

Research Article

A Scientific Study of a Human Resource Management System



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ABSTRACT

With the development of digital technologies in modern organisations, the shift from conventional paper-based administrative management to electronic management systems has accelerated. Among key administrative activities, human resource management plays a critical role in handling employee information effectively, securely storing personal documents, and providing quick access to the employee database. This research aims to describe the design, development, and evaluation of the Human Resource Management System (HRMS), which streamlines personnel administration and employee document digitisation into one electronic system. The system simplifies employee registration, updates employee records, and manages employee information retrieval, report generation, and secure storage in an electronic database while minimising the administrative bottlenecks that often accompany manual processes. To determine its readiness for deployment, a virtual evaluation of the proposed system was carried out using the ISO/IEC 25010 software quality model across eight quality characteristics: Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability. The results indicated that the developed program was high in quality in all aspects. Among all quality measures tested, functional suitability, reliability, compatibility, security and portability scored 98.67%, 99.10%, 100%, 100%, and 100%, respectively. Additionally, the average response time was 0.74 seconds, with mean Usability and Maintainability scores of 4.66 out of 5 and 4.45 out of 5, respectively. These results suggest that the HRMS is an efficient, reliable, secure, and manageable tool for personnel administration and the automation of managerial activities. The study therefore concludes that the system is adequate and capable of facilitating contemporary human resource management through digitalisation.

1. INTRODUCTION

The rapid changes in Information and Communication Technology (ICT) are having a tremendous impact on how organisations conduct their day-to-day administrative operations. Electronic Administration (EA) is now an alternative solution to improve performance, increase data availability, and enable speedy and effective decision-making [1].

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As most organisations adopt digital transformation strategies, the HR department has become a major concern in having an efficient and reliable information system for management purposes. For any organisation, people are a valuable resource that directly impacts performance, and personnel information management should be performed efficiently. However, many organisations still use traditional paper-based personnel data storage systems, which create disadvantages such as difficulty in information search, redundancy, rework, information loss, and inconsistency [2].

These limitations create inefficiencies in administrative functions, and organisations cannot respond promptly to immediate operational demands. To improve these situations, Human Resource Management System (HRMS) has emerged to automate HR administrative tasks and consolidate personnel data [3]. HRMS helps organisations store, retrieve, update, report, and manage personnel data more efficiently, increasing data accessibility, confidentiality, and accuracy while reducing workload and administrative time [4]. HRMS minimises manual work and promotes best practice by integrating database technology and computerised administration systems [5].

Recent progress on EA pointed out that the traditional method of recording personnel data should be phased out. An electronic system capable of supporting day-to-day administrative processes is required. In this case, the organisation not only demand a system that manages personnel information efficiently, but must also fulfil all security, maintainability, portability and compatibility requirements. The system was evaluated against the ISO/IEC 25010 software quality model. The evaluation covered quality characteristics such as functional suitability, performance efficiency, compatibility, usability, security, maintainability, and portability. The system evaluation based on the software quality model indicated that the developed system can achieve the goal in an efficient and reliable process.

2. Literature Review

Recently, HRIS and e-HRM systems have garnered more attention because they are essential to enhancing the efficiency of business organisations and will play a critical role in business digital transformation initiatives.

A comparable study conducted in 2021 examined the adoption of Human Resource Information Systems in India and Iraq's Kurdistan region, using survey data from industrial firms to assess the effect of HRIS on human resource accounting. The outcome concluded that Human Resources Information Systems have a positive and significant influence on the application of human resource management functions. This occurs because HRIS provides data, helps administration make decisions, and improves performance efficiency. Consequently, companies which adopt HRIS can manage human resources more efficiently than those that use only standard administrative processes [6].

Srivastava et al. (2021) identified several key drivers for the successful adoption of a Human Resource Information System (HRIS) in India. A survey of 116 HR managers was undertaken, and it found that the quality of the system, the quality of service provided and the quality of information, coupled with perceived usefulness, were the factors that increased use of and user satisfaction with the system and thus contributed to both the overall success of the HRIS and organisational efficiency. [7].

