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Digital Literacy as a Moderator in the Relationship Between AI-Driven Automation and Job Satisfaction Among Hospital Administrative Staff

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ABSTRACT: This study investigates the moderating role of digital competency in the relationship between automation usage and administrative staff satisfaction in hospitals. Increasing adoption of automated systems, including electronic health records, scheduling software, and AI-assisted administrative tools, has transformed hospital operations and employee responsibilities. However, the effectiveness of automation depends largely on employees' ability to use digital technologies efficiently. The study applies a quantitative research design using survey data collected from hospital administrative staff across public and private healthcare institutions. Statistical analysis examines the direct impact of automation usage on job satisfaction and evaluates whether digital competency strengthens this relationship. The findings indicate that automation usage improves work efficiency, reduces repetitive tasks, and enhances communication processes. Moreover, employees with higher digital competency report greater satisfaction because they adapt more easily to technological changes and experience lower work-related stress. The study highlights the importance of continuous digital training and organizational support in maximizing the benefits of automation in healthcare administration while improving employee satisfaction and operational performance. The results also support strategic investments in employee-centered digital transformation initiatives within modern hospitals globally.

1. INTRODUCTION

There have been transformations witnessed within the healthcare sector due to the emergence of digital technologies and the deployment of automation technology in hospital administrations. The hospitals adopt different forms of automation techniques, including electronic health records, appointments scheduling systems, billing systems, patients' information system, and communication platforms that employ artificial intelligence. With automation technologies, there can be improved efficiency and quality services delivery in hospitals since they eliminate administrative challenges, errors, minimize data management problems, and quicken the decision-making process [1]. Hospitals must embrace automation technologies to offer effective healthcare services within a highly competitive and technologically driven industry. Administrators are responsible for various roles in hospitals, including coordination of services delivery, record keeping, and maintaining communication within the departments [2]. It is, therefore, necessary to analyze the attitude of hospital administrative staff towards the automation process.

Due to the increasing automation technologies in hospitals, there are several opportunities and challenges that the hospital administrative employees may face [3]. Automation will facilitate simplified work, increased productivity, and efficiency in work flow hence resulting in positive outcomes towards their jobs satisfaction. Staff members will have better experiences in completing their tasks with less effort compared to traditional paperwork. On the other hand, rapid deployment of digital automation systems raises issues such as resistance to the new technologies, fear of losing jobs, lack of digital competency among staff members, and job insecurity that may affect their work efficiency. Hospital staff members with poor digital skills may feel dissatisfied, stressed, and lose confidence while working. Digital competency becomes an essential element in analyzing automation technologies in the hospitals.

The term digital competency denotes the proficiency of an organization's personnel in using digital technologies, applications, and other online systems to carry out organizational operations. Digital competency involves technical expertise [4], digital literacy skills, problem-solving skills, and confidence when using technology. Highly digitally competent employees can easily adjust to new automated systems and have the potential to benefit more from digital transformation projects [5]. With regards to the healthcare sector, digitally competent administrative workers will be able to use electronic records, scheduling, and other communication systems to enhance organizational performance and increase worker satisfaction. This means that digital competency could reinforce the connection between automation usage and administrative worker satisfaction.

While there exist many studies which look at automation usage and worker satisfaction in healthcare organizations, few studies have considered the potential moderating impact of digital competency [6]. Most past studies have concentrated on efficiency and organizational gains instead of the human factors associated with automation usage in healthcare organizations. Understanding the moderating impact of digital competency is crucial in light of the growing investments in digital transformation projects by healthcare facilities. As such, this study seeks to understand how automation usage relates to administrative worker satisfaction and the moderating effect of digital competency in hospitals.The major contributions of this study are presented as follows:

1. The study examines the impact of automation usage on administrative staff satisfaction in hospitals.
2. The research identifies digital competency as a moderating factor influencing the relationship between automation usage and employee satisfaction.
3. The study provides practical recommendations for hospitals to improve employee adaptability, digital skills, and organizational efficiency through effective digital transformation strategies.

The remaining part of the paper discusses the review of related literature, conceptual framework, research methodology, data analysis, findings, discussion, implications, limitations, and conclusion related to automation usage, digital competency, and administrative staff satisfaction in hospitals.

