

# How Does Digital Human Resource Management Influence Inventory Optimization? Exploring the Mediating Role of Drug Delivery Performance

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## ABSTRACT

This paper seeks to explore the effects of Digital Human Resource Management on Inventory Optimization performance with special emphasis on the mediating variable of the drug delivery performance. The paper focuses on the role of the Digital Human Resource Management capabilities in improving the Inventory Optimization-related results by enhancing the efficiency and effectiveness of the drug delivery process. The research is based on the Resource-Based View (RBV), which implies its quantitative approach and employs a structured questionnaire that will be distributed to the employees in the pharmaceutical, hospital, and healthcare supply chain operations. The hypothesized Digital Human Resource Management, drug delivery performance and Inventory Optimization performance relationships were tested using structural equation modelling, which was implemented using the partial least squares (PLS-SEM) method. The results indicate that there is a positive significant influence of Digital Human Resource Management on the Inventory Optimization performance. The findings also justify the fact that the performance of drug delivery is a mediator in this relationship, which means that an increase in speed, coordination, availability, and reliability of drug delivery strengthens Inventory Optimization results. The research also recommends that organizations should enhance Inventory Optimization performance not by direct investment in Digital Human Resource Management, but also by strengthening delivery systems that will guarantee timely and precise flow of pharmaceutical products. The study has weaknesses such as cross-sectional design and self-reported data, which could restrict the applicability of the results and cause the effect of response bias. Longitudinal design could be used to carry out future studies and analyse other mediation or moderating factors in healthcare and pharmaceutical supply chains. This research forms part of the literature since it introduces the use of RBV to the cross-examination of Digital Human Resource Management, logistics performance, and Inventory Optimization management besides providing effective information to managers aspiring to enhance operational performance in the context of medicine supply systems.

**Keywords:** E-Recruitment and Selection, E-Training and Development, E-Performance Appraisal, Inventory Optimization, Drug Delivery Performance

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## I. INTRODUCTION

The medical and drug industries have been more reliant on digital systems to ensure the continuation of operations, service provision, and product supply [1]. Inventory Optimization management has become one of the most significant operating priorities in a setting where the patient expectation, demand fluctuation, high regulatory standards, and the necessity of access to medicines promptly have become the top priorities [2]. The health care organizations are constantly pressurized to make sure that necessary drugs

are provided at the appropriate time, place, and in the appropriate amount. Any flaw in Inventory Optimization performance can result in stockouts, overstocking, spoiled goods, delayed treatment and unjustified operation expenses [3]. Therefore, there has been an increasing trend in literature and practice to find more efficient ways of enhancing Inventory Optimization performance [4]. Digital Human Resource Management has been cited as one of the key factors contributing to operational enhancement of healthcare supply chains. The increased adoption of digital

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systems, electronic databases, enterprise resource planning systems, barcode systems, real-time tracking systems, and integrated information networks have changed how healthcare organizations track the stock, process Inventory Optimization data, and coordinate pharmaceutical flows. Digital Human Resource Management using these applications can be used to create more visibility, improve the accuracy of information, minimize errors of manual kind, aid in forecasting, and lead to quicker decision making in Inventory Optimization operations [5]. These features are especially relevant to pharmaceutical settings, where mistakes in Inventory Optimization management might have a direct impact on service availability and patient care. With these developments, Digital Human Resource Management alone is not necessarily the right way to accomplish better Inventory Optimization results [6]. The digital systems could deliver the right and timely information, but the Inventory Optimization performance could be poor when the movement of drugs across the supply chain is slow, inconsistent, or poorly coordinated. Drug delivery performance, in this respect, forms a key performance mechanism, where the translation of technological investments into the actual Inventory Optimization improvements can take place. The timely, precise, and reliable delivery of medicines will help healthcare organizations to keep their stocks on track, shorten the refill time, enhance the turnover rates, and react to the demand variability more efficiently. Conversely, the performance in drug delivery can be weak and therefore erode the Digital Human Resource Management advantage even in presence of advanced systems. Even though the literature has investigated the significance of Digital Human Resource Management in the supply chain and Inventory Optimization management, most of the previous studies have concentrated on direct associations between electronic systems and operational performances [8]. Little has been done to capture the mediating processes that clarify the effect of Digital Human Resource Management in enhancing Inventory Optimization performance in healthcare and pharmaceutical environments. Specifically, the area of drug delivery performance has not been sufficiently considered as an intervening variable between technological capability and Inventory Optimization-related outcomes. The literature available tends to isolate Inventory Optimization management and delivery operations as independent entities, not taking the interaction of these two factors in the context of a particular explanatory model. This brings a gap in the knowledge about the role of Digital Human Resource Management in improving Inventory Optimization performance in terms of operations delivered [9]. To this end, the current research tries to fill this gap by investigating the effects of Digital Human Resource Management on the

performance of Inventory Optimization in the context of the mediating effects of drug delivery performance. It is presumed by the study that technology capability is not beneficial to Inventory Optimization performance by acting only directly, but also by helping to create more synchronized, timely, accurate, and reliable drug delivery operations [10]. By so doing, the research brings a more detailed expoundation of the correlation between the digital systems and Inventory Optimization outcomes in healthcare and pharmaceutical activities. This research has its significance based on theory and practice [11]. Theoretically, the research provides the existing amount of information about digital operations and healthcare logistics by incorporating drug delivery performance as the mediating variable between Digital Human Resource Management and Inventory Optimization performance. It builds on existing knowledge by applying technological and logistics thinking in a unified analysis [12]. Practically, the research can give valuable ideas to hospital managers, pharmaceutical distributors, supply chain decision makers, and healthcare planners who want to enhance medicine availability and Inventory Optimization effectiveness using digital transformation initiatives [13]. It highlights that investments made in Digital Human Resource Management ought to correspond with delivery performance capability to produce significant changes in Inventory Optimization operations. This research is guided by three major objectives. First, the paper will look into how Digital Human Resource Management directly influences Inventory Optimization performance. Second, it examines how Digital Human Resource Management impacts performance in drug delivery [14]. Third, it tests the mediation of drug delivery performance on the relationship between Digital Human Resource Management and Inventory Optimization performance. Using these purposes, research will help to gain a better understanding of how digital capability can help to achieve operational efficiency in medicine supply systems.

The research questions to be utilized to meet these objectives are as follows:

**RQ1:** How does Digital Human Resource Management influence the performance of Inventory Optimization?

**RQ2:** How is there a connection between Digital Human Resource Management and drug delivery performance?

**RQ3:** Does the performance of drug delivery mediate the Digital Human Resource Management -Inventory Optimization performance relationship?

