic value and Cost effectiveness

The rapid growth of organisational data about workforce planning, performance metrics, employee engagement, compensation structures, and talent analytics is what is driving AI integration in HRM. AI offers advanced analytical tools to help organisations make sense of the huge amounts of structured and unstructured data they collect. It can find patterns, make predictions, and help people make decisions based on evidence. Votto et al. (2021) says that this integration makes sustainable business frameworks stronger by aligning HR strategies with insights based on data. Instead of just going with their gut or what has worked in the past, HR managers can use predictive analytics and machine learning models to make their employees more productive.

One of the most well-known uses of AI in HRM is hiring and finding new talent. AI-powered applicant tracking systems, resume screening algorithms, and chatbots make the hiring process easier by quickly finding the best candidates from a large pool of applicants. This shortens the time it takes to hire someone and makes the selection process more accurate. According to Meshram (2023), using AI makes it easier to find highly skilled people, which make hiring faster and fairer. When properly monitored, intelligent systems can look at a candidate's skills, behavioural indicators, and cultural fit to make hiring decisions that are better and less biased than humans. AI is changing performance management systems in addition to hiring. Advanced analytics tools look at trends in employee performance, productivity metrics, and levels of engagement in real time. Khaled et al. (2023) and Hemalatha et al. (2021) say that smart AI technologies bring new ways to manage people, allowing companies to find performance gaps, plan targeted interventions, and make sure that individual goals are in line with company goals. This leads to better accountability, openness, and overall performance of the company.

2.1Training and growth

AI has also had a big effect on training and development. AI-powered learning platforms tailor training programmes by assessing unique skill deficiencies, learning styles, and professional goals. Chen (2022) says that AI-powered training systems help businesses become knowledge-based organisations that can offer personalised and flexible learning experiences. Organisations can improve the quality of learning and make sure that skills keep growing by using smart recommendation engines and automated progress tracking. This is especially important in industries that change quickly. The growing use of AI in HRM is because it can benefit many people, such as customers, employees, and the company as a whole (Chowdhury et al., 2023). AI lets HR professionals focus on strategic initiatives like talent development, organisational culture, and employee engagement by automating repetitive administrative tasks. This change is part of a bigger change in HRM, which has gone from a routine job that includes hiring and firing to a strategic partner that helps the business grow and stay competitive. Updating technology , This change has

happened even faster because of technological progress. The creation of Human Resource Information Systems (HRIS) was a big step toward making HR processes digital. As internet technologies and computing power improved, HRIS became more advanced Tactical HRIS (T-HRIS) platforms that used AI (G.M. & Suganthi, 2022). These systems combine data from different levels of the organization, such as personnel records, task assignments, and performance metrics. This makes it possible to do full analytics and make smart strategic plans. Most people think that using AI in HRM is a good step forward because it tries to get the most value for the least amount of money (Kalia & Mishra, 2023). AI improves operational efficiency and supports sustainable business models by combining automation with smart analysis. But for AI to work well, you need to carefully think about ethical standards, how ready your employees are, and how to handle changes. To keep employees' trust and maintain the integrity of the organization, AI-driven decisions must be open, fair, and accountable. In conclusion, adding AI to HRM is a big change in the way human resources are managed. AI-driven systems are changing how HR works in many ways, including hiring, evaluating employees' work, training, and planning for the future. As businesses work in environments that are becoming more unstable and complicated, AI-powered HRM gives them the flexibility, accuracy, and strategic insight they need to stay ahead of the competition and achieve organisational excellence.

3.1 Research methodology

The present study adopts a descriptive research design to examine the outcomes of Artificial Intelligence (AI) adoption in Human Resource Management (HRM) practices and to analyze the relationships among selected variables. The descriptive design is appropriate because the study aims to systematically describe existing conditions and measure the impact of AI-driven HR practices without manipulating any variables. The study is based on both primary and secondary data. Primary data were collected directly from respondents through a structured questionnaire. Secondary data were gathered from academic databases and scholarly sources such as Scopus, Emerald, Elsevier, Google Scholar, research reports, and open-access journals to ensure conceptual clarity and updated knowledge on AI in HRM.

Area of the Study-The research is confined exclusively to selected IT companies located in Tiruchirappalli (Trichy), Tamil Nadu. The city has witnessed steady growth in IT-enabled services and digital adoption, making it a suitable setting for studying AI integration in HRM practices. The focus is specifically on IT firms where AI technologies are actively used in HR-related operations such as attendance systems, automation, analytics, and workforce management.

Population, Sampling Technique, and Sample Size-The target population consists of employees working in selected IT companies in Trichy that have adopted AI-based HR systems. A convenience sampling method was employed to collect data due to accessibility and practical feasibility. Using this method, primary data were collected from 174 IT employees in Trichy city. The respondents represent different organizational levels to ensure a comprehensive understanding of AI-driven HR practices.

4.1 Hypotheses of the Study

There is a significant impact of Attendance System on Time Saving and Cost Reduction in selected IT companies in Trichy city.

There is a significant impact of Real-Time Experience on Time Saving and Cost Reduction in selected IT companies in Trichy city.

There is a significant impact of Accuracy on Time Saving and Cost Reduction in selected IT companies in Trichy city.

There is a significant impact of Automation on Time Saving and Cost Reduction in selected IT companies in Trichy city.

There is a significant impact of Computing Power & Capacity on Time Saving and Cost Reduction in selected IT companies in Trichy city.

