Design of Human Resources Management and Payroll Information Systems with a Self-service Approach at Recreation Services Company

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Abstract: The database that is not yet integrated makes the payroll process at PT X often hampered because data collection is late in entering HR payroll. Supporting data related to the payroll process at PT X are still in the form of excel and hardcopy. The purpose of this study is to design human resource management and payroll with a self-service approach at PT X. Human resources management and payroll information systems with a self-service approach are expected to produce information supporting the payroll process that facilitates the payroll system in collecting and processing payroll data. The self-service approach is intended to make employees as entities that play an active role in information systems for managing human resources and payroll so they can manage their data in real time. The study was conducted qualitative research method with in-depth interviews, observations, and literatures studies. In this study, the type of data used is primary data. The method used to design human resources management and payroll information systems is the initial six phase of Framework for the Application of System Thinking method. This research will also explain about comparison total cost of ownership between implementations using cloud based compared to on-premise. The results of this study are expected to provide a design of information systems for human resource management and payroll with a self-service approach that can be used by company to minimize the risks that might occur in the payroll process and make the process effective and efficient.

1 INTRODUCTION

One of the business processes in the company is the human resource cycle and payroll which consists of several business processes, such as the process of recruiting, training, paying, evaluating, promoting, and laying off employees from the company (Romney and Steinbart, 2018). Human resource information systems make it easier to store and analyze human resource information, with a self-service system enabling employees to access frequently accessed information, such as personal data, salary, benefits, training, and deductions easily (Decenzo et al, 2016). Rahimzai & Teruhiko (2018), in their research applied a web-based Employee Self-Service module that allows employees, together with professionals in the human resources department to manage employee databases.

Generally, digitizing HRIS has produced a well-integrated HR database and built in a coordinated way using software database management techniques (Tomanna et al., 2018).

Currently supporting data is related to the payroll process, such as employee data information, employee attendance data, and other supporting data (overtime, leave, other benefits, incentives, employee deductions, etc.) PT X is still in excel and hardcopy, so HR payroll must reprocess the information and data in accordance with the format provided by the Apisoft application (HR payroll system). The HR Payroll and Compensation Benefit Supervisor (2018) said that often the process was hampered because of late data collection into the HR payroll, the database that has not been integrated causes the process to be longer because it has to match the data.

According to Sirkemaa (2015), information technology infrastructure may be seen as a basic technology platform for other systems used in various business activities and processes. This study designed an information system for human resource management and payroll with a self-service approach at PT X. The analysis of total cost of ownership was done to determine which infrastructure is better in implementing information systems for human resource management and payroll with a self-service approach at PT. X.

2 THEORICAL FRAMEWORK

This study only focuses on the cycle of human resources or payroll cycle, as explained in the previous chapter. According to Romney and Steinbart (2018), states that human resource management activities are limited to information about hiring, transfer, training, and gathering information about the use of working time that occurs every day.

Payroll cycle activities are based on Romney and Steinbart (2018), there are five input sources to the payroll system, namely HRM Department, Employees, Various Deputies, Banks, Government Agencies, and Other Companies.

System modeling includes process modeling and data modeling of the data Flow Diagrams (DFD) which are translated into Context Diagrams, Functional Decomposition Diagrams (FDD), Entity Relationship Diagrams (ERD), and user interface.

The total cost of ownership (TCO) was developed by Bill Kirwin, director at the Gartner group (Gartner Inc.) in 1987, an information technology research company and United States advisory firm based in Stamford. All costs associated with the use of computer hardware and software include administrative fees, licensing fees, distribution and configuration, hardware and software updates, training and development, maintenance, technical support, and all other costs associated with obtaining, implementing, operation, maintenance and improvement of computer systems in organizations. Using the TCO approach, total costs can be calculated from sum of Up-front costs with Operational costs (Mtebe and Raisamo, 2014).