2.RELATED WORK

The fast adoption of automation and digitalization in healthcare organizations has revolutionized hospital administration processes and work practices of its staff members. Some empirical research has been done regarding digital transformation effects, IT adoption, and digital competency in terms of performance improvement and employee satisfaction in healthcare organizations. Thus, [7] stressed the necessity of digital transformation in improving the effectiveness and quality of healthcare services. However, issues with employee readiness and adaptation to changes associated with digitalization pose significant obstacles to implementation. [8] put forward the Technology Acceptance Model (TAM) according to which user perception of usefulness and ease of use affects the acceptance of information technology systems.

[9] examined determinants affecting health information technology adoption among nurses with inadequate digital skills. The results indicated the negative impact of low digital literacy, fears concerning technology use, and lack of organizational support on technology adoption. [10] stated that attitudes of healthcare workers toward information technology depend on their computer skills, training, and organizational support systems. Therefore, digital readiness of healthcare employees is critical to successful implementation of automation.

Empirical studies focused on digital competency have emerged increasingly. [11] studied the issue of digital competence sharing in healthcare organizations. Results showed that collaborative learning and supportive management help improve digital capabilities and increase technological confidence of employees. [12] explored digital health competencies' profile among

healthcare professionals and concluded that higher competencies are related to adaptability and better performance of staff members and more positive attitudes toward technologies.

Moreover, research has been conducted on the connection between digital work practices and employee satisfaction. [13] demonstrated that digital work practices increase employee satisfaction because they lead to enhanced communication, flexibility, and productivity. In particular, the study pointed out that organizations utilizing positive digital practices achieve better employee engagement and lower workplace stress. Similar findings were obtained by [14], who researched the digital literacy level of healthcare professionals and discovered that people with high levels of digital literacy display more positive attitudes toward information systems and are more willing to use automated technologies.

In turn, [15] studied the application of an electronic medical record system in healthcare settings and revealed its potential for increased efficiency, fewer medical mistakes, and improved interdepartmental collaboration. Nevertheless, the researcher identified challenges associated with staff training and reluctance to adapt to new technologies among healthcare professionals. Overall [16-20], all of the above works demonstrate that automation technologies bring significant advantages, yet employee digital competence plays a crucial role in digital transformation.

While existing literature provides evidence on healthcare automation, technology adoption, and digital literacy, there are very few studies devoted to digital competency as a moderator between automation usage and administrative personnel satisfaction in hospitals. For this reason, the current study aims to investigate how digital competency acts as a moderator between automation usage and employee satisfaction in hospital administration.

Table 1: Summary of Related Studies on Digital Transformation, Automation Usage, and Digital Competency in Healthcare

Reference	Research Area	Techniques Used	Outcome Metrics	Advantages	Limitations
[7]	Digital transformation in healthcare	Literature review	Operational efficiency, service quality	Comprehensive framework	Limited empirical validation
[8]	Technology acceptance	Technology Acceptance Model (TAM)	User acceptance, perceived usefulness	Strong theoretical foundation	Generalized across industries
[9]	Health IT adoption	In-depth interviews	Technology adoption factors	Detailed qualitative insights	Small sample size
[10]	Digital competence sharing	Qualitative study	Digital skill development	Focus on collaboration	Limited generalizability
[11]	Electronic medical records	Healthcare system analysis	Efficiency, cost reduction	Practical healthcare insights	High implementation costs
[12]	Employee attitudes toward IT	Survey analysis	Attitude toward healthcare IT	Identifies training importance	Limited healthcare scope
[13]	Digital work practices	Empirical analysis	Work satisfaction, productivity	Strong workplace implications	Non-hospital context
[14]	Digital health competency	Cross-sectional study	Competency profiles	Healthcare-specific findings	Limited longitudinal evidence
[15]	Digital literacy in healthcare	Survey research	Digital literacy levels	Highlights employee readiness	Focused mainly on literacy

3.METHODOLOGY

The proposed study uses a quantitative research methodology for the purpose of examining the influence of digital competency on the relationship between automation usage and staff satisfaction in hospitals. Primary data would be gathered via questionnaires distributed among administrative staff of hospitals both publicly and privately run. Convenience sampling method will be employed, followed by data analysis involving the use of descriptive statistics and moderation analysis [21]. Statistical methods would be applied in determining the direct impact of automation usage and moderating effect of digital competency on employee satisfaction and organizational effectiveness.