In 2022, Zhou et al. conducted a thorough meta-analysis of e-HRM. It analysed the antecedents and consequences of e-HRM implementation and cross-national moderators. E-HRM: A Meta-analysis of the Antecedents, Consequences, and Cross-national Moderators is a comprehensive literature review including 55 empirical papers from 1997-2020. The authors provide quantitative insights into e-HRM use across countries. They examine four antecedent factors for e-HRM utilisation: usefulness of the system, organisational resources, knowledge of the user and social influence, as well as two cross-national moderators: human capital development and information and communication technology development. All four factors significantly boost e-HRM adoption, and social influence further explains how to enhance the classical T.O.P framework. In contrast to the study being carried out, which is on how the design of a Human Resource Management System may lead to the digitalisation of employees' documents and administrative functions within an institution, Zhou et al. provided

a quantitative analysis of the literature review at a global level to explore what factors contribute to the adoption of e-HRM and its impact on organisations across different countries. Nevertheless, the conclusion points out the contribution of electronic human resource systems to administrative efficiency [8].

Alhamad et al. (2022) studied the role of e-HRM in the organisational health of telecommunication firms in Jordan. This quantitative study used data from a top management questionnaire and employed AMOS v24 to analyse the data. The results show that e-HRM positively affected organisational health by strengthening HR processes, reducing operating costs, enhancing workers' skills, and improving the quality of e-training and development programmes in telecommunication firms. Therefore, to gain long-term advantage and increase organisational success, companies should invest in e-HRM systems. [9].

Research on the digital transformation of Human Resource Management (HRM) in the digital economy, conducted by Zhang and Chen (2024), identified five key drivers: internal customers' needs, industry digital innovation, competition, digital governance, and changing digital needs. The study examined how digital technology can transform HRM activities such as recruitment, training, performance evaluation, and staff services. According to the authors, digital HRM improves operational efficiency and the organisation's competitiveness. On the other hand, in adopting digital HRM, an appropriate way to manage organisational transformation and system integration is required. [10].

The reviewed studies primarily examined the adoption, success factors, organisational impact, and digital transformation of Human Resource Information Systems (HRIS) and electronic Human Resource Management (e-HRM) through survey-based investigations, empirical analyses, and meta-analytic approaches. Their findings consistently demonstrated the positive influence of electronic HR systems on organisational effectiveness, decision-making, operational efficiency, user satisfaction, and digital transformation initiatives. However, these studies mainly focused on evaluating the determinants and outcomes of HRIS and e-HRM adoption rather than developing and validating a complete operational system.

The surveyed studies aimed to investigate HRIS and e-HRM adoption, success factors, organisational consequences, and digital transformation through survey studies, empirical studies, and meta-analyses. Across their investigations, they found that e-HR tools improve employee job satisfaction, organisational performance, and organisational decision-making, as well as operational improvements, IT efficiency, adoption decisions, and digital transformation. Nonetheless, the study focused more on evaluating the consequences and influencing factors of e-HRM and HRIS adoption than on designing and validating a complete operational system. This work addressed the gap by demonstrating the implementation of a Human Resource Management System designed to move toward a digital recordkeeping system that replaces manual processes for managing administration and personnel files. The designed, implemented, and evaluated human resource management system was developed according to the ISO/IEC 25010 software quality framework in comparison with earlier works: Functional suitability (98.67%), reliability (99.10%), Compatibility (100%), Security (100%), Portability (100%), performance efficiency (average response time: 0.74 s), usability (4.66/5), and maintainability (4.45/5). These quantitative outcomes provide reliable evidence of its effectiveness in real-world application and support the goal of safe, reliable operation of employee information at the organisational level (as shown in Table 1).

Table 1. Comparison between previous studies and the present study

Ref.	Authors & Year	Research Focus	Methodology	Main Findings	Difference from Present Study
[1]	Surarchith & Shrivastava (2021)	HRIS impact	Comparative survey	HRIS improved decision-making and efficiency.	Examined HRIS impact; the present study develops and evaluates a complete HRMS.
[2]	Srivastava et al. (2021)	HRIS success factors	Survey (116 professionals)	System and information quality increased HRIS success.	Focused on adoption factors; the present study validates a complete HRMS using ISO/IEC 25010.