According to the National Institute of Standards and Technology (NIST) quoted from Erl et al. (2013), "Cloud computing is a model for enabling networks that are ubiquitous, convenient, and on demand access to a collection of shared computing resources that are easily managed (such as networks, servers, storage, applications, and services) that can be quickly available and released with the minimum effort of management or service provider interaction. Whereas the on-premise definition is a type of software delivery model that is installed and operated from in-house servers and customer computing infrastructure. It uses the organization's original computing resources and only requires a copy of the software licensed or purchased from an independent software vendor (Erl et al., 2013).

3 RESEARCH METHOD

This study used a qualitative research methodology with case studies to analyze access and inclusion in organizational services (Yin, 2014). Case studies are used in order to answer the questions that researchers ask related to the ineffectiveness of the payroll process at PT X.

The data source used in this study is primary data. Primary data is a direct source of data (Sugiyono, 2015). According to Sunyoto (2013), primary data is original data collected by researchers to answer their research problems specifically. The data used in this study was collecting by obtained directly from field observation activities, interviews with informants, and related parties who directly manage payroll data, including the HR department head, HR payroll and compensation benefit supervisor, and HR administration staff.

All data obtained will be analyzed using system development methods, namely the FAST (Framework for the Application of Systems Technique) method. FAST consists of 8 stages, namely scope definition, problem analysis, requirement analysis, logical design, decision analysis, physical design and integration, construction and testing, and installation and delivery (Whitten and Bentley, 2007). The section focused on this research is only the initial 6 phases. In the decision analysis phase, a comparison analysis of on-premise cloud is carried out using the Total Cost of Ownership method.

4 ANALYSIS AND DESIGN OF INFORMATION SYSTEM

4.1 Scope Definition

The payroll system is part of the human resource management system. Activities carried out from the payroll system are processes of data from the

management of human resources. The input source of the payroll process is data that comes from many actors. Based on the results of interviews, documentation and observations of the author, the following analysis of the scope of the problems that occur in the human resource management system and payroll PT X using the PIECES framework.

- **Performance**

  Data collection is late in entering HR Payroll, so it requires integration of payroll systems with human resource management systems so as to speed up the salary calculation process.

- *Information*

  There are some data that are not filled, tucked, and not inputted, so data input is needed automatically through a website-based system with verification notifications via e-mail.

- *Economics*

  Storage of information supporting data on the payroll process that still uses hardcopy meets the storage filling cabinet, so that it is necessary to store information on supporting data for the payroll process in an online database.

- *Control or Security*

  The HR payroll section is often overtime at the payroll period because the database is not yet integrated so it needs to be re-validated to avoid human error, so that the employee self-service approach allows employees to do all matters relating to human resource management online.

- *Efficiency*

  Management of the payroll process supporting data cannot be managed by each employee at any time, so a system is needed for employees to do all matters relating to human resource management online without the need for departmental admin assistance.

- *Services*

  Providing employee salaries often experiences delays because the supporting data for the salary calculation process are still done manually, so that an information system for human resource management and payroll is needed that is able to provide the payroll process supporting data quickly and accurately.

4.2 Problem Analysis

Based on the scope of the problems identified in the previous phase, an analysis of the problems, impacts, and problem solving related to the information system of human resource management and payroll is done manually as follows:

- The problem with the number of manual support forms for payroll processes that have an impact on the payroll process supporting data becomes incomplete and takes time in recording, required payroll process support forms are made with electronic forms (e-Form), and approval processes are also conducted through the system information on management of human resources and payroll whose notifications will be directly connected to e-mail.

- Long time process problems in managing human resource data have an impact on the payroll process supporting data to be inaccurate or invalid, it is necessary to manage human resource data by employees by storing data online and can be accessed at any time.

- Problems with data collection that is late in entering HR Payroll have an impact on the payroll process for a long time and the HR payroll section must overtime in the payroll period, required integration of supporting data for the payroll process with the payroll system.

4.3 Requirement Analysis

The proposed system of human resource management and payroll is expected to be able to meet several needs as follows:

- Record employee data in real time and easy to access with the Internet network.
- Facilitate electronic forms (e-forms) of supporting data on payroll processes such as leave forms, late or sick permission, loans, compliment, outside service, overtime, and evaluation with notifications connected via e-mail.
- Provide a smart reminder when an employee will expire.
- Integrated with attendance machines, so attendance data can be processed directly in the human resource management system and payroll.
- Make payroll reports for each period to be given to finance and accounting.
- Send pay-slip to employee e-mails every period.

