International Journal of
INTELLIGENT SYSTEMS AND APPLICATIONS IN ENGINEERING
ISSN:2147-6799 www.ijisae.org Original Research Paper

Employee Performance Data Management and Analysis of Ilocos Sur Polytechnic State College through Human Resource Information System Application

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Submitted: 30/12/2023 **Revised**: 06/02/2024 **Accepted**: 13/02/2024

Abstract: This research aims to explore the use of Human Resource Information System (HRIS) in managing and analyzing employee performance data at Ilocos Sur Polytechnic State College (ISPSC). The study utilized a descriptive and developmental research design and collected data through survey questionnaire and interviews with HR personnel and IT experts. Results showed that the college had implemented a Human Resource Information System to manage employee records and performance data, but there were challenges in its use and adoption by employees. The study also found that the Human Resource Information System had enabled the college to generate various reports and analyses on employee performance, which had helped in decision-making and planning. Recommendations were provided to improve the use and adoption of the HRIS, such as providing training and support to employees and enhancing the system's functionality. Overall, the study highlighted the importance of HRIS in managing and analyzing employee performance data, which can contribute to college's overall performance and success.

Keywords: *Human resource information system, employee performance, institution, agile methodology, data management, data analysis.*

1. Introduction

Employee performance is one of the significant factors of Higher Education Institutions (HEI) for gaining a competitive edge in the economic environment. Employee performance is defined by Shankar Pawar [27] as the level of relevant output produced by an employee, and it can be measured through the standard set by the organization (i.e., performance evaluation, attendance, training records, etc.). Highly competent teachers and staff are competitive advantage within the institution since their expertise, research contributions, and teaching skills create a vibrant learning environment to help students succeed in their careers and contribute to the institution's goals and success [11]; as a result, this can promote sustainable, inclusive and economic growth, which is manifested in Sustainable Development Goal [13]. Furthermore, the key to enhance the performance of an employee is by establishing effective management, which the Human Resources department carries out.

The human resource department, often called Human Resources, oversees all aspects of managing an organization's human capital or workforce [23]. Human Resource department is essential in every institution as it encompasses several functions, such as recruiting and retaining top talent, developing employees' skills and talents, and fostering an inclusive environment [25]. Aside from that, Human Resources is also responsible for keeping records of employees, like performance evaluation and attendance/absence, designing and implementing training programs, and following and executing rewarding/payment processes to ensure that the organization runs smoothly and efficiently [8]. These records are one of the most critical pieces of information that helps HR administrators evaluate the performance and productivity level of each employee. It also helps identify areas to improve by giving employee feedback.

In the present-day context, competition among universities has become globalized, and human resource departments in higher education institutions are under intense pressure to increase their productivity, efficiency, and overall performance by optimizing the effectiveness of their employees and transactions. However, many institutions still prefer manual practices, overemphasize paper-based processes, and lack appropriate tools to improve an institution's productivity. Yawar Ali & Mahmood [28] observed that some of the common problems encountered

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by four universities in Pakistan that impede efficient operation and institutional success (which is time-consuming) are continuously using traditional HR methods in maintaining employee data, recruitment, appraisals, training, and payroll. In other instances, Cihan University states that an ineffective human resource management strategy results from a shortage of information caused by a lack of reliable instruments on which the institution could depend as input to achieve its goals [3].

Information is considered to be an advantage for any organization. It must be coordinated and handled effectively to achieve consistency. The advancement of technology allows companies to implement a computer-based information system to preserve their information assets and turn most of their processes into digital processes. Process digitization converts data into a digital form so that data is well structured and processed efficiently. Data transmission would then be carried out remotely and access to data would be simpler and quicker. This would result in better performance of the transactional processes of the organization, quicker communication, and increased productivity performance of employees using the system.