3.1 Research Design

The study would employ a quantitative research methodology for the examination of the moderating role of digital competency on the relationship between automation usage and staff satisfaction. This research would concentrate on obtaining structured responses from the administrative staff employed at public and private hospitals. For this purpose, a survey approach would be utilized, allowing to gather information concerning [22] automation usage, digital competency of hospital workers and their level of satisfaction. Through the application of statistical methods it would become possible to evaluate direct and moderating relationships. With quantitative methodology, it becomes feasible to make objective judgments about phenomena being studied. The approach can also facilitate identifying trends connected to technology adoption and its impact on employee adaptability in healthcare administration fig 1. Within the framework of the conceptual model, the following would be identified: automation usage as an independent variable; staff satisfaction – as a dependent variable; digital competency – as a moderating variable.

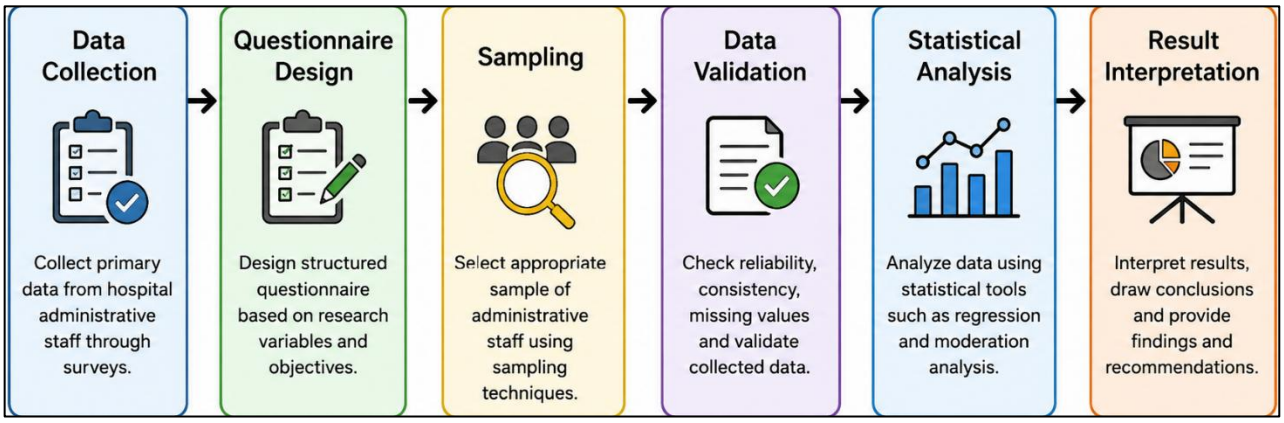

Figure 1: Research Methodology Process Flow for Automation Usage and Digital Competency Analysis in Hospitals

3.1.1 Research Objectives

In this case, the objectives of the research will involve the examination of the relationship among automation use, digital competency, and administrative staffs' satisfaction in hospital settings. The study is concerned about the impact of automation on employees' satisfaction and the effect of digital competency on their ability to adjust to digitalization [23]. This study is going to examine the mediating effect of digital competency in the relationship eqn 1

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$$AU = \frac{\sum_{i=1}^{n} A_i}{n} \quad (1)$$

The automation usage equation is used to determine the average automation system usage among administrative staff in the hospitals. This involves measuring the amount of interaction by the employees with digital technologies including e-record, scheduling, and communication technologies. The equation helps analyze the degree of automation usage by the organization as well as its impact on employees [24-28].

3.1.2 Research Hypotheses

The hypotheses have been created in order to test the relationship of study variables. The study assumes that automation usage has a positive effect on the satisfaction levels of the administrative staff. In addition, higher levels of digital competency enhance

employee flexibility regarding automation technology usage. Furthermore, higher levels of digital competency will positively moderate the influence of automation usage on employee satisfaction.

$$DC = \frac{TK + DL + PS}{3} \quad (2)$$

Digital Competency Equation represents a formula that evaluates the total digital competency level of workers considering their technological knowledge, digital literacy, and the ability to solve problems. Digital competency is estimated as a measure of employees' efficiency in using automated systems in administration processes in hospitals. The Digital Competency Equation may be used to conduct moderation analysis in order to identify the relationship between digital competency and adaptation to automation, as well as administrative staff satisfaction.

3.2 Data Collection and Sampling

Primary data will be obtained through a structured survey administered to administrative staff in hospitals. Respondents should be chosen among hospital administrators working at public and private healthcare facilities in order to ensure the representation of various levels of technology application and different work environment. A convenience sampling approach is applied in order to provide access to potential participants. The survey consists of sections concerning demographic characteristics, automation usage, digital competency and job satisfaction. Survey responses will be provided through rating scales varying from strongly agree to strongly disagree. All data collected will be kept confidential. Statistical analysis of data will be conducted to explore correlations between the study variables and test the hypotheses proposed.