4.4 Logical Design

The design process displays functional decomposition diagrams, context diagrams, data flow diagrams, data dictionaries, process specifications, and modeling databases on

information systems for managing human resources and payroll.

Functional decomposition diagrams in information systems management of human resources and payroll are divided into four subsystems at the first level, twenty subsystems at level two, and eight subsystems at level 3, as shown in Figure 1.
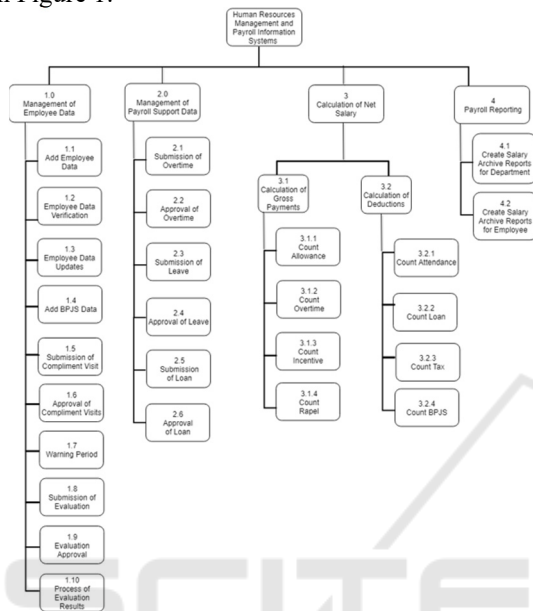

Figure 1: Functional Decomposition Diagram

Data Flow Diagrams are used to find out the relationships between entities in information systems management of human resources and payroll. Data flow diagram level 1, used to describe the flow of data and documents that in and out the system. The HR management system and payroll have 4 subsystems, consists of employee data management subsystem, management of payroll supporting data, calculation of net salary, and payroll reporting. Data flow diagram level 1 as shown in Figure 2.
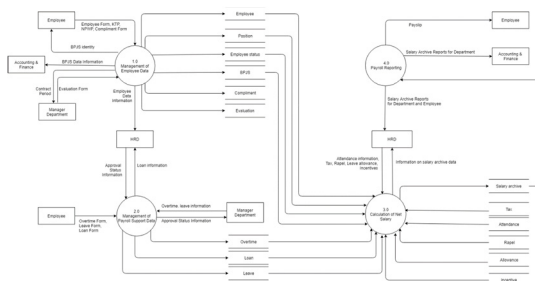

Figure 2: Context Data Flow Diagram

4.5 Decision Analysis

This phase helps management in making decisions in implementing systems for managing human resources and payroll, what technology is useful and can be applied to the management system of human resources and payroll. In this case, there are two solutions offered in the implementation of system infrastructure, namely Cloud based and On-premise. Analysis of the total costs needed to determine the system infrastructure using the Total Cost of Ownership (TCO) approach. This TCO approach divides costs into two categories, namely up-front costs and operational costs.

So that,

Total cost = Up-front cost + *Operational cost*

Up-front costs are costs incurred by companies in building information systems before the system can be used, in the up-front cost infrastructure is the cost of server devices, devices that support server devices such as UPS (Uninterrupted Power Supply), NIC (Network Interface Card), Switches and cables are needed in connecting server and network device.

While operational costs are costs incurred by the company after the system can be used, such as maintenance and development costs, hosting, and data center maintenance costs.