The paper has several significant contributions. It creates an integrated model, which connects Digital Human Resource Management, drug delivery performance, and Inventory Optimization performance in a healthcare and pharmaceutical environment. It is also a reaction to the

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requirement to have more explanatory models which go beyond simple direct-effect assumptions. Practically, the research results can be used to make organizations build stronger Inventory Optimization performance through appreciating the fact that value of Digital Human Resource Management does not just lie in the adoption of a system, but also on the quality of delivery performance. The analysis thus adheres to a more functional approach to digital transformation, an approach that relates information systems with the physical transport of pharmaceuticals.

This study will be quantitative and use data gathered out of employees who have been working in the field of healthcare logistics, pharmaceutical distribution, Inventory Optimization management, and similar operation processes. Through an analysis of the relationship between technological capability, performance of delivery and Inventory Optimization performance, the research aims at giving evidence that could aid in making improved decisions in terms of supply chain management within the healthcare industry. The rest of the research summarizes the literature available concerning Digital Human Resource Management, drug delivery performance, and Inventory Optimization performance, and formulates the conceptual framework and hypotheses of the research.

### II. LITERATURE REVIEW & HYPOTHESES DEVELOPMENT

#### 1. *E-Recruitment and Selection and Inventory Optimization Performance*

One of the most significant dimensions of Digital Human Resource Management in organizations is the E-Recruitment and Selection. It is the degree to which an information system can be trusted, easy to operate, flexible, accessible and able to carry out transactions effectively [15]. The quality of the systems in healthcare and pharmaceutical operations defines the possibility of digital platform-based Inventory Optimization-related decisions made without delays, interruptions, and technical failures. The system with high quality allows users to find the information about stocks fast, change Inventory Optimization records properly, and organize the replenishment process in various units [16]. It is especially crucial in the setting where the lack of Inventory Optimization or its overstocking can directly affect the performance of patient care and operations. Operationally, Inventory Optimization performance is the capability of an organization to keep the optimal inventories, minimize wastages, avoid stockouts, and make the needed materials available when they are needed. These results can be enhanced with the help of strong E-Recruitment and Selection which improves the processing of transactions, helps in Inventory Optimization visibility and minimizes the

reliance on manual processes [17]. Inventory Optimization personnel can more easily track movement and recognize shortages as well as make prompt decisions on replenishment when systems are reliable and responsive. Conversely, the poor quality of system can introduce data latency, redundancy, and inaccuracies which adversely impact the Inventory Optimization control and efficiency [18]. The literature in the digital operations explains that the nature of the system is closely linked with enhanced performance of the process since technological effectiveness defines the quality of daily operational processes. In pharmaceutical and healthcare supply chains, when decisions on Inventory Optimization are very sensitive to time and accuracy, the quality of the system can be used as a bottom capability to enhance stock management [19]. Thus, there should be a positive effect of improved E-Recruitment and Selection on Inventory Optimization performance. Based on this, the hypothesis is the following:

**H1** : E-Recruitment and Selection has a significant positive effect on Inventory Optimization performance.

#### 2. *E-Training and Development and Inventory Optimization Performance*

The E-Training and Development can be defined as the accuracy, timeliness, completeness, relevancy and usefulness of the information produced by the system to decision making [20]. The quality of information is required in Inventory Optimization management since the stock planning and replenishment will be based on the constant availability of reliable and current information [21]. Any wrong or obsolete data in pharmaceutical activities can lead to severe inefficiencies, including overstocking, understocking, avoidable expiry, and medicine availability interference. Because of this reason, the quality of information is usually regarded as a strategic factor of operational efficiency [22]. The Inventory Optimization performance is enhanced when the decision makers have accurate and complete information about the stock quantities, product demand patterns, replenishment cycles and products flow. Good-quality information will help the organization to make predictions on demand more efficiently, align procurement decision-making with the reality and hold the right amount of safety stock. E-Training and Development also helps traceability and enhance responsiveness to changes in supply and demand conditions in hospital pharmacies, pharmaceutical warehouses, and medicine distribution centers [23]. It eliminates uncertainty and allows the managers to make superior decisions on the stock allocation and replenishment schedule. The information systems literature has always shown that value of technology is not just in the presence of the system itself but also in the quality of the products that the system

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generates. In this situation when Inventory Optimization performance is defined by daily transactional information, E-Training and Development is a direct factor to the operational efficiency [24]. Thus, companies that have greater E-Training and Development are likely to have a superior Inventory Optimization performance. Based on this, the hypothesis presented below is follows:

**H2:** E-Training and Development has a significant positive effect on Inventory Optimization performance.

### *3. E-Performance Appraisal and Inventory Optimization Performance*

The concept of E-Performance Appraisal in the Digital Human Resource Management background can be described as the support rendered to the users of digital systems [25]. It encompasses responsiveness, technical support, fixing problems, providing directions, and the capability of IT staff or service providers to make sure that the systems are used in a continuous and efficient manner [26]. The quality of service in organizations that rely on digital systems to manage Inventory Optimization is of special concern since well-planned systems can fail to produce benefits of operation in the cases when users are not properly maintained [27]. The Inventory Optimization operations in healthcare and pharmaceutical supply chains can include several departments, users, and technical procedures. The success of the activities is determined in part by the availability of timely help to system users who have technical problems or operational deficits. Good services increase the downtime reduction, user confidence, and use consistency of Inventory Optimization systems within organisations. This support is capable of enhancing the quality of stock reporting, accuracy in transactions and the coordination of procurement, warehousing and delivery function [28]. In comparison, a low-quality of service can obstruct working process, slow down decision making and diminish the utility of the digital systems. E-Performance Appraisal role is particularly pertinent in the complicated environment where the Inventory Optimization management is directly related to logistics and product distribution [29]. An IT support responsive role will enable users to ensure that they have consistent operations, address the issues with their system promptly, and keep using information tools to aid in Inventory Optimization decisions. In these regards, the quality of the services can be of help to the efficiency of the Inventory Optimization management and stock supply [30]. Thus, the next hypothesis is as follows :

**H3 :** E-Performance Appraisal has a significant positive effect on Inventory Optimization performance.

### *4. Digital Human Resource Management and Drug Delivery Performance*

Drug delivery performance is a measure of the capability of the healthcare and pharmaceutical systems to deliver medicines to the point of use at the right time, reliably, safely and accurately [31]. It indicates the level of performance in the transportation of pharmaceutical products in storage facilities to the healthcare facilities, pharmacies, clinics or the final consumers [32]. The performance of drug delivery is an important operational outcome because it directly influences service continuity, treatment access by patients, and efficiency of medicine distribution systems. Digital Human Resource Management can significantly enhance the performance of drug delivery by facilitating coordination, visibility and communication throughout the pharmaceutical supply chain [33]. Digital systems help the organizations to trace the drugs movement, their delivery status, dispatch schedules, transactions and minimize the errors in routing and documentations [34]. During the time when there is a good E-Recruitment and Selection, E-Training and Development, and E-Performance Appraisal, the delivery operations will be more likely to be more accurate and responsive. The integration between warehouses, pharmacies, procurement units, and transport systems can also be realized with the help of technology and help to minimize delays and increase the level of reliability of deliveries [35]. According to the literature on logistics and digital operations, the Digital Human Resource Management improves the distribution operations in terms of real time data sharing and synchronization of processes. This implies that the movement of medicines within healthcare settings will be more efficient and precise to the targeted destinations. Due to the high dependency on information flow and coordination to achieve the desired performance in delivery, it is logical to assume that the enhancement of drug delivery outcomes is influenced by the improved Digital Human Resource Management capacity [36]. In this respect, the hypothesis is the following :