3.2.1 Sample Size Determination

Sample size determination depends on the population of hospital administrators and necessary accuracy of calculations. Sufficient sample size helps to conduct reliable and valid moderation analysis. At least 200 responses will be collected in order to interpret the results of automation usage and digital competency in hospital administration in eqn 3.

$$N = \frac{N}{1 + n(E^2)} \quad (3)$$

The sample size equation can be utilized in the determination of the sample size needed for the study considering the population size and the margin of error acceptable. The equation ensures the reliability and precision of statistical results through the effective representation of hospital administrators' responses concerning the utilization of automation and digital skills assessment.

3.2.2 Data Validation

The data validation process is employed to verify the reliability, accuracy, and validity of questionnaire data collected. The process involves testing of missing values, reliability, and data consistency. The Cronbach's alpha technique is applied in determining the internal consistency of the measurement variables regarding automation utilization, digital skills, and job satisfaction among hospital administrators.

$$\alpha = \frac{k}{k} - 1\left(1 - \frac{\sum \sigma_i^2}{\sigma_t^2}\right) \quad (4)$$

The Cronbach's alpha formula is used to establish the consistency and reliability of the research questionnaires in terms of internal reliability of items in the survey. This approach tests the consistency of survey variable measurements in producing reliable answers from the respondents. The high alpha values mean that the scales used for measuring automation use, digital competency, and administrative staff satisfaction in hospitals will be more reliable for statistical analysis.

3.3 Statistical Analysis Model

This statistical tool is applied to explore the direct relationship between automation usage and administrative staff satisfaction in hospitals. In addition, the study uses statistical analysis to test the effect of digital competency as a moderator variable in determining the relationship between the main variables under consideration. Such methods as descriptive statistics, correlation analysis, regression analysis, and moderation analysis are used to analyze the collected data in the study. While regression analysis tests the predictive relationship between the variables, moderation analysis assesses whether digital competency moderates the

influence of automation usage on administrative staff satisfaction. These statistics allow estimating the importance of digital skills for improving digital transformation projects in healthcare organizations and increasing administrative staff satisfaction.

3.3.1 Regression Analysis

Regression analysis is used to measure the influence of automation usage on the level of administrative staff satisfaction in healthcare organizations. It allows assessing the predictive power between independent and dependent variables in the study to show how automation technologies influence employee satisfaction. This approach enables researchers to estimate the level of automation usage influence on work efficiency and staff satisfaction.

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$$SS = \beta_0 + \beta_1 AU + \varepsilon \quad (5)$$

The regression analysis measures the direct effect of automation usage on staff satisfaction. It analyzes the effect of change in automation usage on the level of satisfaction among staff members of hospitals. It also involves the use of constant value, regression coefficient, and error terms for predictive analysis and importance of the automation technology in healthcare management.

3.3.2 Moderation Analysis

The moderation analysis is performed to test if the digital competence moderates the relation between automation usage and satisfaction of the administrative staff. It is carried out for identifying any interaction effects between the automation usage and digital competence. It can help understand whether the employees who have high digital competencies tend to be more satisfied and adaptable to technological systems in the hospital management process in Eqn 6.

$$SS = \beta_0 + \beta_1 AU + \beta_2 DC + \beta_3 (AU * DC) + \varepsilon \quad (6)$$

The moderation equation measures the joint influence of automation use and digital competence on employee satisfaction. Interaction reflects the moderating role of digital competence on how automation influences employee satisfaction. The model helps understand the adaptability of employees towards automation in healthcare.

3.4 Proposed Digital Competence Moderation Model

This model will help measure the effect of digital competence in moderating the influence of automation use on administrative employees' satisfaction in hospitals. This model considers automation adoption, digital readiness, and employee satisfaction. It analyses the data obtained from the survey, computes scores for both automation and digital competence, and determines the interaction. The model helps hospital managers improve adaptability of their employees and increase the efficiency of digital transformation efforts by effective technology utilization in eqn 7.

$$SMS = \frac{\sum_{i=1}^{n} s_i}{n} \quad (7)$$

The satisfaction mean score formula provides the calculation of the mean score of the level of satisfaction of administrative personnel in hospitals according to the findings of surveys. This formula helps determine the employee attitudes towards the use of automation in the workplace. The satisfaction mean score formula aids statistical analysis of satisfaction levels of the employees in eqn 8.

