

DEVELOPMENT OF AN INTEGRATED ACCOUNTING SYSTEM BY *RESOURCE-EVENT-AGENT* APPROACH (A CASE STUDY AT KOPERASI PEGAWAI DANA PENSUN TELKOM)

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Abstract

Koperasi Pegawai Dana Pensiun Telkom is a cooperative organization that is established by PT. Dana Pensiun Telkom. As a common business entity, financial report is required to give information to the shareholders or decision maker about organization's financial state. Decision maker in this case is the board of directors. Based on this financial report, board of directors may decide the organization's strategies.

Financial report which has an important role in decision making process has a problem on its publishing time. This delayed financial report's publishing time makes decision making process become hampered. This problem is caused by three factors, such as disintegrated data and application, and transaction journalizing process which is still using manual method.

Resource-Event-Agent approach's role on this research is to facilitate the modelling data process so that the data and application integration become more effective. The modelled data using Resource-Event-Agent can fulfil organization business process requirements especially for automating the transaction journalizing process.

By using Resource-Event-Agent, the system that can be a solution is Integrated Accounting System. This system will integrate data, application, and automating the transaction journalizing process. On the future, Resource-Event-Agent can be used to model every data on every business activities on the organization.

Keyword: Financial Report, Data Integration, REA Approach, Posting Automation, Accounting Information System

1. Introduction

An employee cooperation is among the important facilities an organization could offer in recent times. The existence of such cooperation in an organization assists employees and members to fulfil their needs, be it commerce and banking within the organization's premises.

Koperasi Pegawai Dana Pensiun Telkom (Telkom Employee Cooperation Pension Fund) is an employee cooperation owned and operated on the premises of the Dana Pensiun Telkom (Telkom Pension Fund) office located on Jl. Surapati No. 151, Bandung. The cooperation offers commercial activities as well as banking services for

members and employees of Dana Pensiun Telkom and those surrounding its operations.

As a common entity, Koperasi Pegawai Dana Pensiun Telkom is required to publish an annual report as proof of its activities in the preceding fiscal year. The annual report also includes an annual financial report to show the achievements of the cooperation in the preceding fiscal year. The report is prepared by the directors of the cooperation using data from daily reports and daily transactions.

The parties contributing to the preparation of the cooperation's financial report consist of the directors and managers. The directors have the authority to manage financial activities and preparation of the financial report. Managers or authorized staffs, on the other hand, are responsible in handling commercial transactions and preparation of daily transaction recapitulation.

Staff appointed to manage the cooperation's commercial activities records every transaction on a Microsoft Excel spread sheet. Each transaction data recorded is saved on a local storage disk. This method of data recording and such standalone application will result in difficulties in preparing the financial report. The manager who prepares the financial report will require financial data from commercial activities. The manager will then request for the sales transaction data from the relevant staff before preparing the financial report. The issue here is that preparation of the financial report is unintegrated, which requires the preparer to request data using traditional means, i.e. meeting the cooperation staff directly.

Having procured the needed data, the issue following is the traditional recording or journaling process. To prepare a financial report, the preparer has to manually journalize each transaction from the data. Issues arise if there are numerous transactions, where several identical transactions are journalized inconsistently.

The issues mentioned earlier are time-intensive and cumbersome as cooperation directors hold the premier status as an employee of the Dana Pensiun Telkom, making such status a priority

in working. Thus, their cooperation responsibilities are set aside for the sake of their main responsibilities for the company.

Several issues mentioned earlier hinder the financial report preparing process, which in turn delays its publication. Such delays cause delays in decision making by the directors. Another effect of the delay is the possibility of undetected fraudulent business processes in Koperasi Pegawai Dana Pensiun Telkom.

On the grounds of the issues mentioned, this study aims to develop a computerized system capable of creating financial reports quickly and accurately. The solution is developed based on suitable methods or approaches to be implemented in the case study of Koperasi Pegawai Dana Pensiun Telkom.

2. Literature Review

2.1. Accounting

Accounting is a process of identification, recording, and communicating of economic transactions of an entity. The identification process in accounting recognizes a transaction taking place in an entity. This process then classifies whether a transaction is either an economic or noneconomic. Recording, done after identification, chronologically and systematically records the monetary value of the identified economic transaction. Communication is where the data recorded becomes accounting information to be reported and distributed in the form of financial report.

2.2. Accounting Information System

Accounting information system (AIS) subsystems process financial transactions and nonfinancial transactions that directly affect the processing of financial transactions. The classification of AIS is shown on Figure 1.