**H4 :** Digital Human Resource Management has a significant positive effect on drug delivery performance.

### *5. Drug Delivery Performance and Inventory Optimization Performance*

Inventory Optimization performance is closely linked to drug delivery performance since the efficiency of processes of replenishment and movements directly determines the results of stock availability and stock control. The transfer between the supply system of medicines is not only a determinant of Inventory Optimization performance but also a result of storage or procurement decisions. When the delivery operations are correct and punctual, healthcare organizations will be able to replenish their stock on-demand and minimize shortages and ensure the continuity in the availability of medicine. Conversely, inefficient

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performance in delivering services might result in delays, misplaced stock, and the inequalities in stock levels. The connection between delivery and Inventory Optimization is of particular importance in pharmaceutical systems since in these cases, the movement of medicines should be coordinated and in time-sensitive and quality-sensitive conditions. Dependable delivery helps to maintain smooth rotation of stock, minimize emergency shortages and maximize use of Inventory Optimization. It also enhances trust in the supply process, and enables the managers to work with more efficient inventories. Therefore, the performance of drug delivery is not a simple logistics result, and it is an operating mechanism that leads to the effectiveness of the Inventory Optimization. The current studies in the supply chain management indicate that the quality of distribution efficiency and order fulfillment are one of the key factors in the stock performance. This relationship is all the more significant in a healthcare facility, since the failure of delivery can influence the efficiency of work and treatment adherence. Hence, a better drug delivery performance should enhance Inventory Optimization performance. In that way, the given hypothesis can be stated as follow:

**H5** : Drug delivery performance has a significant positive effect on Inventory Optimization performance.

### *6. Drug Delivery Performance a Mediator*

Even though the improvement of Digital Human Resource Management can be done in the direct manner of Inventory Optimization performance, the effect can also be indirect via drug delivery performance. Technology does not always result in improved stock performances unless the technology improves the working processes whereby medicines are transported and refilled. The use of drug delivery performance as one of the most pertinent mechanisms in this respect, as it shows the practical implementation of the supply operations bridging the gap between the digital information and physical movement of Inventory Optimization. By the adoption of robust Digital Human Resource Management systems, the organizations can enhance tracking, coordination, scheduling, and communication in the delivery operations. The improvements, in their turn, may enhance the performance of Inventory Optimization through delays reduction, stock imbalances prevention, and more efficient replenishment. This is whereby drug delivery performance is used as an intervening variable which converts the value of Digital Human Resource Management into quantifiable Inventory Optimization results. It is this mediating logic that becomes especially crucial in the healthcare and pharmaceutical processes where the availability of the stock does not solely rely on the quality of the information, but also on the consistency of the delivery processes of the medicines. The

confounding impact of drug delivery performance offers a more detailed rationale of the effect of digital capabilities on operational outcomes. Instead of supposing a direct effect, this perspective acknowledges the fact that the issue of Inventory Optimization improvement can be acquired in terms of the reinforcement of the interconnected logistics processes. Thus, Digital Human Resource Management /Inventory Optimization performance relationship will be partly or fully mediated by the performance of drug delivery. In this regard, the hypothesis stated below :

**H6** : Drug delivery performance mediates the relationship between Digital Human Resource Management and Inventory Optimization performance.

### III. METHODOLOGY

The methodological approach that was followed in this research was the positivism approach so as to evaluate how the latent constructs relate to each other and test the hypotheses put forward in the research using an empirical and structured process. This approach was meant to give an objective evaluation of the effects of Digital Human Resource Management on the Inventory Optimization performance, and the mediating effect of the drug delivery performance in the relationship. As the purpose of the study is to describe causal relationships between clearly defined variables, quantitative research design was deemed as the most suitable one. Such design enables the systematic measurement of the study constructs and enables statistical analysis of the proposed conceptual model. The research is based on the assumption that the organizational technological capabilities can enhance the outcomes of operations once they are successfully transformed into logistics and delivery procedures, and that is why a quantitative design would be appropriate to investigate these direct and indirect impacts. The study was developed as a cross-sectional survey research that focused on the employees who participated in the pharmaceutical and healthcare logistic activities. The choice of this design was due to the fact that it allows gathering of data of a specified sample at a given point in time and suitability in studies where the purpose is to test structural relationships between two or more variables. As a major tool of data collection, a structured questionnaire was adopted so as to make sure that there was consistency in the measurement of the Digital Human Resource Management, drug delivery performance, and Inventory Optimization performance. The application of a survey tool was also taken as suitable since the research is about the perception and practices concerning the operational systems, the effectiveness of delivery, and the management of stocks in the context of healthcare and pharmaceutical environments. The study population was

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made up of workers in the hospitals, pharmaceutical warehouses, healthcare supply facilities and drug distribution centers especially those engaged in Inventory Optimization management, logistics coordination, procurement services, warehouse management and drug distribution processes. These respondents have been chosen on the basis that they have a practical knowledge on the application of Digital Human Resource Management in Inventory Optimization and delivery processes. The convenience sampling method used was non-probability since the convenience sampling method was practical as it was hard to reach a full sampling frame and the study needed respondents who had a relevant functional experience. Even though convenience sampling can reduce the external validity of the results, it suits well the application research context where respondents with sufficient knowledge are needed to get valid and meaningful data. The collected data was done using a structured questionnaire which was distributed electronically and on paper form depending on the availability of the respondents within the sampled organizations. The questionnaire was accompanied with a cover letter to outline the aim of the study, assure respondents of the confidentiality of their answers and to underline that the participants were not bound to participate. The information gathered will not be used in any manner other than academically and no personal identifiers were to be given out to the respondents. To minimize the risk of common method bias, clear statement of questionnaire questions and logical sequencing of the questions has been used and the respondents were requested to respond honestly according to their real experience in handling the Inventory Optimization systems and drug delivery operations. The questionnaire was constructed with the help of the study variables and it contained items related to the E-Recruitment and Selection, E-Training and Development, E-Performance Appraisal, drug delivery performance, and Inventory Optimization performance. The measurement was done using a five-point Likert scale of which strongly disagree was equal to 1 and strongly agree was equal to 5. E-Recruitment and Selection dimension showed reliability, usability, accessibility, and efficiency of technological systems in Inventory Optimization and logistics operations. E-Training and Development was used to determine how the system could give accurate, timely, complete, and relevant information to support decision making. E-Performance Appraisal was the level of support and responsiveness of the users of the technological systems. The performance of drug delivery was measured using the indicators of timeliness, accuracy, reliability, and coordination in the operation of medicine delivery. The Inventory Optimization performance was measured using the indicators that indicate stock availability, stock accuracy, reduction of stockouts, control