This research in comparing TCO Cloud based and On-premise makes several assumptions to be able to compare resources even though with different infrastructure models. Here are some assumptions:

- Analysis of TCO based on 36 months (3 years), this is based on the life cycle standards of computer infrastructure.
- Costs are estimated to be based on prices in Indonesia.
- System for managing human resources and payroll for in-house
- Cloud service prices are estimated monthly.
- Minimum specifications for the HR management system server and payroll used in this research are based on the following specifications::
  1. Processor: Intel Xeon Quad Core
  2. Server Memory (RAM): 8GB, maksimum 64GB
  3. Hard disk: minimum 500MB

PT X already has a server device and the following data center which is sufficient for HR management systems and payroll, namely Lenovo ThinkServer

TS150. The TCO estimation on the implementation of infrastructure on an On-premise basis at PT X does not have an up-front cost. While Operational costs will be described as follows:

- Maintenance and development costs: these costs are calculated based on the salary of the technical staff at PT X. Minimum PT X requires one technical staff to manage and maintain the system. The scale of salary for computer science graduates in Indonesia is estimated at Rp. 6,000,000 per month. So for one staff within a period of 3 years, PT X will be charged a fee of Rp. 216,000,000.

- Hosting costs: PT X already has a corporate domain that can be used for HR management systems and payroll.

- Data center maintenance costs: To be simple, the electricity costs consumed by AC, computer hardware is estimated by PT X to be Rp. 1,000,000 per month. Thus, PT X will be charged a fee of Rp. 36,000,000 in 3 years.

Table 1: Summary of the estimated infrastructure costs of On-Premise

Cost Item	Monthly Cost	Total
Up-front cost	Nill	Nill
Operational cost		
Maintenance and development costs	Rp. 6.000.000	Rp. 216.000.000
Hosting costs	Nill	Nill
Data center maintenance costs	Rp. 1.000.000	Rp. 36.000.000
Total		Rp. 252.000.000

TCO analysis for Cloud based is based on cloud infrastructure services in Indonesia. Cloud based infrastructure is not subject to up-front fees because all services are already in a virtual machine, so what is calculated in the following explanation is operational cost. In this thesis, the infrastructure cloud services used are:

1. Datacomm
   The specifications used are in accordance with the assumptions previously explained, by using 1 vCPU, 8GB memory, 500GB storage, and the OS used is Windows a monthly fee of Rp.

3,599,999. So for a period of 3 years PT X is charged a fee of Rp. 129,599,964.

2. Zettagrid
   The specifications used are in accordance with the assumptions described before, using 3.2 Ghz CPU, 8GB memory, 500GB storage, and the OS used is Windows Server 2008 R2 Web, and a 500GB network monthly fee of Rp. 3,330,000. So for a period of 3 years PT X is charged a fee of Rp. 119,880,000.

Based on the above analysis of two companies offering cloud infrastructure services. Zettagrid cloud service is cheaper than Datacomm. So, in this research we will use the lowest price of the Zettagrid infrastructure cloud service for comparison with On-premise. Table 2 show the comparison of TCO Cloud based with On-premise.

Table 2: Comparison of TCO Cloud based with On-premise

Cost Item	On-premis	Cloud based
Up-front cost	Nill	Nill
Operational cost		
Maintenance and development costs	Rp. 216.000.000	Nill
Hosting costs	Nill	Rp. 119.880.000
Data center maintenance costs	Rp. 36.000.000	Nill
Total	Rp. 252.000.000	Rp. 119.880.000

Based on the comparison above, if PT X uses cloud infrastructure services then the profit difference obtained is Rp. 132,120,000. However, PT X must also consider the advantages and disadvantages of each of these services. Like cloud infrastructure services, the technology used does not provide access to full control of the company. So, if a problem occurs, it will refer to the agreed SLA. On-premise infrastructure gives the company complete access to control.

4.6 Physical Design

Physical Data Flow Diagrams are used to determine the relationship between the implementation of entities in information systems management of human resources and payroll. There are four parts to the physical data flow diagram, namely the physical process implementations, physical data flows, physical external agents, and physical data stores. Information systems for managing human resources and payroll use JavaScript as a physical process, and MySQL as physical data storage. Overall the implementation relationship between entities can be seen on the physical data flow diagram in Figure 3.
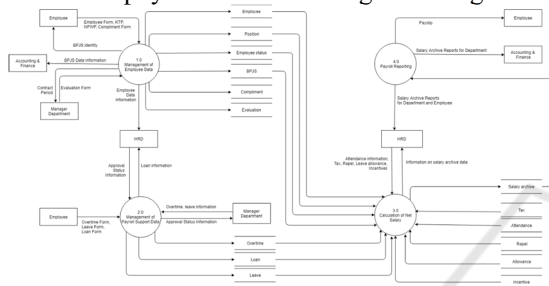