AIS consists of the main subsystems:

- 1) *Transaction Processing System (TPS)*: supports daily business operations with numerous reports, documents, and messages for users throughout the organization.
- 2) *General Ledger/Financial Reporting System (GL/FRS)*: produces the traditional financial reports, such as the income statement, balance sheet, statement of cash flows, tax returns, and other reports required by the law; and,
- 3) *Management Reporting System (MRS)*: provides internal management with special-purpose financial reports needed for decision making.

2.3 Resource-Event-Agent

The Resource-Event-Agent (REA) model is a technique for capturing information on the economic phenomena of an organization. It describes a business as a set of economic resources, economic events, and economic agents. Unlike other traditional accounting systems, the REA system allows accounting and non-accounting data to be stored and identified on a centralized database. Using such repository, the user interface is customizable to fit the needs of every user in the organization. The REA model

may be implemented using various relational database and object-based database architectures.

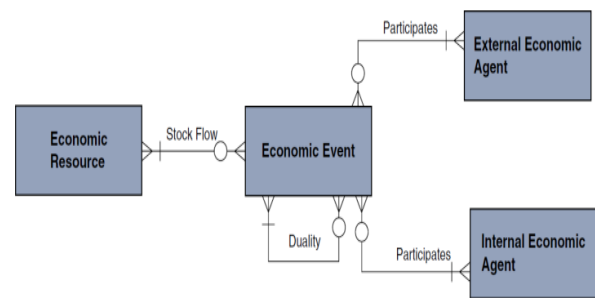


Figure 1. REA approach structure

Figure 1 shows the basis of the REA model which is a unique version of the entity relationship (ER) diagram, consisting of three entity types (resource, event, agent) and its association. The REA, as its name suggests, consists of three elements as follows:

- 1) *Resources*: Resource is understood as economically viable resources for the company. It is defined as a finite object under the control of the organization. It is used economic transactions with transaction partners and its value may fluctuate (increase or decrease) in accordance with the transaction.
- 2) *Events*: The REA model uses two types of events: *economic events* and *support events*. *Economic events* are activities which causes resources to fluctuate as shown in its relationship in the stock flow figure above. *Economic events* are important information elements for an accounting system and should be acknowledged in detail. *Support events* are activities consisting of controlling, planning, and managing those pertaining to economic events but do not directly affect resource value.
- 3) *Agents*: Agents in the REA model are individuals and departments participating in economic activities and support. Actors are either those from inside or outside of the organization authorized make use of the economic resources. Each economic event is associated with at least one internal agent and one external agent participating in the transaction. Actors are also involved in support events, but exchange of information is the main focus rather than exchange of resources.

The REA approach consists of seven stages divided into two phases, view modelling and view integration. The view modelling phase produces individual REA diagram. There are four stages in the view modelling phase, as follows:

- 1) *Identification of event entity*: This stage is the preliminary step whose aim is to identify the event entities to be modelled.
- 2) *Identification of resource entities*: The next step is to identify the resource entities affected by the modelled events.
- 3) *Identification of agent entities*: Each economic event entity in an REA diagram is associated with at least two agent entities.
- 4) *Determine association and cardinalities between entities*: This step determines the association and cardinality between entities, either between resource and event, agent and event, or event and event.

The second phase is view integration. The view integration phase produces an integrated REA diagram for the entire system and its required attributes. This phase consists of three stages, as follows:

- 1) *Consolidation of individual models:* This stage combines individual REA diagrams produced in the last stage of view modelling. This stage will produce an REA diagram consolidating the data needs of the entire system.
- 2) *Defining primary key, foreign key, and attributes:* Having produced an integrated REA diagram, the next step is to define the primary key, foreign key, and attributes based on the cardinality between entities.
- 3) *Constructing physical database and produce user views:* At this stage, the entities and its attributes are imported into a computerized database and presented for a user view.

3. Solution System Development

3.1. General System Description

Figure 2 shows the schematics of the solution is developed to meet the requirements of the issues. Emphasis is put on application and data integration as well as recording automation to meet the demands of an integrated accounting system. In its implementation, each functional area will be integrated under a single database. Thus, each workstation used for each functional area is integrated with one another. As the spread sheet application currently in use does not support storage on databases, a web application capable of integrating business processes carried out at each unit in the entity has to be developed.