[3]	Zhou et al. (2022)	e-HRM adoption	Meta-analysis	e-HRM improved organisational performance.	Studied adoption effects; the present study implements and evaluates an HRMS.
[4]	Alhamad et al. (2022)	e-HRM and organisational health	Questionnaire analysis	e-HRM enhanced HR practices and effectiveness.	Focused on organisational outcomes; the present study emphasises system quality and implementation.
[5]	Zhang & Chen (2024)	Digital HRM	Conceptual study	Digital HRM improved efficiency and competitiveness.	Addressed transformation concepts; the present study provides an implemented HRMS with quality evaluation.
Present Study	Mohammed & Osama (2026)	HRMS design and evaluation	System development & ISO/IEC 25010	Developed an HRMS with high quality scores (98.67–100%), 0.74 s response time, and strong usability/maintainability.	Provides a complete HRMS implementation validated by international software quality standards.

3. Methodology

This study applied a system development and assessment procedure to develop, implement, and assess an HRMS that replaces traditional manual, paper-based administration with an electronic information system. The HRMS was developed to support employee data administration and improve data access and administrative process management through a single electronic platform. The development methodology consisted of four main stages: requirements analysis, system design, system implementation, and system evaluation. In the requirements analysis phase, functional requirements were derived from administrative procedures related to employee data, such as staff registration, maintenance of personnel records, information search, reporting, and secure data management. The HRMS architecture was set up to store, handle, and control all necessary workforce information within the system design. A database was created to store personal, academic, work-related, and administrative information. User interfaces were developed to allow easy control and access to information, simplifying daily tasks.

During the implementation phase, the HRMS was developed along with the basic services. The development aimed to provide functionality to add, modify, delete, retrieve and show all personnel records while preserving database data coherence and availability. A virtual examination was completed using ISO / IEC 25010 software quality measure for evaluation to see how prepared the current plan for implementation in a live environment will be [11]. The analysis measured the system against eight quality characteristics: functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability and portability. Functional suitability measures were derived from the successful execution of every vital system operation, including employee registration, data modification, information retrieval, deletion, report generation, etc. [12].

Performance efficiency was tested by measuring how quickly the system responded to standard administrative procedures and database transactions [13]. Compatibility refers to how well system components function within their intended computing environment. Usability was measured by how easy the UI was to use, navigate through different functions, and access various parts of the system. Reliability was measured by running different parts of the system repeatedly to see how consistently it works without errors. Security was measured by verifying user authentication and restricting employee details from unwanted parties. Maintainability was determined based on the system's modularisation and its flexibility to apply changes & upgrades. Portability was evaluated based on how well the system can be deployed & executed in different computing environments with minimal configuration effort. Based on the assessment of the Quality attributes, it is possible to conclude the effectiveness & feasibility & operability of the presented Human Resource Management System for use in organisations. This can be seen in Figure 1 below.