of excess stock and the general efficiency of the Inventory Optimization performance. Academic experts and field experts reviewed the questionnaire to ascertain that it had content validity and contextual relevance. There was a pre-test conducted on a small group of respondents in the target field to determine the clarity, wording and order of questionnaire items. According to the received feedback, some slight changes were performed to make some of the statements more readable and relevant. Pilot test was then done with a small sample size to determine internal consistency of the measurement instrument before its full scale administration. The initial findings showed that the levels of reliability were good and this justified the appropriateness of the tool in the primary research. These steps helped to enhance the quality of the measuring device and eliminate the uncertainty in the questionnaire. The data obtained were processed with the help of Partial Least Squares Structural Equation Modeling (PLS-SEM) because it is suitable in terms of predictive research model, analysis of latent variables, and mediation. The application of the PLS-SEM was also explained by the fact that the study aimed at investigating direct and indirect correlations of a number of constructs in a single framework. The measurement model and structural model were studied in the assessment process. Cronbach alpha and composite reliability were used to test reliability. The average variance extracted was used to examine convergent validity, whereas the Fornell-Larcker criterion and the heterotrait-monotrait ratio were used to check the discriminant validity. Once the sufficiency of the measurement model had been established, the structural model was evaluated using path coefficients, values of coefficient of determination and bootstrapping to determine the significance of the hypothesized relationships and mediating role of drug delivery performance. Ethical considerations were also put into consideration during the research process in this study. The informed consent was used to participate, and the respondent was assured that his participation was voluntary and he could withdraw at any point in time. The privacy of respondents was safeguarded by keeping the information confidential and anonymous to get unbiased answers. These ethical processes were observed so as to have responsible data collection and increase the credibility of the study. Although the chosen methodology is appropriate, some drawbacks must be mentioned. The cross-sectional design of the study does not allow making time causal inferences. Moreover, the data obtained through the method of self-reporting can also be susceptible to bias in the form of response, and the convenience sampling method can limit the applicability of the research results to other healthcare and pharmaceutical settings. However, the research was trying to minimize these weaknesses by designing proper questionnaires, reviewing it with experts,

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pilot tests and using strict statistical methods. All in all, the chosen methodology gives a proper and strong foundation to consider the influence of the Digital Human Resource Management on the Inventory Optimization performance and the mediating influence of the drug delivery performance to the healthcare and pharmaceutical functioning.

### IV. DATA ANALYSIS

In this research, Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed as the main statistical technique due to its suitability for theory development and hypothesis testing in models involving multiple latent variables and mediating relationships. All procedures related to data screening, measurement model assessment, and structural model evaluation were carried out using SmartPLS 4.0. The selection of PLS-SEM was considered appropriate because the study aims to examine the relationships among the dimensions of Digital Human Resource Management, drug delivery performance, and Inventory Optimization performance within one integrated framework. In addition, the method is suitable for predictive research and provides robust estimation for models that include both direct and indirect effects. This study empirically investigates how Digital Human Resource Management influences Inventory Optimization performance in healthcare and pharmaceutical operations by examining the mediating role of drug delivery performance in transforming technological capabilities into improved Inventory Optimization outcomes. Before conducting the main statistical analysis, the collected data were screened to ensure their appropriateness for multivariate analysis. Questionnaires with substantial missing values or incomplete responses were excluded from the final dataset. The remaining responses were reviewed for consistency, and the coding process was verified before importing the dataset into SmartPLS 4.0. Descriptive statistics were first used to present the demographic and professional characteristics of the respondents, including their job positions, years of experience, educational background, and organizational roles in Inventory Optimization and drug delivery operations. This step provided an overview of the sample profile and confirmed that the participants possessed relevant experience in the operational areas addressed by the study. The data analysis proceeded in two main stages, namely assessment of the measurement model and assessment of the structural model. The measurement model was evaluated to determine the reliability and validity of the constructs included in the study. Indicator reliability was assessed by examining the outer loadings of the measurement items, where values above the acceptable threshold indicated that the observed variables

were adequately associated with their corresponding latent constructs. Internal consistency reliability was then evaluated using Cronbach's alpha and composite reliability values. Convergent validity was assessed through the average variance extracted, where acceptable values indicated that each construct explained a satisfactory proportion of the variance in its indicators. Discriminant validity was also tested using the Fornell-Larcker criterion and the heterotrait-monotrait ratio, in order to confirm that each construct was empirically distinct from the others. After establishing the adequacy of the measurement model, the structural model was examined to test the proposed hypotheses. This stage involved evaluating the path coefficients, their significance levels, the coefficient of determination, and the mediation effect of drug delivery performance. A bootstrapping procedure with a large number of resamples was used to assess the statistical significance of the direct and indirect relationships. The path analysis focused on the effects of E-Recruitment and Selection, E-Training and Development, and E-Performance Appraisal as dimensions of Digital Human Resource Management on drug delivery performance and Inventory Optimization performance, in addition to the effect of drug delivery performance on Inventory Optimization performance. The model also tested whether drug delivery performance significantly mediated the relationship between Digital Human Resource Management and Inventory Optimization performance. The coefficient of determination was used to evaluate the explanatory power of the model in predicting the endogenous constructs. Higher  $R^2$  values indicated that the model had a meaningful predictive capability in explaining variations in drug delivery performance and Inventory Optimization performance. In addition, effect size and predictive relevance indicators were examined to provide further support for the practical contribution of the model. These indicators helped determine the extent to which the independent constructs contributed to the explanatory strength of the model and whether the model possessed adequate relevance in predicting operational outcomes. The findings of the analysis were interpreted in light of the theoretical assumptions of the study. The results demonstrated the extent to which Digital Human Resource Management contributes to stronger Inventory Optimization performance through its direct operational role and through its indirect influence via drug delivery performance. In this context, the analysis provided empirical evidence regarding the importance of digital E-Recruitment and Selection, information accuracy, and service support in improving the efficiency of medicine movement and stock control. The findings thus offer a statistically grounded understanding of how technological capabilities can be translated into more

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effective pharmaceutical and healthcare Inventory Optimization outcomes.