Figure 3: Physical Data Flow Diagram

Physical entity relationship diagrams are used to determine the data types used in the system database model. The system for managing human resources and payroll uses a MySQL database, so the data types used include Integer, Char, Varchar, Text, and DateTime. The physical entity relationship diagram of the HR management system and payroll can be seen in Figure 4.
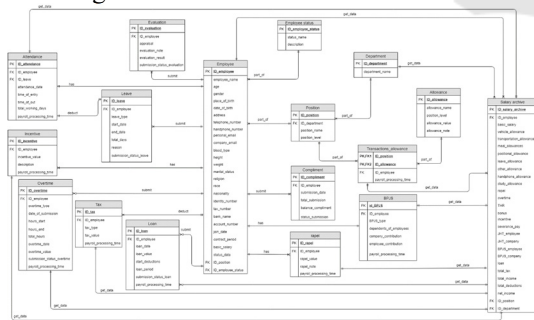

Figure 4: Physical Entity Relationship Diagram

The architecture of the HR management system and payroll is used to see the flow of services being passed until it is stored in the database. The supervisor of self service employees makes the service online, so that it can be accessed in real time. Thus, the HR management system and payroll are made based on websites that can be accessed via browser devices on desktop or mobile.

5 CONCLUSION

After carried out all stages of this study, several conclusions can be conveyed by the researcher are: 1) providing a system of supervision and convenience for employees and company management in managing employee data quickly; 2) provide control of frauds that can occur in the management of payroll supporting data; 3) reduce the risk of input errors or non-current data; 4) The payroll process can be done on time because all payroll supporting data has been integrated; 5) Cloud based infrastructure services have lower TCO when compared to On-premise.

Several suggestions can be conveyed are: 1) Research carried out is still at six initial phases of system development, it is expected that further research reaches the implementation and maintenance phase; 2) Companies can integrate e-learning systems that help employees get knowledge easily; and 3) The management system of human resources and payroll is expected to be developed into a mobile application, so there is no need to open it through a browser.

REFERENCES

DeCenzo, D. A., Robbins S. P., and Verhulst, S. L. (2016). Fundamentals of Human Resource Management 12th edition. New Jersey: John Wiley & Sons.

Erl, T., Mahmood Z., and Puttini, R. (2013). Cloud Computing: Consepts, Technology, Architecture. Massachusetts, Prentice Hall.

Kirwin, B. (1997). CIO Enterprise Vol. 11. Stamford, President and group.

Mtebe, J. S., and Raisamo, R.. (2014). eLearning Cost Analysis of On-Premise versus Cloud-hosted Implementation in Sub-Saharan Countries. *The African Journal of Information Systems*, 6(2), pp. 48-64.

Rahimzai, H. A., and Hiraishi, T. (2018). The Impact of Human Resource Management Information System (HRIS) And Itscore Modulesin the Government of Afghanistan: A Case Study of Malaysia, Kenya & Georgia. *Proceedings of 101st The IRES International Conference*, pp. 38-41.

Sirkemaa, S. (2015). Towards Information Technology Infrastructure Management. *Journal of Emerging Trends in Computing and Information Sciences*, 6(11), pp. 614-621.

Sugiyono. (2014). Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D. Bandung, Alfabeta.

Sunyoto, D. (2013). Metodologi Penelitian Akuntansi. Bandung, PT Refika Aditama Anggota Ikapi.

Tomanna, T., Gerbi, D.Y., Hossin, M.A., and Zhang, S.Y. (2018). Impact of Information System on Transformation of Human Resource Performance: An Exploratory Study in Oromia Radio and Television Organization. *Journal of Human Resource and Sustainability Studies,* 6(1), pp. 37-52.

Whitten, J. L., and Bentley, L. D. (2007). System Analysis & Design for the Global Enterprise, 7th edition. New York, McGraw-Hill International Edition.

Yin, R K. (2014). Case study research: Design and methods, 5th edition. Thousand Oaks, Sage Publications.