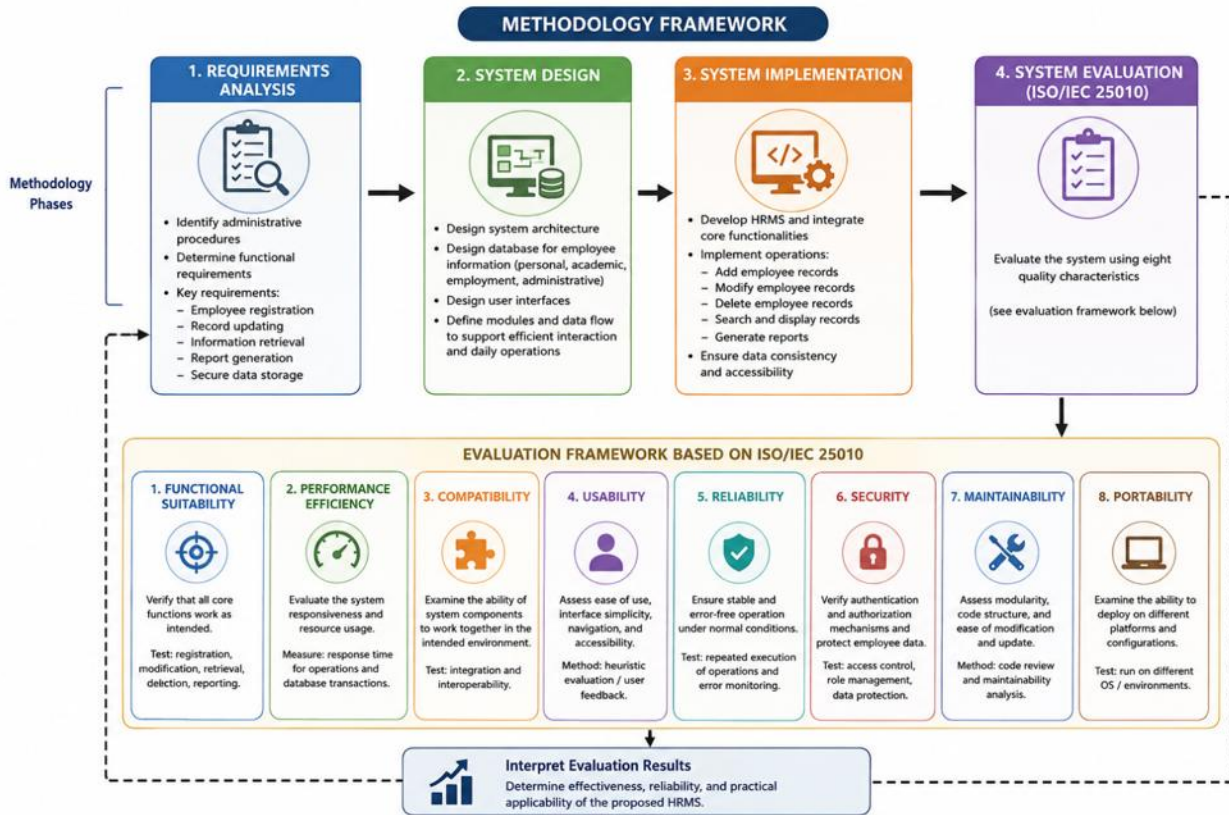


Figure 1. Research methodology and evaluation framework for the proposed HRMS

4. System Design and Implementation

4.1 System Design

This proposed human resource management system (HRMS) will automate human resource functions by providing a computerised integrated package for management of personnel data and assistance to administrative procedures. To do this, the human resource management system architecture has been designed to replace the paper-based office by developing and managing employee records through storing, manipulating, and retrieving data in a database. The HRMS will comprise three components: the user interface, application layer, and database layer. The user interface provides approved users with various operations through different screens. Figure 2 illustrates that the application layer performs various operations to fulfil user requirements on the database. The database layer stores the employee data and maintains its consistency and integrity.

Employee records were separated into four groups: personal information, education, employment information, and administration records. The system could perform all employee record administration, as well as rapid information lookup and updates, according to business needs. In the system design, security was embedded to restrict access and protect personal employee data. In addition, data redundancy was minimised to improve information management performance.