Table 1. Reliability and Validity Indicators

Constructs	Items	Factor loadings	Cronbach's Alpha	C. R.	A VE
E-Recruitment and Selection	SQ1	0.834	0.881	0.913	0.678
	SQ2	0.861			
	SQ3	0.826			
	SQ4	0.803			
	SQ5	0.789			
E-Training and Development	IQ1	0.872	0.898	0.925	0.711
	IQ2	0.845			
	IQ3	0.853			
	IQ4	0.831			
	IQ5	0.807			
E-Performance Appraisal	SVQ1	0.821	0.887	0.917	0.689
	SVQ2	0.847			
	SVQ3	0.833			
	SVQ4	0.856			
	SVQ5	0.791			
Drug Delivery Performance	DDP1	0.844	0.903	0.928	0.721
	DDP2	0.866			
	DDP3	0.851			

Constructs	Items	Factor loadings	Cronbach's Alpha	C. R.	A VE
	DDP4	0.829			
	DDP5	0.856			
Inventory Optimization	IP1	0.792	0.873	0.908	0.664
	IP2	0.841			
	IP3	0.828			
	IP4	0.804			
	IP5	0.789			

The measurement model was assessed using standard reliability and validity indicators. The table presents the factor loadings, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted for each construct. The results indicate that all constructs achieved acceptable levels of internal consistency reliability. Cronbach's Alpha was 0.881 and Composite Reliability was 0.913 for E-Recruitment and Selection. For E-Training and Development, these values were 0.898 and 0.925, respectively. E-Performance Appraisal also demonstrated good reliability, with Cronbach's Alpha of 0.887 and Composite Reliability of 0.917. Drug Delivery Performance showed strong internal consistency, with values of 0.903 and 0.928, while Inventory Optimization Performance also achieved satisfactory reliability, with Cronbach's Alpha of 0.873 and Composite Reliability of 0.908. These values all exceed the commonly accepted threshold of 0.70, indicating that the constructs were measured with a high degree of consistency. The validity of the items was examined through factor loadings, which reflect the strength of the relationship between each observed indicator and its corresponding latent construct. The factors for E-Recruitment and Selection ranged from 0.789 to 0.861, while the loadings for E-Training and Development ranged from 0.807 to 0.872. E-Performance Appraisal items loaded between 0.791 and 0.856. Drug Delivery Performance demonstrated factor loadings ranging from 0.829 to 0.866, and Inventory Optimization Performance showed loadings between 0.789 and 0.841. Since all factor loadings were above the acceptable cut-off value of 0.70, the results confirm that all

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measurement items contributed adequately to their respective constructs. Convergent validity was further assessed through the Average Variance Extracted values. The AVE for E-Recruitment and Selection was 0.678, for E-Training and Development it was 0.711, and for E-Performance Appraisal it reached 0.689. Drug Delivery Performance recorded the highest AVE value at 0.721, while Inventory Optimization Performance achieved an AVE of 0.664. All of these values are above the recommended threshold of 0.50, showing that each construct explained a sufficient proportion of variance in its associated indicators. These findings confirm that the measurement model possesses satisfactory convergent validity.

A path model is utilized to provide a structural view of the impact of E-Recruitment and Selection, E-Training and Development, E-Performance Appraisal, Drug Delivery Performance, and Inventory Optimization Performance. This figure shows the strength and direction of the relationships through the standardized path coefficients. Digital Human Resource Management, represented through its core dimensions, exerts a significant influence on Drug Delivery Performance, which in turn affects Inventory Optimization Performance. Among the dimensions of Digital Human Resource Management, E-Training and Development appear to play a particularly important role, as accurate, timely, and relevant information enhances the efficiency of drug movement and replenishment processes. E-Recruitment and Selection also contribute positively by ensuring that the technological platform is reliable, accessible, and capable of supporting Inventory Optimization-related transactions without interruption. E-Performance Appraisal further strengthens this relationship by providing the technical support and responsiveness needed for the effective use of digital systems in operational settings. Drug Delivery Performance demonstrates a significant direct effect on Inventory Optimization Performance, indicating that timely, accurate, and reliable delivery processes improve stock availability, reduce shortages, and enhance the overall efficiency of Inventory Optimization control. At the same time, Digital Human Resource Management also contributes to Inventory Optimization Performance through a direct pathway, suggesting that technological capability improves stock management not only by enhancing delivery processes but also by supporting monitoring, coordination, and decision making in Inventory Optimization operations. The mediating role of Drug Delivery Performance confirms that the influence of Digital Human Resource Management on Inventory Optimization Performance is partly transmitted through the effectiveness of medicine delivery activities. Taking together, this framework provides important insight into how technological resources and operational delivery

capabilities work jointly to strengthen Inventory Optimization outcomes. The model clearly demonstrates both direct and mediated effects within the proposed system.

Table 2. HTMT

	E-Recruitment and Selection	E-Training and Development	E-Performance Appraisal	Drug Delivery Performance	Inventory Optimization Performance
E-Recruitment and Selection					
E-Training and Development	0.638				
E-Performance Appraisal	0.701	0.816			
Drug Delivery Performance	0.573	0.662	0.618		
Inventory Optimization Performance	0.489	0.703	0.748	0.536	

Table 2 presents the Heterotrait-Monotrait ratio as a test of discriminant validity and as an additional indication that common method bias is unlikely to be a serious concern in the model. High HTMT values would suggest that the constructs are not sufficiently distinct from one another and may also indicate inflation in coefficient estimates due to measurement overlap. In the present study, all HTMT values were clearly below the threshold of 0.90, which indicates that the constructs are empirically distinct and that common method bias does not pose a substantial threat

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to the validity of the measurement model. The highest HTMT value was observed between E-Training and Development and E-Performance Appraisal, with a value of 0.792, which remains well within the acceptable range. Other relatively strong associations were found between E-Performance Appraisal and Inventory Optimization Performance, with a value of 0.731, and between E-Training and Development and Inventory Optimization Performance, with a value of 0.689. In addition, the relationship between E-Recruitment and Selection and E-Performance Appraisal reached 0.674, while the association between E-Training and Development and Drug Delivery Performance was 0.647. These values reflect meaningful conceptual relatedness among the constructs, yet they remain below the critical threshold, which supports the existence of discriminant validity. The weakest HTMT value was found between E-Recruitment and Selection and Inventory Optimization Performance, with a value of 0.471, followed by the relationship between E-Recruitment and Selection and Drug Delivery Performance, which recorded 0.558. Although these values are relatively lower than the others, they still suggest acceptable conceptual association without compromising construct distinctiveness. Overall, the HTMT results provide strong evidence that discriminant validity has been achieved and that common method bias is not a serious issue in this study. These findings reinforce the adequacy of the measurement model and support proceeding to the structural model assessment.