3.2. Resource-Event-Agent Implementation

The role of Resource-Event-Agent as an approach is to model data in use based on occurring business processes. The REA approach is capable of producing a database model which stores resources, events, and agents involved and their associations. Large number of business processes will hinder data modelling development in real-time. Using systematic REA approach, modellers could model easier and the model developed could fulfill the data needs of an integrated company.

The primary concept of the REA approach is by mapping resources, events, and agents. Under the REA model, there are several steps to be followed to map the three elements based on current business processes.

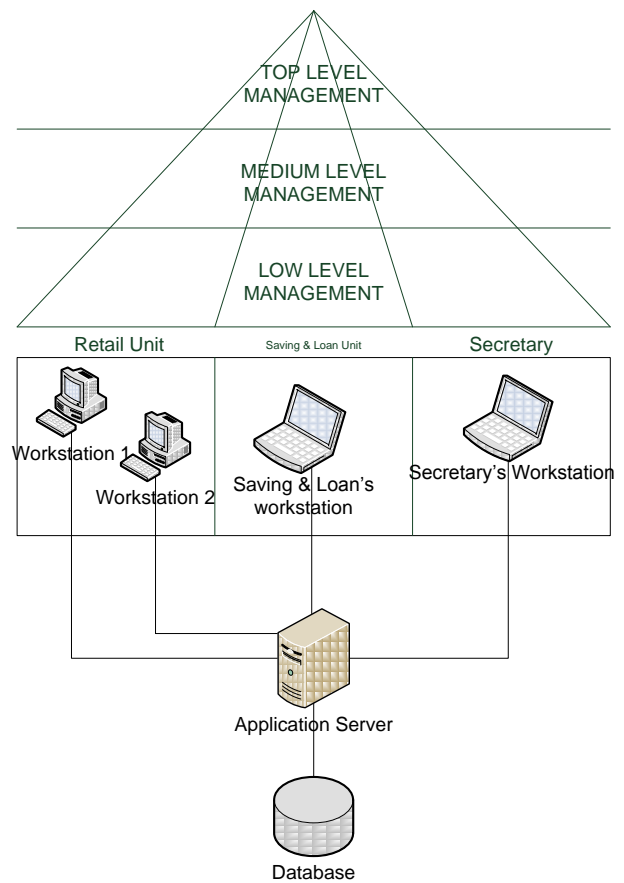


Figure 2 The solution's schematics (<https://db.tt/m2bYyott>)

There are four stages in data modelling from a business process using REA approach, as follows:

- 1) *Identification of event entity:* In this stage, each event entity is identified and recorded chronologically.

Table 1

Identification of Event Entities

No	Business Unit	Business Process	Events
1	Small shop	Sales	Goods received
2			Payment

- 2) *Identification of resource entities:* This stage identifies resource entities. Every account will be classified as resource too.

Table 2

Identification of Resource Entities

No	Resource	Events
1	Stock	Goods received
2	Cash	Payment

- 3) *Identification of agent entities:* This stage identifies the agents involved in an event.

- 4) *Determine association and cardinalities between entities:* This stage produces an individual model.

Table 3
Identification of Agents Entities

No	Resource	Events	Agents
1	Stock	Goods received	Supplier Staff
2	Cash	Payment	Supplier Staff

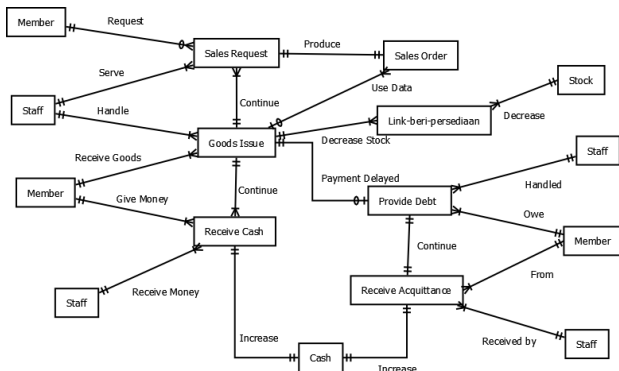


Figure 3. Individual REA model in a sales process
(<https://db.tt/glpOO9sD>)

Figure 3 shows REA’s capability to model user-friendly data in chronological order. After each individual model of each business process has been developed, a model consisting of integrated business units is developed. There are 3 stages for this end:

1) *Consolidation of individual models:* Individual models are consolidated into a data model whose functional areas are integrated into one another.