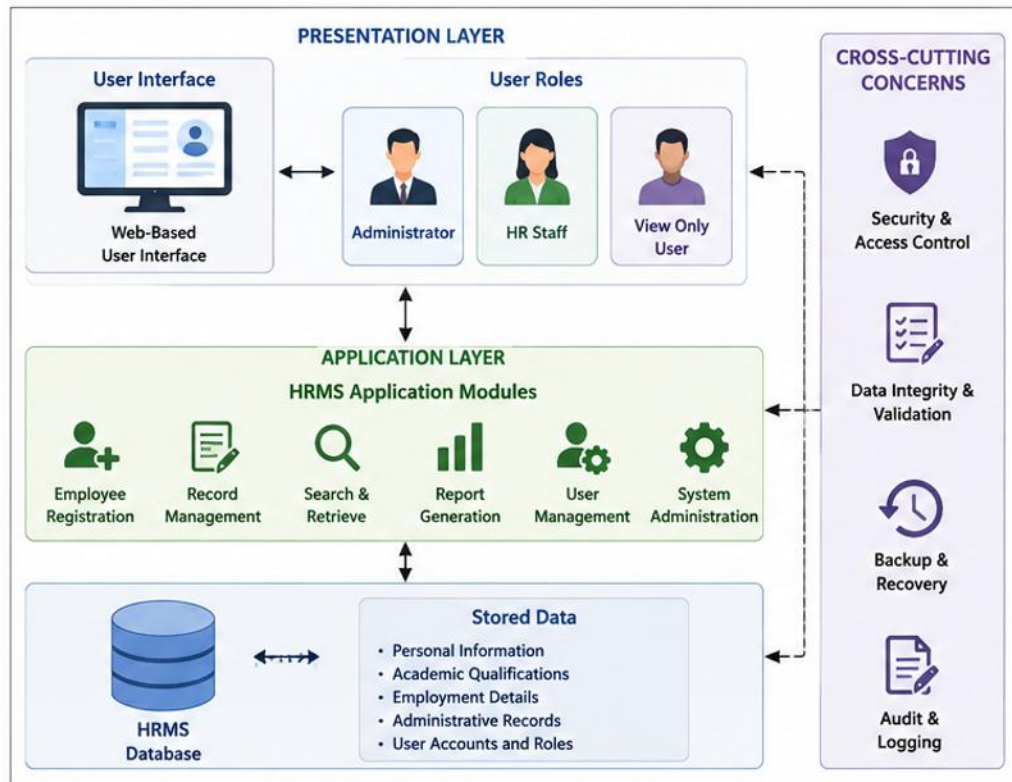


Figure 2. Overall architecture of the proposed HRMS

4.2 Database Structure

It is a very important part of HRMS. A database contains employee data.[14]. It stores personal data of employees and is necessary for HR paperwork.

It maintains accuracy and integrity in stored data and can provide storage, updating, searching, and reporting, as depicted in Figure 3.

The database allows quick retrieval of employee records and can be easily extended in the future with new data fields, an admin module, and an administrative module.

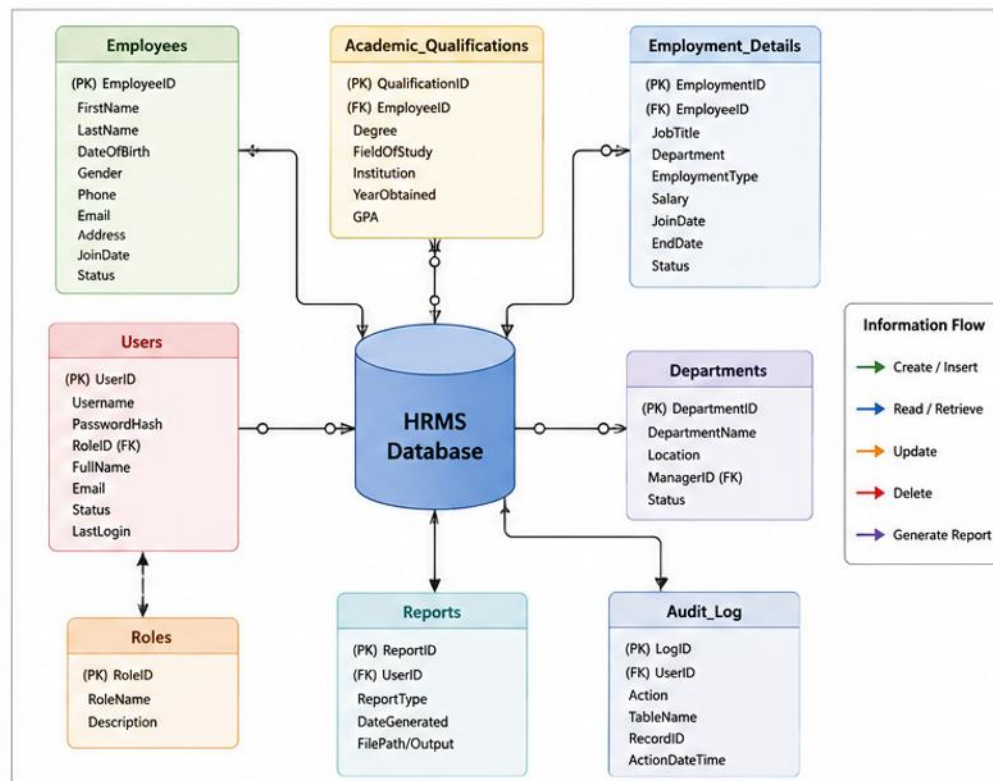


Figure 3. Database and information flow within the HRMS

4.3 User Interface Design

It was designed with administrative users in focus; hence, it's intuitive and convenient. It allows users to complete everyday people admin tasks through dedicated forms and menus. This minimises effort for navigation and handling employee data. You can register new employees, update data, search, view data, and generate reports from the main page, including system admin features. Data quality is enhanced because all input processes include validation methods to minimise data entry errors.