The manual condition of Human Resource Management Processes remains a concern in the Philippines. This was visible in the province of Ilocos Sur, particularly in the Ilocos Sur Polytechnic State College. The researcher interviewed the Human Resource Management Office about the current methods of identifying, managing, recording, and evaluating employee records (i.e., summary of undertime, training records, performance evaluation) regarding their performance. The HR staff stated that MS Excel is used to input data, and the office simultaneously still depends on paper-based processes in their day-to-day operations. In addition, the department keeps employee records in a filing cabinet. However, when reports are needed, the HR personnel manually scan papers from bulk files. For instance, one of the discrepancies in the HR office is monitoring the number of absences/undertime of the employees or incomplete time-in that causes the failure to update the names in the attendance [26]. As a result, HR loses productivity, reduced real-time insights, strategic initiatives, and administrative backlogs, leading to workflow disruptions, and implying that an appropriate tool is needed to systemize their transactions [5].

Human Resource Information System has proven its significance in various organizations throughout the world, whether in business or academia. In 2018, Hawa Walichio et al.,[15] stressed the positive impact of RIS on the Vihiga Country Government in Kenya, arguing that e-training improves the efficacy of collecting data on employees, e-payroll administration decreases time wasted in banks for funds, and HRIS enhances decision-making. While Afifah & Sary, 2020 [2] indicated that there is a significant influence of HRIS in terms of improving the time management of employees. Basically, the employment of HRIS enhanced the administrative and analytical objectives of HR departments in Malaysia's Private Education; it is imperative that it is a powerful and effective technology tool to assist HR professionals in performing complicated tasks in the most intelligent and efficient way as well as accomplish towards strategic human resource management [16]. Beyond that, as noted by Lardizabal & Battung [18], the system provides employee analytics to assist administrators in retaining best-fit personnel since retention strategies are a long-term investment in the school's future growth and competitiveness.

Data Analytics, on the other hand, will be utilized to help HR professionals in evaluating data to identify solutions or make decisions about HR challenges that correspond with the institutional plan [22]. On top of that, analytics may assist managers in accurately monitoring employee performance, identifying high-performing personnel, and developing more effective organizational growth strategies. This is evident in some studies, Credit Suisse Group AG is one of the nine global "Bulge Bracket" banks known for its strict confidentiality policies that offer investment banking, private banking, asset management, and shared services. However, the company faced a significant issue with employee turnover. To address this issue, they deployed Predictive HR analytics using an algorithm that could predict who might quit the company. And with that, this is now widely recognized as one of the earliest examples of employee churn analytics [6].

The researcher proposes a Human Resource Information System integrating the 4th industrial technology, Data Analytics, to address this issue and streamline HR practices of entering, storing, retrieving, and processing the details of the employees' information. This also includes validating the information needed for the employees' progress. The Human Resource Information System (HRIS) is one of the most significant Management Information Systems contributing to an organization's human resource administration functions in promoting a sustainable and innovative workforce, which can be viewed in SDG 9 [13]. Salah et al., 2022 [26] discussed that HRIS is a software or solution for the data entry, tracking, and information needs of a business's Human Resources, management, and accounting functions. HRIS merges human resource management with information technology to simplify the decision-making process, and it also aids in complex negotiations that fall under the human resource umbrella. This platform allows managers to track employee data anywhere worldwide within a few minutes [10] with the assistance and supervision of cyberspace. Alongside HRIS, conventional ways of managing

employees have altered, and operations inside organizations operate smoothly with minimum errors. Hence, this transformation process enables employees to acquire new proficiency, skills, and abilities.

This study aims to design and develop HRIS modules to manage and analyze data on employee performance of Ilocos Sur Polytechnic State College. Specifically, this study seeks to achieve the following:

- Examine the information requirements to design and develop the proposed system;
- Design the features to be integrated into the proposed system; and
- Determine the extent of usability of the proposed system.

2. Methods

2.1. Research Design

In this study, the researcher used the quantitative type of research employing descriptive and developmental research design. Quantitative research is a structured and rigorous method that generates and refines knowledge for problem-solving by using objective and deductive approaches and systematic strategies [21]. The descriptive design is used to gather information about the current status of HRIS implementation, the challenges in using and adopting the system, and the benefits and limitations of using the system for employee performance data management and analysis. The developmental design is used to provide recommendations to improve the use and adoption of the Human Resource Information System at ISPSC.

Data of the study were collected through a survey questionnaire and interviews with HR personnel and IT experts. The survey questionnaire was used to gather quantitative data on the status of the HRIS of ISPSC. The interviews were used to gather qualitative data in the experiences and perspectives of HR personnel and IT experts regarding the HRIS system.