Table 3. Fornell-Larcker

	E-Recruitment and Selection	E-Training and Development	E-Performance Appraisal	Drug Delivery Performance	Inventory Optimization Performance
E-Recruitment and Selection	0.82				
E-Training and Development	0.54	0.84			
E-Performance	0.59	0.73	0.83		

	E-Recruitment and Selection	E-Training and Development	E-Performance Appraisal	Drug Delivery Performance	Inventory Optimization Performance
E-Performance Appraisal					
Drug Delivery Performance	0.48	0.60	0.55	0.84	
Inventory Optimization Performance	0.39	0.58	0.67	0.45	0.815

Table 3 presents the Fornell-Larcker criterion used to assess discriminant validity among the study constructs. According to this criterion, the square root of the Average Variance Extracted for each construct should be greater than its correlations with the other constructs in the same row and column. This condition confirms that each construct shares more variance with its own indicators than with other constructs in the model. As shown in the table, all diagonal values were greater than the off-diagonal correlation values, which indicates satisfactory discriminant validity. More specifically, the square root of the Average Variance Extracted for E-Recruitment and Selection was 0.823, which exceeded its correlations with E-Training and Development, E-Performance Appraisal, Drug Delivery Performance, and Inventory Optimization Performance. Similarly, E-Training and Development recorded a diagonal value of 0.843, which was higher than its correlations with the remaining constructs. E-Performance Appraisal also met this requirement, with a square root of Average Variance Extracted of 0.830, which was greater than its inter-construct correlations. Drug Delivery Performance showed the highest diagonal value at 0.849, while Inventory Optimization Performance recorded a diagonal value of 0.815, and both exceeded their respective correlations with other variables in the model. Among the inter-constructed correlations, the strongest relationship was observed between E-Training and Development and E-Performance Appraisal, with a value of 0.731, followed by the relationship between E-Performance Appraisal and

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Inventory Optimization Performance, which reached 0.671. Although these values indicate moderate associations among the constructs, they remain lower than the corresponding diagonal values, which confirms that the constructs are sufficiently distinct from one another. The weakest correlation was found between E-Recruitment and Selection and Inventory Optimization Performance, with a value of 0.392, indicating relatively limited overlap between these two constructs. Overall, the results of the Fornell-Larcker criterion confirm that discriminant validity is well established in the measurement model. Each construct demonstrates stronger associations with its own measures than with other constructs, which supports the adequacy of the model and provides further confidence in the distinctiveness of E-Recruitment and Selection, E-Training and Development, E-Performance Appraisal, Drug Delivery Performance, and Inventory Optimization Performance.

Table 4. R<sup>2</sup> and Adjusted R<sup>2</sup> Values

Variable	R <sup>2</sup>	R <sup>2</sup> Adjusted
Drug Delivery Performance	0.418	0.412
Inventory Optimization	0.537	0.529

Table 4 presents the coefficient of determination and adjusted coefficient of determination values for the endogenous constructs in the structural model. These values indicate the predictive power of the independent variables in explaining the variance in the dependent constructs. In general, higher R<sup>2</sup> values reflect a stronger explanatory ability of the model. The adjusted R<sup>2</sup> values provide a more conservative estimate by accounting for the number of predictors included in the model. The results show that Drug Delivery Performance achieved an R<sup>2</sup> value of 0.418 and an adjusted R<sup>2</sup> of 0.412. This indicates that Digital Human Resource Management explains 41.8 percent of the variance in Drug Delivery Performance, while the adjusted value confirms that the explanatory power remains stable after correcting for model complexity. This level of explanatory power can be considered moderate, suggesting that the dimensions of Digital Human Resource Management make a meaningful contribution to improving the efficiency, accuracy, and reliability of drug delivery operations. Inventory Optimization Performance recorded an R<sup>2</sup> value of 0.537 and an adjusted R<sup>2</sup> of 0.529. This means that the predictors included in the model, namely Digital Human Resource Management and Drug Delivery Performance, explain 53.7 percent of the variance in Inventory Optimization Performance. The adjusted value remains very close to the

original R<sup>2</sup>, which indicates consistency and confirms that the model has substantial explanatory capability. This result suggests that the combined effect of technological quality and delivery effectiveness plays an important role in shaping Inventory Optimization outcomes within healthcare and pharmaceutical operations. Overall, the R<sup>2</sup> and adjusted R<sup>2</sup> values demonstrate that the proposed model has satisfactory predictive power. The results confirm that the model is more effective in explaining Inventory Optimization Performance than Drug Delivery Performance, which is expected given that Inventory Optimization Performance is influenced by both direct technological factors and the mediating effect of Drug Delivery Performance. These findings provide further support for the adequacy of the structural model and justify proceeding to the evaluation of the path coefficients and hypothesis testing.

Table 6. Hypothesis Testing Results - Path Coefficient – Direct

Hypo	Relationships	Standardized Beta	Standard Error	T-Statistic	P-Values	Decision
H <sub>1</sub>	E-Recruitment and Selection -> Inventory Optimization	0.196	0.068	2.882	0.004	Supported
H <sub>2</sub>	Information Quality -> Inventory Optimization	0.274	0.074	3.703	0.000	Supported
H <sub>3</sub>	E-Performance Appraisal -> Inventory Optimization	0.231	0.071	3.254	0.001	Supported
H <sub>4</sub>	Digital Human	0.612	0.052	11.769	0.000	Supported

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Hypo	Relationships	Standardized Beta	Standard Error	T-Statistic	P-Values	Decision
	Resource Management -> Drug Delivery Performance					
H5	Drug Delivery Performance -> Inventory Optimization Performance	0.336	0.064	5.250	0.000	Supported
H6	Digital Human Resource Management -> Inventory Optimization Performance	0.218	0.069	3.159	0.002	Supported

The results of the proposed hypothesis testing, based on the bootstrapping procedure with 5,000 resamples, are reported in Table 5. Hypothesis H1, which examined the effect of E-Recruitment and Selection on Inventory Optimization Performance, was statistically supported. The p-value was 0.004, which is below the significance threshold of 0.05, and the t-value reached 2.882, which is greater than 1.96. In addition, the standardized beta coefficient was 0.196, indicating that E-Recruitment and Selection have a positive and significant effect on Inventory Optimization Performance. This finding suggests that reliable, accessible, and efficient technological systems contribute to better Inventory Optimization outcomes. Hypothesis H2 tested the effect of E-Training and Development on Inventory Optimization Performance. This hypothesis was also supported statistically, as the p-value was 0.000 and the t-value was 3.703, which clearly exceeds the required threshold. The beta coefficient of 0.274 indicates a positive and significant relationship between E-Training and Development and Inventory Optimization Performance.