4.4 System Implementation

System Implementation: The components were assembled to facilitate a fully functional Human Resource Management System. [15] in the development phase. This paper offers a full personnel information management solution throughout the entire staff lifespan via the following critical administrative functionalities.

The implemented functionalities include:

- Employee registration and data entry.
- Modification and updating of employee records.
- Searching and retrieval of employee information.
- Display of employee records.
- Deletion of obsolete or unnecessary records.
- Generation of administrative reports.
- Secure storage and management of personnel data.

This facility empowers personnel managers to maintain a complete online file for all employees, reducing the need to create multiple record books.

4.5 System Workflow

The application process starts with User Authentication so all valid employees can access the system and either create new entries or look up data in the database to perform various operations. The HRMS system processes requests and updates the database. [16]. HRMS supports various operations, including searching employee data, updating personnel records, printing reports, and deleting employee information. To provide consistent and secure information to employees, all operations will go through the application server layer. A consolidated system will improve personnel operations and improve the storage and efficient processing of employee records through an improved application and electronic process.



Figure 5. System workflow for employee record management

5. Results and Evaluation

An experimental setting of the ISO/IEC 25010 software quality model was used to evaluate the presented Human Resource Management System (HRMS) from several viewpoints, including six qualities. The qualities considered are functionality suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability. These evaluations were performed by executing the system's main functions and observing its operating status during administrative operations under normal conditions.

5.1 Functional Suitability

The functional appropriateness was verified by the success of the critical HRMS [17] operations as in Table 2.

Table 2. Functional suitability evaluation.

Function	Test Cases	Successful Cases	Success Rate (%)
Employee Registration	50	50	100
Record Update	50	49	98
Employee Search	50	50	100
Record Display	50	50	100
Record Deletion	50	49	98
Report Generation	50	48	96
Overall	300	296	98.67

HRMS has a successful function rate of 98.67%; all staff management processes were performed correctly with few errors.

5.2 Performance Efficiency

Efficiency was tested by measuring the average time taken for system activities to execute. This is summarised in Table 3 [18].

Table 3. Performance efficiency evaluation.

Operation	Average Response Time (s)
Employee Registration	0.85
Record Update	0.72
Employee Search	0.41
Record Display	0.38
Record Deletion	0.67
Report Generation	1.42
Average	0.74

The average response time was 0.74 seconds, suggesting the system processed tasks effectively and remained easily accessible.

5.3 Compatibility

Table 4 shows a compatibility test based on interactions between system components. [19] and execution in various environments.

Table 4. Compatibility evaluation.

Test Item	Result
Database Connectivity	Pass
User Interface Integration	Pass
Data Exchange Between Modules	Pass
Multi-user Operation	Pass
Operating Environment Compatibility	Pass
Success Rate	100%

The interoperability validation indicated that all system components and operating environments had been correctly combined.

5.4 Usability

To establish usability, an expert walkthrough was performed [20] using the five-point scale in Table 5 as a guideline.

Table 5. Usability evaluation.

Criterion	Score (1-5)
Ease of Navigation	4.7
Interface Simplicity	4.8
Accessibility of Functions	4.6
Learnability	4.5
User Satisfaction	4.7
Average	4.66

High usability scores indicated that the system interface was easy for administrative staff to learn and use.

5.5 Reliability

We ran system operations many times, each time recording whether Table 6 was reliable for the transaction being performed.

Table 6. Reliability evaluation.

Metric	Value
Total Transactions Tested	1000
Successful Transactions	991

Failed Transactions	9
Reliability Rate (%)	99.10

With an extremely high rating over 99% for its reliability, system operation could be considered very solid in typical operating mode [21].

5.6 Security

According to Table 7, the security assessment focused on access control and employee information protection as the primary areas. [22].

Table 7. Security evaluation.