The data collected were analyzed using descriptive statistics and thematic analysis. Descriptive statistics was used to analyze the quantitative data gathered from the survey questionnaire, while the thematic analysis was used to analyze the qualitative data gathered from the interviews. The findings from the analysis was used to provide recommendations for improving the use and adoption of the Human Resource Information S at ISPSC for employee performance data management and analysis.

2.2. Development Process

The researcher utilized the Agile method that served as a guide in the design and development of HRIS for Employee Performance Data Management and Analysis of ISPSC.

The Agile Software Development Life Cycle is a hybrid of iterative and incremental process models that focuses on adaptability and customer satisfaction by developing the system in its rapid state. According to Gurung et al. [14], the requirements are broken down into several smaller sections that can be built incrementally. Each incremental section is created iteratively. The Agile methodology contains five [5] phases in the software development workflow.

- Analyze User Requirement. Throughout this phase, the researchers obtained information from the Human Resource Management Office. The researchers also observed the office's current process in analyzing and managing data on employee performance. The researchers employed a document review and a structured interview to gain knowledge about the existing policies and procedures in the said office (see Requirements Needed in the Developed Human Resource Information System Employee Performance Data Management and Analysis in Results and Discussion).
- Design the Program. Upon completing the information gathered for the HRIS, the researchers constructed a low-fidelity prototype and a UML diagram that visually represents the HRIS's architecture, features, and workflow. It also illustrates how the HR staff (user) may interact with the system.
- Code the Program. The researchers utilized several programming languages or technologies to code the system during this phase. The researchers utilized ReactJS (JavaScript framework) and Next.js, Tailwind (CSS framework), and for the system's front-end development technology, respectively. The database utilized was PostgreSQL, and the back-end utilized was built with Laravel which is a PHP framework (see Features of the Ilocos Sur Polytechnic State College Human Resource Information System in Results and Discussion).
- Document and Test the System. The researchers subjected the system for pilot testing. The total enumeration technique was obtained to select the four (4) Human Resource Staff as respondents and three (3) IT experts to evaluate the usability of the system. It is a purposive sampling approach in which the complete population (i.e., the total population) is examined with a particular set of characteristics. A purposive sample is a non-probability sample chosen based on demographic characteristics and the study's objectives. Purposive sampling, as opposed to convenience sampling, is sometimes referred to as

judgmental, selective, or subjective sampling [9]. The respondents assessed the extent of usability of the human resource information system using the survey instrument adapted from ISO 9126-1 by Buenaflor [19]. Additionally, it was modified based on the system's features (see Level of Usability of ISPSC Human Resource Information System in Results and Discussion).

- Operate and Maintain the System. The system was released by the researchers after pilot testing and improvement to the end user, which is the Human Resource Management Office.

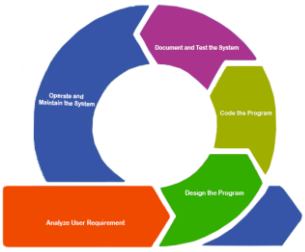

Fig 1. Agile Methodology

2.3. Data Analysis

Each questionnaire indicator was assessed and classified utilizing a 5-point Likert Scale. The scale ranged from 5 being the highest with the descriptive equivalent of "excellent" and 1 being the lowest with the descriptive equivalent of "poor" for system acceptability. The weighted mean was used to quantify and analyze the data along with a survey instrument (ISO:9126).

Table 1. 5-point Likert Scale

Point Scale	Statistical Range	Descriptive Equivalent	Descriptive Interpretation
5	4.20-5.00	Excellent	Very Acceptable
4	3.40 -4.19	Very Good	Acceptable
3	2.60 -3.39	Good	Fairy Acceptable
2	1.80 -2.59	Fair	Poorly Acceptable
1	1.00 -1.79	Poor	Not Acceptable

3. Result and Discussion

This section presents and discusses the study's results, which consist of system requirements for designing and developing the Human Resource Information System for Employee Performance Data Management and Analysis, system features, and the extent of usability of the proposed system.

