

## Teacher Salary Projections Based on Student Tuition Fees and Teacher Assessments Using Linear Regression Algorithms at the Al-Husna Foundation TPA

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### Abstract

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Managing teacher salaries at non-formal educational institutions like Taman Pendidikan Al-Qur'an (TPA) is often done manually, leading to inefficiency, a high potential for calculation errors, and a lack of transparency. This research aims to design and build a web-based teacher payroll information system at TPA Yayasan Al-Husna that is integrated with a Linear Regression Algorithm to solve these issues. Using the Waterfall system development method, the system was built with the PHP language, the CodeIgniter framework, and a MySQL database. The result of this research is a functional system that can automate the salary calculation process based on variables such as teaching hours, attendance, and years of service, thereby significantly increasing efficiency, accuracy, and transparency. A key feature of this system is the implementation of the Linear Regression Algorithm, which was successfully used for three predictive functions: projecting the number of students, analyzing the feasibility of a teacher's salary increase based on performance evaluations, and forecasting future salary budgets. System testing using the Blackbox Testing method showed that all 30 functionality scenarios performed as expected. In conclusion, the developed system not only offers a practical solution for payroll administration at TPA Yayasan Al-Husna but also serves as a strategic decision-making tool for management through its predictive capabilities, which fills a research gap in the application of predictive models in non-formal educational institutions.

**Keywords:** Payroll Information System, Linear Regression, Waterfall Method, Prediction

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## INTRODUCTION

According to Pratama et al. (2025) human resource management is an essential component that supports the operational sustainability of an institution, including non-formal educational institutions such as the Al-Qur'an Education Park (TPA). Within the spectrum of management, the payroll system plays a vital role as a major determinant of the welfare and motivation of teaching staff, which is inherently correlated with the quality of educational output (Keivin & Shadiq, 2020). Despite the advancement of information technology that has revolutionised various sectors, a large number of educational institutions, especially at the non-formal level, still persist in applying manual methods in payroll administration

(Zulfikar et al., 2022). Data indicates that around 70% of non-formal educational institutions in Indonesia still rely on manual financial recording systems (Nasril & Aribah, 2018). This practice not only results in time inefficiency, but also significantly increases vulnerability to operational anomalies, such as calculation errors, data redundancy, transparency deficits, and delays in remuneration payments. The logical consequence of this problem is the potential degradation of educators' trust and work ethic.

The case study conducted at the Al-Husna Foundation's TPA confirmed the empirical relevance of these challenges. With a total of 10 teachers and staff, and the number of students showing a fluctuating trend, from 143 students in the 2022-2023 period to 123 students in 2024-2025, the complexity of payroll administration has escalated. The process currently implemented is entirely manual, from attendance recapitulation to salary calculations using simple spreadsheet software or calculators. The existing system is not yet capable of accommodating objective and automated performance evaluation variables, including teaching hours, attendance rates, and length of service. The absence of an integrated system also hinders management's ability to evaluate performance and project future payroll budgets (Purwanto, 2014), a strategic weakness, given that the financial stability of the foundation is influenced by the regularity of tuition fee payments from students.

The research gap addressed by this study stems from the limited implementation of predictive algorithms in payroll information system architecture, particularly in the domain of non-formal religious educational institutions. Previous literature has demonstrated the effectiveness of web-based information systems in improving the efficiency of payroll processes and reducing recording errors. Other studies such as Haerani & Resti (2023); Hakim et al. (2024); Haryadi Tri Nugroho & Hidayat (2024); Maruloh & Sari (2023); Nurdin et al. (2022); Riyana et al. (2023); Syukron & Abdurrazaq (2021); Zulfikar et al. (2022) and many more have explored the potential of Linear Regression Algorithms to predict remuneration amounts based on certain variables, such as work experience. However, the majority of these studies focus on the corporate context or formal educational institutions and have not comprehensively integrated predictive functionality into the payroll operational system at the TPA level. Thus, the urgency of this research lies in the effort to combine the development of an automated payroll system with the application of the Linear Regression Algorithm to provide a systematic budget projection feature.

The urgency of this research is based on the pressing need to transform an inefficient manual system into a digital system that guarantees speed, accuracy, and transparency. The proposed system is not only positioned as an administrative instrument for calculating and paying salaries, but also as a strategic decision-making tool for foundation management. Through the integration of Linear Regression Algorithms, this system is designed to generate projections of future payroll budget requirements based on historical data analysis of student numbers and teacher performance variables, thereby enabling more optimal allocation of funds and avoiding potential budget deficits. The contribution of this research covers both practical and theoretical dimensions. Practically, the resulting system offers concrete solutions for optimising operational efficiency and financial accountability at the Al-Husna Foundation TPA. Theoretically, this research

enriches the scientific literature on the specific application of linear regression models in the context of financial management in non-formal educational institutions.