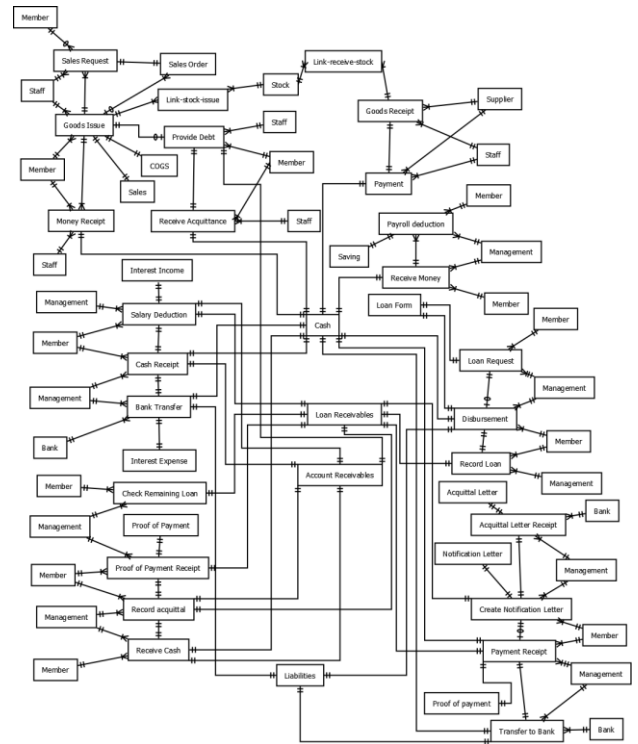


Figure 4 Database scheme developed using REA approach
(<https://db.tt/WdxIK4mM>)

This REA approach can be connected to accounting system. As we know, REA approach will help modeller to map the data requirements of an organization, including financial accounts. So REA approach will also map what and where the accounts should be located on the schema. When a sales transaction is done then Sales Account will be credited. And in the end of accounting period, the system can gather all data from database using certain SQL query to resume and produce a financial information.

2) *Defining keys:* This stage defines the primary key, foreign key, and attributes of an entity.

Table 4
Key Used on Entities

No	Table Name	Primary Key	Foreign Key	Attributes
1	sales_order	no_sales_order	no_goods_issue	time content status
2	stock	id_stock		name_stock available_stock value_stock sales_price stock_type

3) *Constructing physical database and produce user views:* A database is build using the readily-available RDBMS application. For this study, the RDBMS application used is MySQL. The database itself, DDL

(Definition Data Language) query is implemented by first preparing the resource and agent tables. The event table is then prepared.

3.3. Application Integration

A new application to support data integration is used to solve current application disparities. The application used is web-based applications whose functions accommodate the needs of each business process, as shown in Figure 5.

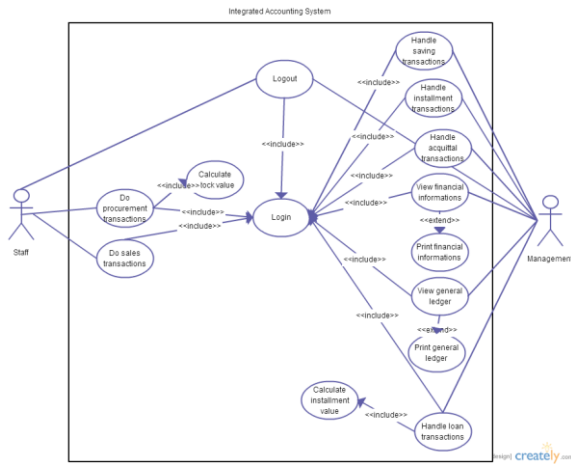


Figure 5 Functions accommodated by the system
<https://db.tt/3y7uq5Hz>

Implemented integration is shown in Figure 6 and Figure 7. Both class diagrams uses object-oriented programming concepts, which are in actuality one integrated diagram class. The class diagrams show that the applications between two business units – savings and loan and sales – have been integrated.