3.1. Requirements Needed in the Developed Human Resource Information System Employee Performance Data Management and Analysis

- Employee Information. The employee information was based on the Civil Service Form No. 212 Personal Data Sheet, which includes personal details and educational background. The personal details of the employee include name, birth date, birthplace, sex, civil status, mobile number, telephone number, citizenship, date hired, and employee ID. The educational background consists of different levels of education, school name, degree/course, unit earned, period attended, unit earned, year graduated, scholarship/academic honors received, and training/seminar attended.

- Training Records. The training records in this study refer to the list of training or seminars obtained by the employee on the part of Civil Service Form No. 212 Personal Data Sheet.

- Leave Request. The content of the leave request were based on the Civil Service Form. 6 Revised 2020 Application for Leave of the institution, which includes the following attributes: employee name, type of leaves (sick leave, vacation leave, forced leave, etc.), inclusive dates or duration of leaves, status of filing, remarks (with pay or without pay) and action taken (approved or disapproved), remaining leaves, position, and year.

- Individual Performance Committee Review. The Individual Performance Committee Review (IPCR) outlined the key points of the performance review, a performance management tool that an employee must submit every semester that involves commitments towards attaining office goals at the end of the rating period. The objectives were separated into three categories: strategic, core, and support functions, major final output, performance indicators, target of accomplishments or rating period, actual accomplishments, total average, and overall average rating. This has been approved and signed by the employee, the dean or head, and the supervisor.

- Daily Time Record. The daily time record covers the arrival and departure time (morning and noon), regular working days, month, and employee ID

number, as specified in the Civil Service Form No. 48. This is to oversee the employee's attendance.

3.2. Features of the Ilocos Sur Polytechnic State College Human Resource Information System

The features of the developed system were based on the information requirements gathered from the Human Resource Management Office.

Figure 2 shows the dashboard that provides a visual representation of key HR metrics and data in the form of graphs, of the different categories in analyzing the performance. Each category contains a period that specifies the year, department, and occurrences. The dashboard panel was also divided into five (5) categories: dashboard, employee, training records, attendance, leave management, performance management, admin settings, and system settings. A dashboard is a powerful tool for the HR Staff to gain insights into which areas and departments to improve and contribute to the decision-making process of the Human Resource Management Office of the institution.

Fig 2. Dashboard of the Human Resource Information System Application

The next feature of the human resource information system shown in Figure 3 presents the importing of attendance data via csv or .dat file from the biometrics systems. Generated data were directly stored in the system and automatically computed on the dashboard.

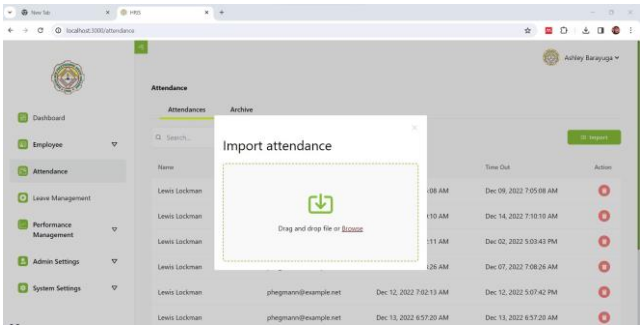

Fig 3. Import CSV/.dat file of Attendance Module

The content of the Leave Management shown in Figure 4 are the following: employee name, types of leave, date started and ended, duration of leave, status of filing, remarks and action taken. This assists the HR Staff to record and monitor the leave record of every employee.

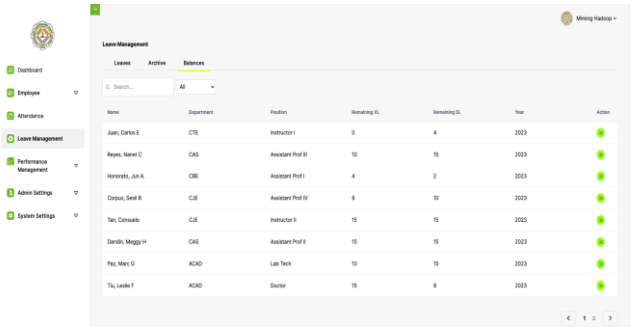

Fig 4. Leave Management Module

Lastly, the Employee Module was split into employee profiles, training records, and rewards or accomplishments (see Figure 5). Data entry of training or seminars and awards or accomplishments on the employee profile were collected and generated into training records, awards, or accomplishments panels