Based on this justification, the main objective of this study is to design and develop a web-based teacher payroll information system at the Al-Husna Foundation TPA that is integrated with the Linear Regression Algorithm. Specifically, this system aims to automate the salary calculation process based on relevant variables and provide predictive functionality to support more effective and data-driven budget management.

## **RESEARCH METHOD**

This research is designed as a case study that applies system development design to build and implement an integrated payroll information system with predictive algorithms. The main framework that guides the system development life cycle (SDLC) is the Waterfall model. This model was chosen because of its linear and sequential nature, which is well suited to projects where the functional and non-functional requirements of the system have been clearly defined from the outset, enabling a systematic and controlled development process. The research workflow strictly follows the stages of the model.

Waterfall, beginning with Requirement Analysis to identify system specifications, followed by System Design, which includes architectural design, database design, and process flow modelling using Unified Modelling Language (UML). The next stage is Implementation, where the system design is translated into functional program code using the PHP language with the CodeIgniter framework and MySQL database. After the system is built, the Testing phase is carried out to verify and validate functionality before the system is handed over to users, and ends with the Maintenance phase. The object of this study is the payroll management process at the Al-Husna Foundation's Al-Qur'an Education Park (TPA) located in Bekasi, which was chosen because of the relevance of the problem, namely the continued use of a manual payroll system that is prone to inefficiency and errors. To obtain comprehensive data, a triangulation approach consisting of three data collection techniques was used.

## **RESULTS AND DISCUSSION**

This research resulted in a web-based teacher payroll information system at the Al-Husna Foundation TPA that integrates linear regression algorithms for prediction. This system is designed to address issues with the previous manual system, such as calculation errors, delays, and lack of transparency.

### **Application of Linear Regression Algorithms**

The linear regression algorithm is applied in three main aspects: analysis of the number of students, assessment of teacher performance, and analysis of teacher salaries (Shadek & Swastika, 2017).

1. **Analysis and Projection of the Number of Islamic Boarding School Students:** Simple linear regression analysis was used to project the number of students in the future based on historical data from the last three years (2022-2025). Based on the calculations, the regression equation  $Y=152-10X$  was obtained,

where Y is the number of students and X is the period of years. The analysis results show a downward trend in the number of students of around 10 students per year. Using this equation, the number of students for the 2025-2026 academic year is projected to be 112 students.

2. **Teacher Performance Assessment Analysis:** Teacher Performance Assessment Analysis To assess eligibility for salary increases, multiple linear regression analysis was used with four independent variables: length of service ( $X_1$ ), innovation ( $X_2$ ), discipline ( $X_3$ ), and attendance ( $X_4$ ). The resulting equation model is  $Y=3.12+0.15X_1 +0.90X_2 +0.80X_3 +0.85X_4$ , where Y is the predicted performance score. Teachers were considered “eligible” for a raise if their predicted score reached  $\geq 90$ . The results showed that out of ten teachers, eight were categorized as ‘eligible’ for a salary increase, while the other two teachers were deemed “ineligible” based on the established criteria.
3. **Teacher Salary Analysis and Prediction:** This analysis aims to project teachers' base salaries based on length of service using simple linear regression. Using data from 10 teachers, the regression equation  $Y=590,000+36,050X$  was obtained. This model indicates that the base salary (for 0 years of service) is IDR 590,000, with an increase of IDR 36,050 for each additional year of service. Based on this model, the system can predict the base salary for each teacher, as shown in the Teacher Salary Prediction Table, where, for example, a teacher with 20 years of service is predicted to have a base salary of around Rp 1,311,007.

### **System Design**

The system design was carried out using the Waterfall method and visualized using UML diagrams to illustrate the functionality and workflow of the system (Afni et al., 2019; Tujni & Hutrianto, 2020).

1. **Use Case Diagram:** Identifies the actors involved, namely the Administrator, Treasurer, Principal, TPA Coordinator, and DKM, along with the main functions they can access. These functions include attendance records, financial calculations, salary payments, and report checking and printing.
2. **Activity Diagram:** Describes the system workflow in detail for each function, starting from the attendance data recap process by the admin, financial data calculation, salary payment process, to the report checking workflow by various levels of leadership.
3. **Sequence Diagram:** Details the interactions between objects in the system based on the sequence of events for specific scenarios, such as the attendance data input process, salary verification and approval, and report printing.
4. **Class Diagram and Database Design:** The system data structure is designed using class diagrams that map the main entities such as Teachers, Students, Salaries, Tuition Fees, Expenses, and Reports. This design is then implemented into a MySQL database named sim\_sekolah. There are 11 main tables that are interrelated to ensure data integrity, including the following tables guru, gaji, spp, siswa, users, dan role.