Structural Equation Model

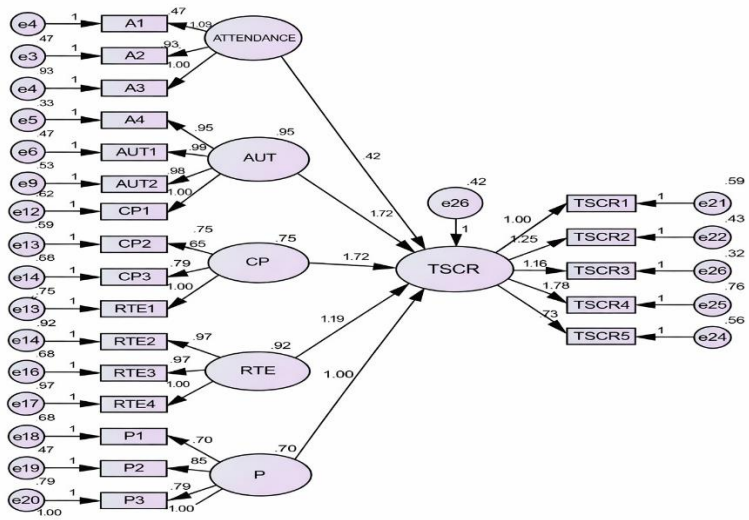

Figure 1

Table 1 : Structural Model Results

TSCR	<—	Attendance	0.09	0.044	2.057	0.04**	H1- supported
TSCR	<—	Real-Time Experience	0.422	0.06	7.042	<0.001**	H2-Supported
TSCR	<—	Accuracy	0.049	0.035	1.393	0.164	H3-Not supported
TSCR	<—	Computing Power & Capacity	0.194	0.05	3.887	<0.001**	H4- Supported
TSCR	<—	Automation	−0.025	0.058	−0.425	0.671	H5-Not supported

5.1 Structural Model Results and Hypotheses Testing

The structural model was scrutinised to assess the influence of AI-driven HRM dimensions on Time Saving and Cost Reduction (TSCR) within IT firms in Tiruchirappalli. To test the proposed hypotheses, the standardised regression weights, standard errors, Critical Ratios (C.R.), and significance levels were looked at. The results show that attendance has a positive and statistically significant effect on TSCR ($\beta = 0.09$, C.R. = 2.057, $p = 0.04$). H1 is supported because the p-value is less than 0.05. This means that AI-based attendance systems help some IT companies run more smoothly by saving time and money on administration. Real-Time Experience also has a strong and very important positive effect on TSCR ($\beta = 0.422$, C.R. = 7.042, $p < 0.001$). H2 is strongly supported because the p-value is less than 0.001. This result implies that real-time data processing and prompt system responsiveness substantially improve time efficiency and cost optimisation in HR functions. Accuracy, on the other hand, does not have a statistically significant effect on TSCR ($\beta = 0.049$, C.R. = 1.393, $p = 0.164$). H3 is not supported because the p-value is greater than 0.05. This means that even though AI systems might make data more accurate, the current model doesn't show that accuracy directly leads to measurable time and cost savings. The analysis also shows that computing power & capacity have a positive and important effect on TSCR ($\beta = 0.194$, C.R. = 3.887, $p < 0.001$). So, H4 is true. This finding indicates that superior system processing capabilities and computational efficiency augment operational velocity and diminish processing-related expenses. Automation, on the other hand, has a negative and statistically insignificant relationship with TSCR ($\beta = -0.025$, C.R. = −0.425, $p = 0.671$). H5 is not supported because the p-value is much higher than 0.05. This means that automation by itself may not directly save time and money unless it is backed up by good implementation plans and the organisation is ready for it.

6.1 Managerial Implications

The most important thing for managers to remember is how much real-time experience and computing power can affect the bottom line. Companies should go beyond just digitising records and invest in high-performance AI infrastructure that gives them instant feedback on their data. This will save them a lot of time and money. The strong statistical support for these dimensions suggests that the value of AI in HRM lies in its ability to provide immediate "live" insights, allowing managers to make rapid, data-driven decisions that prevent costly delays. So, leaders should put more money into high-capacity cloud computing and real-time analytics dashboards than just "static" AI tools. Also, the fact that the Accuracy and Automation hypotheses do not get any support is a strategic warning. Managers need to know that accuracy alone doesn't mean efficiency; high-quality data only saves money if it is part of a streamlined workflow that leads to action. The negative and unimportant effects of automation also suggest that IT companies may be automating too many processes without making sure that the organisation is ready or that employees are on the same page. This "automation paradox" means that just replacing human work with AI can cause hidden costs, like system friction or the need for constant manual overrides. To close this gap, HR managers should focus on strategic implementation, which means making sure that automation is used to fix specific

problems instead of being used as a general solution. Managers can make sure that technology helps productivity instead of being a technical burden by making sure that AI works with human oversight, especially when it comes to attendance and real-time monitoring.

7.1 Conclusion - The study confirms that AI-driven HRM is a complex tool, but its parts do not all help save time and money (TSCR) equally. Real-time experience and computing power & capacity are the main things that make things more efficient, and they also give the best return on investment. Attendance tracking does help in a statistically significant way, but it's not as important as the infrastructure's raw processing power and the fact that data is available right away. It's interesting that accuracy and automation do not seem to matter. This could mean that there is a "maturity gap"—the IT companies may have the tools, but without proper integration or a strategy that focuses on people, these specific areas do not lead to measurable financial or time savings.

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