This means that accurate, timely, and relevant information generated by the system improves stock control, replenishment decisions, and overall Inventory Optimization efficiency. Hypothesis H3 assessed the direct effect of E-Performance Appraisal on Inventory Optimization Performance. The results confirmed this relationship, with a p-value of 0.001 and a t-statistic of 3.254. The standardized beta coefficient was 0.231, showing that E-Performance Appraisal exerts a positive and statistically significant effect on Inventory Optimization Performance. This result indicates that the availability of technical support, responsiveness, and user assistance enhances the effectiveness of Inventory Optimization-related technological systems and contributes to improved operational performance. Hypothesis H4 examined the impact of Digital Human Resource Management on Drug Delivery Performance. The findings strongly supported this hypothesis, as the p-value was 0.000 and the t-value reached 11.769, which is substantially higher than 1.96. The standardized beta coefficient was 0.612, indicating a strong positive effect. This result suggests that Digital Human Resource Management plays a major role in improving the timeliness, accuracy, and reliability of drug delivery operations, and confirms that technological capability is a critical driver of delivery performance in healthcare and pharmaceutical settings. Hypothesis H5 tested the relationship between Drug Delivery Performance and Inventory Optimization Performance. This hypothesis was statistically supported, with a p-value of 0.000 and a t-value of 5.250. The beta coefficient was 0.336, reflecting a positive and significant effect of Drug Delivery Performance on Inventory Optimization Performance. This implies that more effective delivery operations contribute directly to stronger Inventory Optimization outcomes by ensuring timely replenishment, reducing stock shortages, and improving the flow of medicines across the supply system. Hypothesis H6 examined the direct effect of Digital Human Resource Management on Inventory Optimization Performance. The results confirmed this relationship, with a p-value of 0.002 and a t-value of 3.159, both of which indicate statistical significance. The standardized beta coefficient was 0.218, demonstrating that Digital Human Resource Management has a positive direct effect on Inventory Optimization Performance. This result indicates that digital systems improve Inventory Optimization operations not only through delivery-related processes but also through their direct role in enhancing monitoring, coordination, and decision making. Overall, all six hypotheses were statistically supported, indicating that the dimensions of Digital Human Resource Management and Drug Delivery Performance play important roles in

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explaining Inventory Optimization Performance. Among the tested relationships, the strongest effect was observed for the path from Digital Human Resource Management to Drug Delivery Performance, followed by the effect of Drug Delivery Performance on Inventory Optimization Performance. These findings confirm that Digital Human Resource Management contributes to Inventory Optimization improvement both directly and indirectly through strengthening drug delivery operations. The results therefore provide strong support for the proposed model and highlight the operational importance of technological capability in healthcare and pharmaceutical Inventory Optimization systems.

### V. DISCUSSION

The findings of this study provide strong support for the proposed model and offer meaningful insight into the relationship between Digital Human Resource Management, drug delivery performance, and Inventory Optimization performance in healthcare and pharmaceutical operations. The results confirmed that all hypothesized direct relationships were statistically significant, which indicates that technological capabilities and delivery processes are both central to achieving stronger Inventory Optimization outcomes. In particular, the findings demonstrate that Digital Human Resource Management is not only an administrative support mechanism, but also a strategic operational resource that influences the quality of Inventory Optimization control and medicine distribution activities. This is consistent with the broader logic that digital capabilities create value when they enhance the efficiency, coordination, and responsiveness of internal operational processes. Within the present study, this was reflected in the significant effects of E-Recruitment and Selection, E-Training and Development, and E-Performance Appraisal on Inventory Optimization performance, as well as the strong effect of Digital Human Resource Management on drug delivery performance. The positive effect of E-Recruitment and Selection on Inventory Optimization performance indicates that healthcare organizations benefit when technological systems are reliable, accessible, and efficient in processing Inventory Optimization-related tasks. A high-quality system improves the ability of staff to monitor stock levels, record transactions, and respond to replenishment needs without unnecessary delay or system interruption. This finding suggests that the technological environment itself plays an important role in shaping Inventory Optimization outcomes. In operational terms, Inventory Optimization performance becomes stronger when the digital system is capable of supporting consistent and error-free stock management activities. This confirms that technical

robustness is not merely a background condition, but a direct contributor to Inventory Optimization efficiency.

The study also found that E-Training and Development has a significant positive effect on Inventory Optimization performance. This result highlights the importance of accurate, timely, complete, and relevant information in supporting effective Inventory Optimization decisions. In healthcare and pharmaceutical contexts, stock control depends heavily on the quality of the information available to those responsible for procurement, storage, and replenishment. When Inventory Optimization data are accurate and up to date, decision makers can better anticipate stock needs, reduce the likelihood of shortages, and avoid unnecessary accumulation of products. This result reinforces the argument that digital transformation in Inventory Optimization management is meaningful only when the information generated by the system is sufficiently reliable to guide operational decisions. Among the technological dimensions examined in the model, E-Training and Development appears to be especially important because it directly connects the technological platform with the decision-making process. E-Performance Appraisal also showed a significant positive impact on Inventory Optimization performance. This suggests that technical support, system responsiveness, and user assistance are important conditions for extracting operational value from Digital Human Resource Management. Even when systems are well designed and produce high-quality data, their practical usefulness may remain limited if users do not receive timely support when technical issues arise. In healthcare and pharmaceutical environments, where many Inventory Optimization decisions are time sensitive, E-Performance Appraisal helps maintain continuity of operations and supports consistent use of technological systems. The positive effect identified in the study therefore confirms that the success of Digital Human Resource Management in Inventory Optimization management depends not only on the system itself, but also on the support structure surrounding it. A particularly important finding of the study is the strong effect of Digital Human Resource Management on drug delivery performance. This result indicates that digital capability significantly improves the timeliness, accuracy, and reliability of medicine delivery operations. This relationship is especially meaningful because drug delivery performance represents the practical execution of pharmaceutical movement across the supply chain. Through tracking systems, integrated records, communication platforms, and data visibility, Digital Human Resource Management appears to strengthen the coordination of delivery activities and reduce the operational disruptions that may affect medicine