### **Interface Implementation and Testing**

The system was developed using the CodeIgniter framework and implemented in the form of an intuitive web interface (Anggraini et al., 2020). The interface consists of a login page, a dashboard that displays data summaries, and special pages for managing data on teachers, students, tuition fees, expenses, payroll, reports, predictions, and access logs. System testing was conducted using the Blackbox Testing method on 30 scenarios covering all key functionalities for each actor. The test results showed that all system features worked as expected (“As Expected”) with no functional errors found.

### **Teacher Salary Projections Based on Student Tuition Fees and Teacher Assessments Using Linear Regression Algorithms**

The results of the study show that the development of a web-based payroll information system with integrated linear regression algorithms successfully addressed the problems at the Al-Husna Foundation's TPA. The system was designed to significantly improve efficiency, accuracy, and transparency compared to the previous manual process, which was prone to human error and delays. Automating payroll calculations based on variables such as attendance, teaching hours, and length of service not only speeds up the administrative process but also ensures objectivity in determining salaries, which ultimately increases teacher confidence and motivation (Ramadini & Mulyati, 2023). The implementation of this system is in line with previous research findings showing that web-based information systems can speed up the payment process and reduce recording errors.

The application of linear regression algorithms is a major added value in this study, providing predictive capabilities that are not possessed by manual systems or payroll information systems in general. The system's ability to project the number of students in the future provides a data basis for the foundation in planning capacity and resources. More importantly, predicting teacher salaries based on length of service and performance appraisals enables management to carry out more accurate and strategic budget planning, as well as avoid potential deficits. This is in line with research by (Haryadi Tri Nugroho & Hidayat, 2024), which also utilised linear regression for salary prediction, albeit in a different Business Intelligence context. The uniqueness of this research lies in the direct integration of the prediction model into the payroll operational system of a non-formal educational institution, filling an existing research gap.

From a technical standpoint, the selection of the Waterfall development method has proven effective for projects with clearly defined requirements, such as this payroll system. The systematic and sequential approach from analysis to testing ensures that each functionality is designed and implemented in accordance with user requirements identified at an early stage. The use of UML diagrams in the design phase was very helpful in visualising the system architecture, workflow, and data structure, which served as clear guidelines during the implementation and testing process. The results of the Blackbox testing, which showed the compatibility of all functionalities with the expected scenarios, confirmed that the system had been successfully built in accordance with the design and research objectives.

Overall, the resulting system is not only a practical solution for the Al-Husna Foundation TPA, but also provides a theoretical contribution regarding the application of predictive models in management information systems in religious education environments.

## CONCLUSION

Based on the results of research and discussion, it can be concluded that a web-based teacher payroll information system integrated with a linear regression algorithm has been successfully designed and implemented at the Al-Husna Foundation's TPA. This system effectively overcomes the various weaknesses of the previous manual system by improving efficiency, accuracy, and transparency in the payroll process.

Automating salary calculations based on relevant variables such as teaching hours, attendance, and length of service has been proven to minimise the risk of human error and speed up the administrative process. Furthermore, the application of linear regression algorithms provides significant added value by providing predictive capabilities to project the number of students, assess the feasibility of teacher salary increases, and plan future payroll budgets in a more strategic and data-driven manner. The success of functional testing through the Blackbox Testing method confirms that the system built is in line with the research objectives and is ready for implementation. Overall, this research not only provides practical solutions for the Al-Husna Foundation TPA but also contributes theoretically to the application of predictive models in management information systems in non-formal education environments.

## BIBLIOGRAPHY

- Afni, N., Pakpahan, R., & Jumarah, A. R. (2019). Rancang Bangun Sistem Informasi Penggajian Dengan Implementasi Metode Waterfall. *Jurnal Khatulistiwa Informatika*, 7(2). <https://doi.org/10.31294/jki.v7i2.6629>
- Anggraini, Y., Pasha, D., Damayanti, D., & Setiawan, A. (2020). Sistem Informasi Penjualan Sepeda Berbasis Web menggunakan Framework Codeigniter. *Jurnal Teknologi dan Sistem Informasi*, 1(2), 64–70. <https://doi.org/10.33365/jtsi.v1i2.236>
- Haerani, R., & Resti, H. (2023). Perancangan Sistem Informasi Penggajian Berbasis Web Dengan Metode Rapid Application Development. *JATISI (Jurnal Teknik Informatika Dan Sistem Informasi)*, 10(2), 94–104. <https://doi.org/https://doi.org/10.35957/jatisi.v10i2.3640>
- Hakim, I., Asdi, A., & Afriliansyah, T. (2024). Implementasi Algoritma Komputasi Linear Regression untuk Optimasi Prediksi Hasil Pertanian. *Kesatria : Jurnal Penerapan Sistem Informasi (Komputer dan Manajemen)*, 5(3), 1423–1434. <https://doi.org/https://doi.org/10.30645/kesatria.v5i3.460>
- Haryadi Tri Nugroho, & Hidayat, S. (2024). Implementasi Intelegen Bisnis dengan Visualisasi Data Gaji dan Algoritma Linear Regresion. *Jurnal Indonesia : Manajemen Informatika dan Komunikasi*, 5(2), 1245–1259. <https://doi.org/10.35870/jimik.v5i2.657>
- Keivin, K., & Shadiq, J. (2020). Sistem Informasi Penggajian Guru Berbasis Website Pada SMK Tiara Bangsa Bekasi. *JURNAL MAHASISWA BINA INSANI*, 4(2), 205–214. <https://ejournal-binainsani.ac.id/index.php/JMBI/article/view/1278>
- Maruloh, M., & Sari, I. P. (2023). Penerapan Model Waterfall Pada Sistem Informasi Pembayaran SPP dan Pengisian Rapor SMK Muhammadiyah 13. *Reputasi: Jurnal*