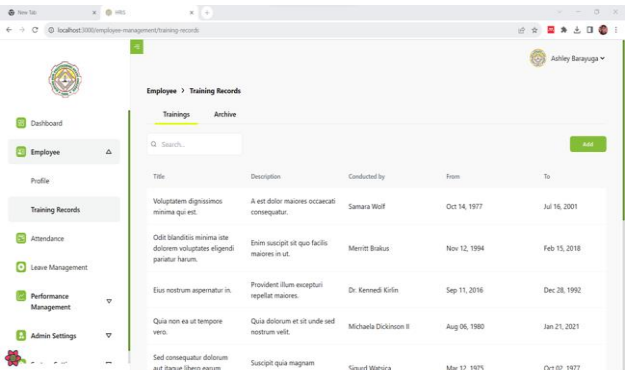

Fig 5. Employee Module Accepted Fonts Within Figures

3.3. Level of Usability of ISPSC Human Resource Information System

The adapted and modified assessment tool used in evaluating the extent usability of the system was the ISO 9126-1. It was given to the respondents on the Human Resource Management Office.

It can be gleaned from Table 2 that the mean score of the ISPSC Human Resource Information System in terms of Functionality on the usability of the system is 4.18 with a descriptive equivalent of Very good, described as “Acceptable.” It is also evident that indicators on suitability and security of the system recorded the highest means of 4.57, while the interoperability indicator gained the lowest mean with 3.57, labeled as “Fairy Acceptable.” As a result, the developed HRIS is widely approved for use as an extra management tool in improving and developing the human resource processes of the institution. Furthermore, the results indicate the system functions appropriately, accurately, and effectively toward

completing tasks of the HR Staff for more accessible and more efficient work.

The outcomes of this study corroborate with the conclusions of Prism [24] that a fully functional IT system allows an organization to run smoothly and increases productivity.

Table 2. Usability Level of the ISPSC Human Information System in Terms of Functionality

Indicator	Statistical Range	Descriptive Equivalent	Descriptive Interpretation
Suitability	4.57	Excellent	Very Acceptable
Accuracy	4	Very Good	Acceptable
Interoperability	3.57	Good	Fairy Acceptable
Security	4.57	Excellent	Very Acceptable
Mean	4.18	Very Good	Acceptable

Table 3 indicates that the average score for the ISPSC Human Resource Information System, in terms of reliability regarding the usability of the system, is 4.33. This result corresponds to the descriptive rating of "Excellent," further specified as "Very Acceptable." The data shows that the maturity indicators had the highest average score of 4.71. In contrast, fault tolerance and recovery indicators had the lowest average score of 4.14, both classified as "Acceptable." The findings show that the developed HRIS is highly accepted for successfully dealing with system issues and/or failures.

The outcomes of this study support the findings of Amrutkar & Kamalja [4], discovered that system reliability assessment is crucial since it identifies the critical components in a system and quantifies the impact of component failures.

Table 3. Usability Level of the ISPSC Human Information System in Terms of Reliability

Indicator	Statistical Range	Descriptive Equivalent	Descriptive Interpretation
Maturity	4.71	Descriptive Equivalent	Descriptive Interpretation
Fault tolerance	4.14	Excellent	Very Acceptable
Recoverability	4.14	Very Good	Acceptable
Mean	4.33	Very Good	Acceptable

Usability, on the other hand, assesses the system's effectiveness, efficiency, and satisfaction among users. Table 4 indicates that the average score for the ISPSC Human Resource Information System in terms of usability, regarding the usability of the system, is 4.50. This result corresponds to the descriptive rating of "Excellent," further specified as "Very Acceptable." The data shows that the understandability indicators had the highest average score of 4.71. While learnability had the lowest average score of 4.29, classified as "Very acceptable." It emphasizes that the system incorporates concepts or aspects that are easy to understand, learn, and apply to the tasks at hand.

The findings of this study corroborate the results of Koskie [17], that system usability is a core design feature that can help enhance users' productivity and efficiency in performing tasks.