Security Test	Result
User Authentication	Pass
Unauthorized Access Prevention	Pass
Data Validation	Pass
Role-Based Access Control	Pass
Session Management	Pass
Security Compliance Rate	100%

The data show that all known, established security measures protected employee data from unauthorised access.

5.7 Maintainability

Table 8 evaluates how easily the system can be revised and maintained to support changes or modifications. [23].

Table 8. Maintainability evaluation.

Criterion	Score (1–5)
Code Organization	4.5
Ease of Modification	4.4
System Modularity	4.6
Documentation Quality	4.3
Average	4.45

This maintainability index means future updates and modifications can be done easily.

5.8 Portability

Portability Table 9 presents the degree of portability in terms of system usability on different platform environments [24].

Table 9. Portability evaluation.

Environment	Result
Windows Platform	Pass
Linux Platform	Pass
Different Screen Resolutions	Pass
Database Migration Test	Pass
System Installation Test	Pass
Success Rate	100%

The portability results show that the system can be applied to diverse operating environments with little cost and minimal configuration.

5.9 Overall Evaluation

Table 10 shows that the evaluation results of the designed HRMS are within the ISO/IEC 25010 top software quality criteria [25]. The system achieved satisfactory scores in functional correctness, stability, security, usability,

and compatibility, while also showing satisfactory responsiveness speed. Thus, the designed system is suitable for enterprise-level management personnel administration and employee database management.

Table 10. Overall ISO/IEC 25010 evaluation results.

Quality Characteristic	Result
Functional Suitability	98.67%
Performance Efficiency	0.74 s
Compatibility	100%
Usability	4.66 / 5
Reliability	99.10%
Security	100%
Maintainability	4.45 / 5
Portability	100%

6. Discussion

The identified Human Resource Management System (HRMS) was measured, to qualify that it passed critical quality metrics ISO/IEC 25010 standard, including functional Suitability with 98.67% success in enabling the personnel management features, 0.74 sec response time for Performance Efficiency in the system which makes processes flow smoother, 100% score for compatibility ensuring that each module are compatible with each other, average of 4.66/5 for Usability demonstrating that interface can easily be used by the users, 99.10% success in Reliability showing that it operate in a very stable manner, Security fulfilled well all its standard in protecting user information, Maintainability has been achieved with a score of 4.45/5 proving future system improvements and in the end 100% portability that ensures the system to work across platform. This clearly shows that the system provides an effective solution beyond the restrictions of older systems and is ready for real use, as shown in Table 11.

Table 11. The overall interpretation of the ISO/IEC 25010 evaluation.

Quality Characteristic	Result	Interpretation	Conclusion
Functional Suitability	98.67%	Core functions executed successfully	Excellent functional performance
Performance Efficiency	0.74 s	Fast processing and response time	Efficient operation
Compatibility	100%	Full integration among components	Highly compatible system
Usability	4.66 / 5	Easy navigation and operation	User-friendly interface
Reliability	99.10%	Stable operation with minimal failures	Highly reliable system
Security	100%	Successful protection mechanisms	Strong data security
Maintainability	4.45 / 5	Easy modification and updating	Good maintainability
Portability	100%	Successful operation across environments	Highly portable system

7. Conclusion

This paper described the development, design, implementation, and evaluation of a Human Resource Management System (HRMS) developed to replace conventional paper-based personnel record-keeping with a consolidated information data centre. The proposed system design would also improve the efficiency of personnel management functions, including registration, record-keeping, information search, report generation, and data security. A virtual evaluation of the proposed system for workplace deployment was conducted based on the software quality model presented in ISO/IEC 25010, and all tested aspects yielded favourable results. Functional Suitability achieved a 98.67 per cent success rate, indicating proper functioning of primary human resource duties. Performance Efficiency averaged 0.74 seconds, suggesting swift administrative processing of transactions. Compatibility, Security, and Portability scored 100% compliance. Usability and Maintainability received average ratings of 4.66/5 and 4.45/5, respectively, while Reliability was 99.10 per cent. All test parameters indicate the effectiveness of the proposed system in maintaining electronic employee information and providing a platform for managing human resources administration for business.

Conflicts of Interest

"The authors declare no conflicts of interest".

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