- Rekayasa Perangkat Lunak*, 4(2), 89–95. <https://doi.org/10.31294/reputasi.v4i2.2416>
- Nasril, N., & Aribah, G. (2018). Perancangan Sistem Informasi Linieritas Bidang Studi pada Kementerian Pendidikan dan Kebudayaan. *JURNAL LENTERA ICT*, 4(1). <https://plj.ac.id/ojs/index.php/jriict/article/view/247>
- Nurdin, N., Fajriana, F., Maryana, M., & Zanati, A. (2022). Information System for Predicting Fisheries Outcomes Using Regression Algorithm Multiple Linear. *JOURNAL OF INFORMATICS AND TELECOMMUNICATION ENGINEERING*, 5(2), 247–258. <https://doi.org/10.31289/jite.v5i2.6023>
- Pratama, D. E., Pratama, B. W., Oxygentri, O., & Ema, E. (2025). Analisis Motion Graphic untuk Pemasaran sebagai Fenomena Sosial Baru; Studi Kasus Event Eraspace 2023. *Jurnal Intervensi Sosial dan Pembangunan (JISP)*, 6(1), 97–110. <https://doi.org/10.30596/jisp.v6i1.21475>
- Purwanto, H. (2014). Rancangan Sistem Informasi Penjualan Barang Koperasi XYZ. *JURNAL SISTEM INFORMASI UNIVERSITAS SURYADARMA*, 6(1), 83–111. <https://doi.org/10.35968/jsi.v6i1.278>
- Ramadani, S. A., & Mulyati, Y. (2023). The Effectiveness of The Payroll Accounting System on Internal Control of Employee Salary Payments (Case Study at BPKAD West Java Province). *Jurnal Ekonomi*, 12(1), 273–282. <https://ejournal.seaninstitute.or.id/index.php/Ekonomi/article/view/1151>
- Riyana, I., Suarna, N., & Dwilestari, G. (2023). Analisa Dataset Penjualan Teh Menggunakan Algoritma Linear Regresi. *Jurnal Informatika dan Teknologi Informasi*, 2(2), 209–214. <https://doi.org/10.56854/jt.v2i2.194>
- Shadek, T. F., & Swastika, R. (2017). Pengembangan Aplikasi Sistem E-Learning Pada Seluruh Mata Kuliah Dengan Menggunakan Program Hypertext Preprocessor (Php) Dalam Rangka Peningkatan Mutu Proses Dan Hasil Pembelajaran. *ProTekInfo(Pengembangan Riset dan Observasi Teknik Informatika)*, 4, 12–18. <https://doi.org/10.30656/protekinfo.v4i0.407>
- Syukron, A., & Abdurrazaq, M. H. (2021). Perancangan Sistem Informasi Penggajian Karyawan Berbasis Website Dengan Metode Waterfall. *Jurnal Sistem Informasi Akuntansi (JASIKA)*, 1(2), 74–83. <https://doi.org/10.31294/jasika.v1i2.624>
- Tujni, B., & Hutrianto, H. (2020). Pengembangan Perangkat Lunak Monitoring Wellies Dengan Metode Waterfall Model. *Jurnal Ilmiah Matrik*, 22(1), 122–130. <https://doi.org/10.33557/jurnalmatrik.v22i1.862>
- Zulfikar, I., Saputra, M. A., Prasetyo, N., Rijanandi, T., & Adhinata, F. D. (2022). Prediksi Gaji Berdasarkan Pengalaman Bekerja Menggunakan Metode Regresi Linear. *Journal of Dinda : Data Science, Information Technology, and Data Analytics*, 2(2), 58–63. <https://doi.org/10.20895/dinda.v2i2.548>