$$IES = AU * Dc \quad (8)$$

The equation for the interaction effect strength quantifies the relationship between the effect of using automation technology and the level of digital competence on the job satisfaction of administrative personnel. This is shown in Fig. 2. The interaction effect strength quantifies the relationship between the effect of digital competence in improving the efficacy of automation technology in healthcare facilities

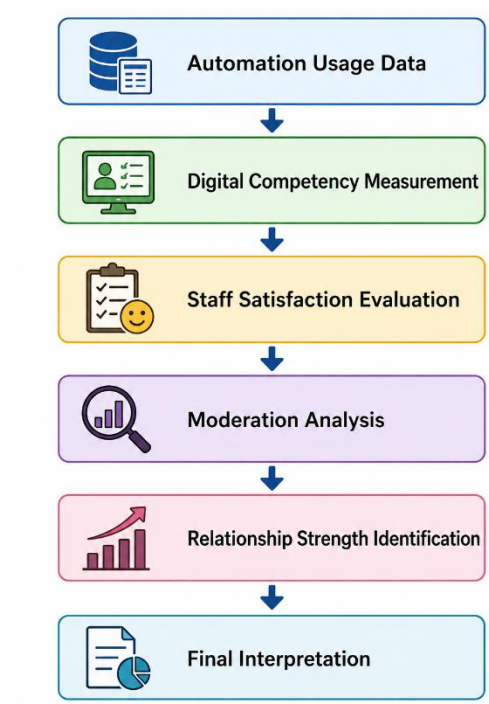

Figure 2: Moderation Analysis Process Flow for Automation Usage, Digital Competency, and Staff Satisfaction

4. RESULTS AND DISCUSSION

The research findings show that automation contributes positively to the job satisfaction of administrative staff members in hospitals. The descriptive analysis showed that there is high use of automation and high digital competence among the staff members that resulted in improved communications, efficiency, and minimized repetitive tasks. From the regression analysis, there is a strong positive relationship between automation and the job satisfaction of the employees. Moreover, the moderation analysis shows that the relationship between automation usage and job satisfaction increases significantly when there is an improvement in the digital competence of the staff members.

4.1 Results of Descriptive Analysis

The descriptive analysis looked into the perception of the respondents on automation, digital competence, and the job satisfaction of administrative staff in fig 3. It was noted from the results that the majority of the administrative staff members regularly use automation tools like electronic health record systems, scheduling tools, and billing software. Employees felt that automation helped in reducing repetitive tasks, improved communication processes, and minimized mistakes. In addition, the findings indicated that the digital competence of the employees was relatively high. As such, the level of job satisfaction among the administrative employees was quite high especially those with digital competence.

Table 2: Descriptive Analysis Results

Variables	Mean Score	Interpretation
Automation Usage	4.12	High
Digital Competency	3.95	Moderate to High
Staff Satisfaction	4.08	Positive

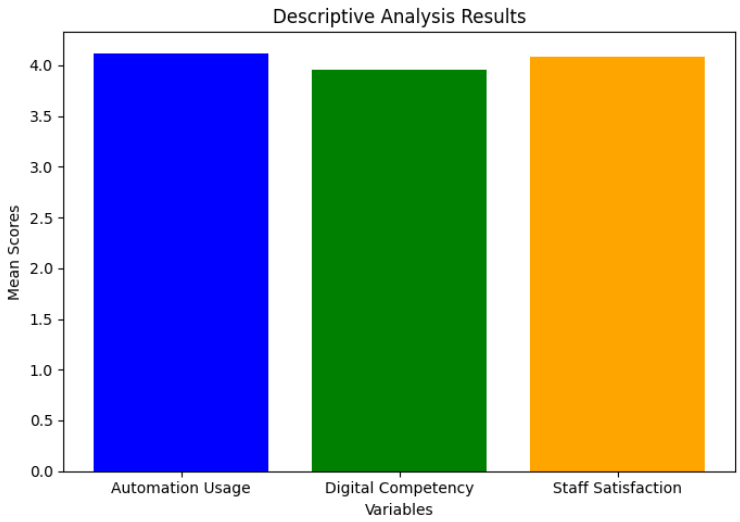

Figure 3: Descriptive Analysis of Automation Usage, Digital Competency, and Staff Satisfaction

4.2 Regression Analysis Results

To determine the impact of automation technologies on administrative staff satisfaction, regression analysis was used in the study to identify the direct impact of automation technologies on administrative staff satisfaction. The study found that there is a positive correlation between automation technologies and satisfaction levels of the employees in the hospitals. The use of automation technologies helped employees perform their jobs more effectively with an efficient coordination of tasks in fig 4. The regression coefficient shows that high automation usage had a positive impact on the job satisfaction of the employees. This proved the hypothesis that automation technologies positively affect employees' work and performance in hospital.