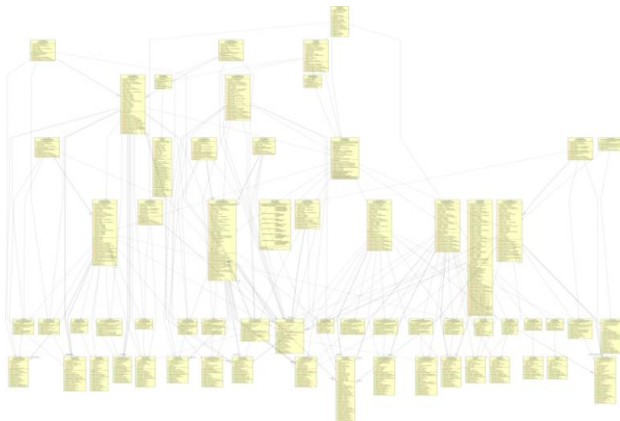


Figure 6 Class structures in the sales process
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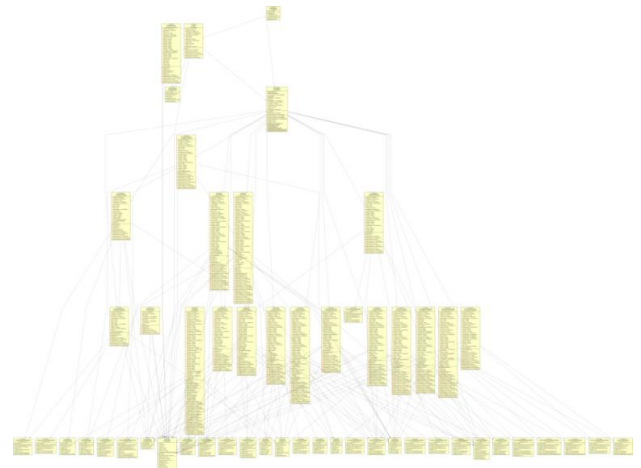


Figure 7 Class structures in the savings and loan
<https://db.tt/0Mw5E5aG>

3.4. Journal Automation

Journal automation is used to ensure that transactions recorded are consisted even if the directors change. Automation is implemented in the application’s code adhering to accounting principles as shown in Table 5.

The recording is done by inserting data into the database whose value follows the principles of debits and credits. By recording in to the database, each transaction could be tracked and validated for financial audit needs.

4. Outcome

Based on steps on developing this solution, the outcome is an Integrated Accounting System capable of providing real-time financial information accurately which may be accessed to view the cooperation’s financial situation, as shown in Figure 8.

Table 5
 Transaction Recording of Each Business Processes

No	Process	Transaction Record
1	Purchase	Dr Stock Cr Cash
2	Sales	Cash sales Dr Cash Cr Sales Dr Unit price Cr Stock Credit sales Dr Business claim Cr Sales Dr Unit price Cr Stock Dr Cash Cr Business claim

5. Conclusion

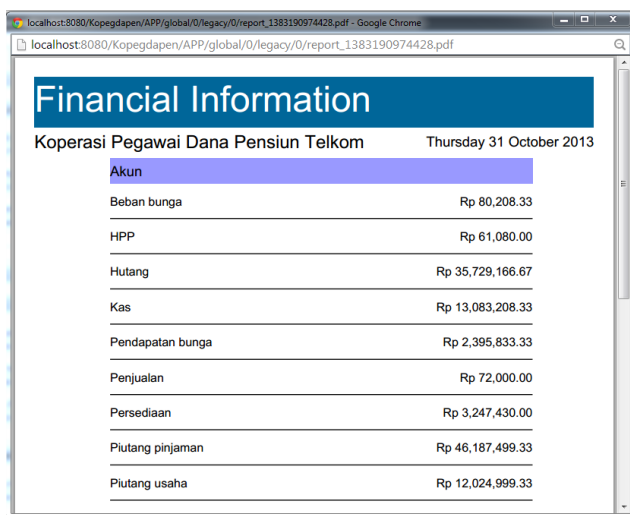
There are several points concluded in this study. Inconsistencies are handled by implementing automatic transaction recording based on accounting principles. Each transaction recorded will be automatically inserted into the database in accordance with standard accounting practices.

Lack of data and application integration is solved by developing a system integrating functional areas. The Resource-Event-Agent approach is used to develop an integrated functional area database schema.

To integrate applications, a web-based application is developed for easier access on each cooperation workstation. Having integrated both items, data collection and validation becomes much easier and reduces the time needed to prepare financial reports. Thus, issues faced by the Koperasi Pegawai Dana Pensiun Telkom are solved.

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Financial Information	
Koperasi Pegawai Dana Pensiun Telkom	
Thursday 31 October 2013	
Akun	
Beban bunga	Rp 80,208.33
HPP	Rp 61,080.00
Hutang	Rp 35,729,166.67
Kas	Rp 13,083,208.33
Pendapatan bunga	Rp 2,395,833.33
Penjualan	Rp 72,000.00
Persediaan	Rp 3,247,430.00
Piutang pinjaman	Rp 46,187,499.33
Piutang usaha	Rp 12,024,999.33

Figure 8 Financial information generated in PDF