Table 4. Usability Level of the ISPSC Human Information System in Terms of Usability

Indicator	Statistical Range	Descriptive Equivalent	Descriptive Interpretation
Understandability	4.71	Excellent	Very Acceptable
Learnability	4.29	Excellent	Very Acceptable
Operability	4.57	Excellent	Very Acceptable
Attractiveness	4.57	Excellent	Very Acceptable
Mean	4.54	Excellent	Very Acceptable

The efficiency measurement evaluates a system's capacity to complete a task without wasting time. Table VI shows that the average usability score for the ISPSC Human Resource Information System, in terms of the system's acceptability, is 4.28. This outcome aligns with the "Excellent" descriptive equivalent, further specified as "Very Acceptable." The data indicates that the resource utilization indicators achieved the highest average score of 4.57. The time behavior received the lowest average score of 4.14, classified as "Acceptable."

The results of this study support the findings of Adducul et al. [1], indicating that the system responds quickly and can distribute resources based on the users' needs.

Table 5. Usability Level of the ISPSC Human Information System in Terms of Efficiency

Indicator	Statistical Range	Descriptive Equivalent	Descriptive Interpretation
Time Behavior	4.14	Very Good	Acceptable
Resource Utilization	4.57	Excellent	Very Acceptable
Mean	4.28	Excellent	Very Acceptable

Maintainability is the ease and speed with which a designed system can return to its operational state after a failure. Table 6 illustrates that the average maintainability score for the ISPSC Human Resource Information System, in terms of the system's usability, is 4.10. This outcome aligns with the "Very Good" descriptive equivalent, further specified as "Acceptable." The data indicates that the resource stability indicators achieved the highest average score of 4.29. Both analyzability and changeability received the lowest average score of 4.00, classified as "Acceptable." This emphasized that system errors could be examined immediately, requiring less work to enhance the system.

The outcomes of this study correspond to Luciano's [20] results; this implies that the system can provide relevant error messages and alternative solutions when clients and other intended users encounter faults and issues while utilizing the system.

Table 6. Usability Level of the ISPSC Human Information System in Terms of Maintainability

Indicator	Statistical Range	Descriptive Equivalent	Descriptive Interpretation
Analyzability	4	Very Good	Acceptable
Changeability	4	Very Good	Acceptable
Stability	4.29	Excellent	Very Acceptable
Mean	4.1	Very Good	Acceptable

Lastly, portability pertains to how easily a system can be transferred from one computer environment to another. Based on the results, the ISPSC Human Resource Information System has an average portability score of 4.32 in terms of system usability. This result corresponds to the "Excellent" descriptive equivalent, further qualified as "Very Acceptable." The data indicates that the instability indicators achieved the highest average score of 4.75. Replaceability is the lowest, with an average score of 4.00, rated as "Acceptable."

The outcomes of this study correspond to Luciano's [20] results, which show that the system is easy to install and requires minimum assistance during network installation.

Table 7. Usability Level of the ISPSC Human Information System in Terms of Portability

Indicator	Statistical Range	Descriptive Equivalent	Descriptive Interpretation
Adaptability	4.29	Excellent	Very Acceptable
Instability	4.71	Excellent	Very Acceptable
Conformance	4	Very Good	Acceptable
Replaceability	4.29	Excellent	Very Acceptable
Mean	4.32	Excellent	Very Acceptable

4. Conclusions

This section presents the conclusion of the developed Human Resource Information System for Ilocos Sur Polytechnic State College.

- The results have shown that the following information that was gathered was required for the application design and development: employee information, training records, leave requests, individual performance committee evaluations, and daily time records.
- The features integrated into the developed system are based on the requirements provided by the end-user, and it is a feasible solution to the existing and conventional process of the Human Resource Management Office of the institution. The system's features are the following: a dashboard that shows the data visualization of each category of employee performance, employee profile, training records, attendance, leave management, performance management, admin setting, and system setting.
- Based on the results, it is considered that the developed system is very acceptable in terms of functionality, reliability, usability, efficiency, maintainability, and portability, indicating that the system is efficient, well-designed, and performs well. Therefore, implementing the system can assist the Human Resource Management Office in analyzing and managing data on employee performance and enhance the quality of services given by the office mentioned above.

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