Table 3: Regression Analysis Results

Variables	**Regression Coefficient**	**Significance Value**	**Result**
Automation Usage → Staff Satisfaction	0.68	0.001	Significant Positive Relationship
Constant Value	1.25	0.000	Significant

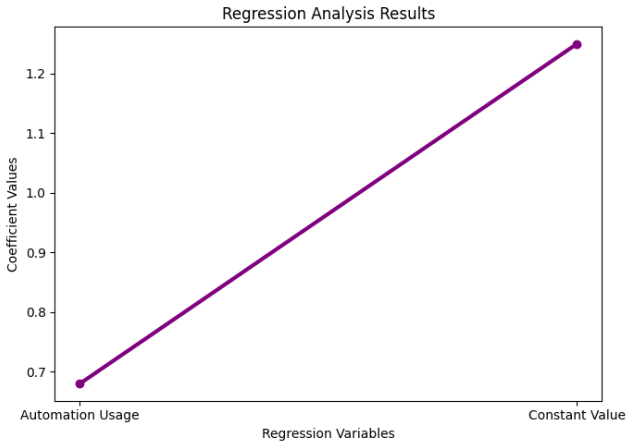

Figure 4: Regression Analysis between Automation Usage and Staff Satisfaction

4.3 Moderation Analysis Results

A moderation analysis was conducted to ascertain whether digital competency mediates the relationship between the use of automation and the job satisfaction of administrative employees. The finding reveals the existence of an interaction effect between automation and digital competence among healthcare employees. Employees who have high levels of digital competence were found to be highly adaptive, confident, and satisfied when using the automated healthcare facilities (fig 5). Digital competence acts as a moderator which significantly enhances the positive effects of automation technology on employees' job satisfaction. This research underscores the need for digital competence, technology training, and organizational support as vital elements in health care digitalization.

Table 4: Moderation Analysis Results

Variables	Interaction Effect	Significance Value	Interpretation
Automation Usage × Digital Competency	0.36	0.002	Positive Moderating Effect
Digital Competency → Staff Satisfaction	0.41	0.001	Significant Positive Influence
Overall Moderation Model	Strong	0.000	Accepted

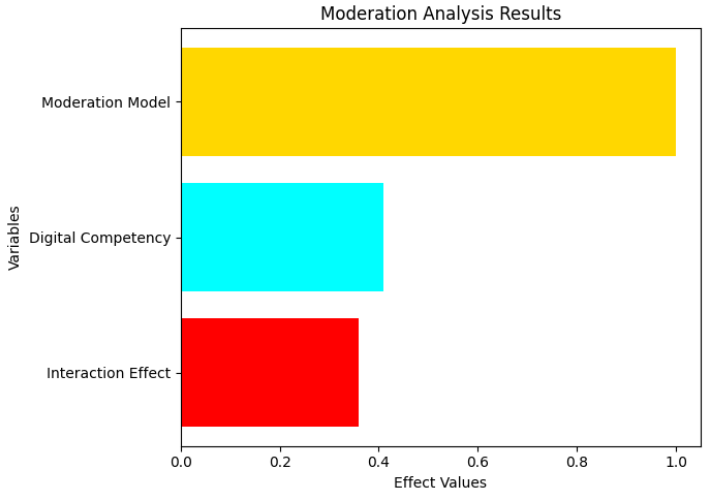

Figure 5: Moderation Effect of Digital Competency on Staff Satisfaction

5. CONCLUSION

The research focused on determining the moderating effect of digital competence in the link between automation and job satisfaction of administrative employees in hospitals. The results indicated that automation has a positive impact on job satisfaction among hospital employees because of the improved efficiency of their activities, decrease in the frequency of doing tedious work related to administration, and increased effectiveness of communications within the hospital. Moreover, the research proved that digital competence is an important moderator of the relationship between automation and employee satisfaction. More specifically, digital competence helped hospital employees become more adaptable, confident, and accepting toward using automated technology in healthcare organizations. Thus, the research makes an important contribution to literature in terms of highlighting the role of automation adoption and digital competence in improving the well-being and productivity of administrative hospital employees.

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