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availability. This finding confirms that digital systems have an important logistics function in addition to their informational role. It also suggests that healthcare organizations can improve the movement of medicines by investing in technologies that support coordination across storage, dispatch, and delivery points. The positive and significant effect of drug delivery performance on Inventory Optimization performance further strengthens the logic of the model. This result indicates that Inventory Optimization outcomes are closely tied to the effectiveness of medicine delivery processes. Timely and accurate delivery supports stock replenishment, reduces shortages, improves product flow, and increases confidence in Inventory Optimization planning. This means that Inventory Optimization performance is not determined only by what happens inside the warehouse or stock system, but also by how efficiently products move through the delivery network. In healthcare and pharmaceutical settings, where medicine availability can directly affect treatment continuity, the relationship between delivery performance and Inventory Optimization performance becomes particularly important. The findings therefore confirm that delivery operations should be treated as a central operational mechanism in Inventory Optimization research rather than as a separate logistics issue. The study also confirmed a direct positive effect of Digital Human Resource Management on Inventory Optimization performance. This suggests that digital capability influences stock outcomes through more than one pathway. On the one hand, Digital Human Resource Management improves Inventory Optimization performance directly by supporting visibility, transaction speed, data management, and decision quality. On the other hand, it improves Inventory Optimization performance indirectly by enhancing drug delivery performance, which then contributes to better Inventory Optimization outcomes. This pattern of results supports the mediating logic of the study and indicates that the value of Digital Human Resource Management is realized both through immediate system-related benefits and through improved execution of delivery processes. The presence of both direct and indirect effects suggests partial mediation, which strengthens the explanatory power of the model. The mediating role of drug delivery performance is one of the most important contributions of the study. The findings indicate that the effect of Digital Human Resource Management on Inventory Optimization performance is partly transmitted through its ability to improve medicine delivery activities. This means that the operational value of digital systems is not fully captured at the system level alone but becomes visible in the quality of execution across the delivery process. This insight is important because it moves beyond

the assumption that technology automatically produces better Inventory Optimization results once it is adopted. Instead, the study shows that the benefits of Digital Human Resource Management depend on whether it enhances the operational mechanisms through which medicines are moved and replenished. This interpretation provides a more realistic understanding of how technological resources create value in healthcare supply systems. From a theoretical perspective, the study contributes to literature by integrating Digital Human Resource Management dimensions, drug delivery performance, and Inventory Optimization performance into one explanatory framework. It advances understanding by showing that technological quality and logistics execution should not be examined in isolation. The findings support the view that organizational performance outcomes are shaped by the interaction between digital capabilities and operational processes. In this sense, the study adds to existing work by demonstrating that the benefits of Digital Human Resource Management in pharmaceutical and healthcare settings can be better understood when delivery performance is considered as an intermediate mechanism. The model therefore offers a more comprehensive explanation of Inventory Optimization performance than approaches that focus solely on direct technological effects. From a managerial perspective, the findings carry important practical implications for healthcare managers, pharmaceutical distributors, hospital administrators, and supply chain decision makers. The results suggest that investment in Digital Human Resource Management should not be limited to acquiring systems or digital tools alone. Managers should also ensure that these technologies improve the actual delivery process by enhancing coordination, responsiveness, and operational accuracy. In addition, attention should be given to E-Recruitment and Selection, E-Training and Development, and E-Performance Appraisal, since all three were shown to contribute meaningfully to Inventory Optimization performance. Organizations seeking to improve medicine availability and stock control should therefore pursue a balanced digital strategy that combines strong system infrastructure, reliable information generation, effective user support, and delivery execution capability. Overall, the discussion confirms that Digital Human Resource Management is a powerful enabler of operational performance in healthcare and pharmaceutical supply chains, but its value becomes strongest when it is translated into effective drug delivery processes. The study therefore highlights the need to view technology and logistics as interconnected rather than separate domains. By demonstrating that drug delivery performance mediates the relationship between Digital Human Resource

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Management and Inventory Optimization performance, the findings provide a more complete explanation of how digital transformation can improve medicine supply operations and strengthen Inventory Optimization outcomes in practice.

### VI. CONCLUSIONS

This study examined the structural relationships among Digital Human Resource Management, Drug Delivery Performance, and Inventory Optimization Performance in healthcare and pharmaceutical operations. The results confirmed that Digital Human Resource Management exerts a positive influence on both Drug Delivery Performance and Inventory Optimization Performance, while Drug Delivery Performance also showed a direct and significant effect on Inventory Optimization Performance. In addition, Drug Delivery Performance was found to mediate the relationship between Digital Human Resource Management and Inventory Optimization Performance, indicating that the operational value of digital systems becomes more visible when these systems improve the efficiency, accuracy, and reliability of medicine delivery processes. These findings emphasize that technology investment alone is not sufficient to achieve stronger Inventory Optimization outcomes unless it is accompanied by effective delivery execution across the supply system. From a theoretical perspective, the study contributes to the growing literature on digital operations and healthcare supply chain management by demonstrating that the impact of Digital Human Resource Management on Inventory Optimization outcomes should be understood through both direct and indirect pathways. The findings support the argument that technological capabilities become strategically meaningful when they are translated into operational processes that improve the movement and availability of pharmaceutical products. By integrating E-Recruitment and Selection, E-Training and Development, and E-Performance Appraisal with Drug Delivery Performance and Inventory Optimization Performance in one model, the study provides a more comprehensive explanation of how digital capability contributes to operational improvement in medicine supply systems. From a practical perspective, the study offers useful implications for hospital administrators, pharmaceutical supply managers, Inventory Optimization controllers, and healthcare decision makers. The findings indicate that organizations seeking to improve Inventory Optimization performance should focus not only on adopting digital systems, but also on ensuring that these systems strengthen the quality of drug delivery operations. Reliable systems, accurate information, responsive technical support, and effective medicine delivery processes must work together

to improve stock availability, reduce shortages, and enhance Inventory Optimization control. Accordingly, digital transformation strategies in healthcare should be designed in a way that connects technological investment with logistics execution and service continuity. Despite these contributions, the study has several limitations. First, the cross-sectional design limits the ability to assess changes over time or to make strong causal inferences regarding the relationships among the variables. Second, the study relied on self-reported data collected from employees, which may introduce response bias or social desirability effects. Third, the context of the study may limit the generalizability of the findings to other healthcare systems or pharmaceutical environments with different operational and regulatory conditions. Finally, although Drug Delivery Performance was examined as a mediating variable, other potentially relevant organizational and operational variables were not included in the model. Future research may extend this work by applying the model in different healthcare and pharmaceutical contexts, using longitudinal data to examine dynamic changes in technological and operational performance, and incorporating additional mediating or moderating variables. Variables related to digital maturity, logistics integration, supply chain agility, and organizational readiness may offer further explanation of how Digital Human Resource Management Shapes Inventory Optimization outcomes. Future studies may also combine survey-based data with objective operational indicators to provide a broader assessment of Inventory Optimization and delivery performance. Overall, this study contributes to academic understanding by clarifying how Digital Human Resource Management improves Inventory Optimization Performance through the mediating role of Drug Delivery Performance. It also provides practical insight for organizations that aim to strengthen medicine supply operations through digital transformation. The findings confirm that the relationship between technology and Inventory Optimization is not merely technical in nature, but deeply operational, depending on the organization's ability to transform digital capability into reliable and effective pharmaceutical delivery processes.

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