

Web-Based Project Activity Management Information System for Construction and Consulting Firm

(Case Study PT.Ward Design)

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Abstrak - Sebagai negara berkembang, bisnis konstruksi di Indonesia memiliki prospek yang sangat menjanjikan. Pada tahun 2014, nilai bisnis ini diperkirakan mencapai US\$ 40,7 triliun. Di Indonesia, terdapat 117.042 perusahaan kontraktor dan 4.414 perusahaan konsultan. Jumlah ini terus bertambah, menyebabkan persaingan semakin ketat. PT. Ward Design adalah salah satu perusahaan yang bergerak di bidang konsultan dan konstruksi. Sejak tahun 2010, klien perusahaan ini mengalami peningkatan sebesar 25% setiap tahun. Dengan peningkatan jumlah klien dan proyek yang dikerjakan, mereka membutuhkan otomatisasi pada proses administratif proyek. Tujuan penelitian ini adalah untuk mengidentifikasi proses bisnis utama dalam pelaksanaan suatu proyek, merancang dan membangun sebuah system informasi berbasis web yang dapat menangani proses tersebut. Aplikasi dibangun dengan menggunakan bahasa pemrograman PHP dan basis data MySQL. Hasil dari penelitian ini adalah sebuah aplikasi web yang dapat menangani proposal proyek, penganggaran, termin dan pembayaran, menyimpan laporan kemajuan proyek, menyimpan data pengeluaran dan pemasukan, serta serah terima proyek. Aplikasi ini juga dapat membuat jurnal transaksi, buku besar dan laporan laba-rugi.

Kata Kunci—*perusahaan konstruksi, aktivitas proyek, system informasi, PHP, MySQL*

Abstract - As a developing country, construction in Indonesia is a prosperous business. In 2014, this business estimated around US\$ 40.7 trillion. In Indonesia, there are 117,042 firms and 4,414 consultants companies. This numbers keep growing, heat up the competition. PT. Ward Design is a company specialized in the field of consulting and construction sector. Its clients increased by 25% every year since 2010. With the increasing number of clients and projects, they need to automate their project's administration process. The purpose of this research is to identify main business processes in a project, design and create a web-based information system to accommodate the process. Application was built using PHP programming and MySQL database. The result of this

research is a web that can manage project proposal, budget plan, payments and terms, record project income and expenditures, project acceptance. The application also can generate transaction journal, ledgers, and profit and loss statements.

Keywords—*construction firm, project activity, information system, PHP, MySQL*

I. INTRODUCTION

As a developing country, construction in Indonesia is a prosperous business. In 2012, this business estimated around US\$ 28.4 trillion, rising to US\$ 40.7 trillion in 2014 [1].



Fig 1 Indonesian Construction Market in 2012-2014

The market has to be shared with 117,042 firms and 4,414 consultants. Even the numbers are still big enough, the number of contractors and consultants is growing fast, bringing up the competition to the next level. PT. Ward Design is one of those construction and consulting firm. The company was founded in 2007. Their clients increased by 25% every year since 2010. Until early 2014, this firm was still using printed documents in their operation. With the increasing number of clients, they found this very complicated. Documents are updated in hourly basis, and they need to be accessed by various person at the same time.

With this characteristic, printed documents leads to data redundancy and inconsistency, leading to delays in project implementation, and financial loss at the end.

This research main purpose is to identify main processes in the firm, and apply a web based information system as a solution to their problem mentioned above. As an additional, managements in PT. Ward Design wanted so the web can generate reports, such as transaction journal, ledger and profit-loss statement.

II. REFERENCE

A. Data Flow Diagram

Data Flow Diagram is a data or process logical model which is created to describe origin and destination of data in a system. It also describe where data is stored, which process produces such data and interaction between data [2].

B. Journal

Journal contains records of transaction. These records are classified into accounts [3]. Journal written in table-shaped columns. The table contains components such as date, description of the transaction, reference, debit and credit. The process of recording transactions into journal is called journalizing [4]. Purpose of transaction is recorded in the description [5].

C. Database Relationship Diagram

Relationship diagram describes data of a process, which is implemented by tables in a database. The main components of database relationship diagram are tables (entities) and relationship between tables [6].

III. MAIN PROCESSES

Main processes are identified through observation and interview with management at the firm. There are seven main processes.

- Create Quotation of Project Budget and Terms; before the project begins, consultants in the firm estimate budget based on client's needs. Budget then proposed to the client to be verified. Client can add, remove or modify details in the proposal. They can also negotiate on the budget plan, payments and terms. Proposal usually changes many times, since client can negotiate. However, the firm only need to record the final proposal, approved by director and client.
- First Payment; after the proposal approved by both side, client then must pay the down payment for the project. This amount of payment varies between clients, according to the terms in the project budget and terms. The firm sent invoice to the client. Invoice then verified and paid by the client. After client paid the invoice, the firm create a receipt.
- On Site Survey; after client pay the down payment, the project can run according to the schedule. Supervisor then oversee the project, decide if there is additional job needed or remove unnecessary job. At the end of every term, supervisor made progress report, acknowledge by the client.

- Invoice and Payment; after progress report is verified, the firm made invoice to be paid by the client.
- Project Acceptance and Handover; at the second from last term, the firm made project acceptance. This document verify that the firm have completed the project, acknowledged by the client.
- Final payment; after client verify project acceptance, the firm then send final invoice for final payment.
- Profit and Loss Statement; contains detailed income and expenses for the project. This document is compiled after the project finished.

IV. APPLICATION DESIGN

Data Flow Diagram is used to model the application design. At the top level or context diagram, there are four entities can interact with the system. Director (direktur), Client (klien), Estimator and administrative (admin).

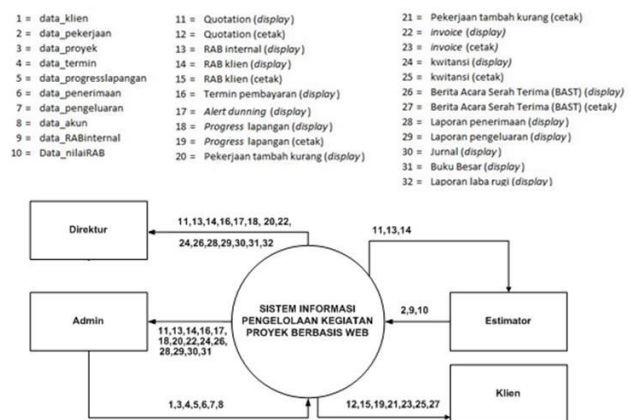


Fig 2 Context Diagram

Context diagram can be broken down into five processes. They are:

- Manage job's master data (kelola masterdata pekerjaan; process 1.1). This is the process where estimator lists all the job in the project.
- Manage client's master data (kelola master data klien; process 1.2). This process used by administrative to manage client's master data, such as information, address, contacts, and so on.
- Manage project's master data (kelola master data proyek; process 1.3). This is when administrative manage client's project.
- Create internal budget (membuat RAB internal; process 1.4). This is when estimator estimate cost for a project. In this process, profit for a project is calculated and estimated.
- Create quotation (membuat quotation; process 1.5). When the company verify internal budget, quotation contains budget and terms is created and proposed to client.

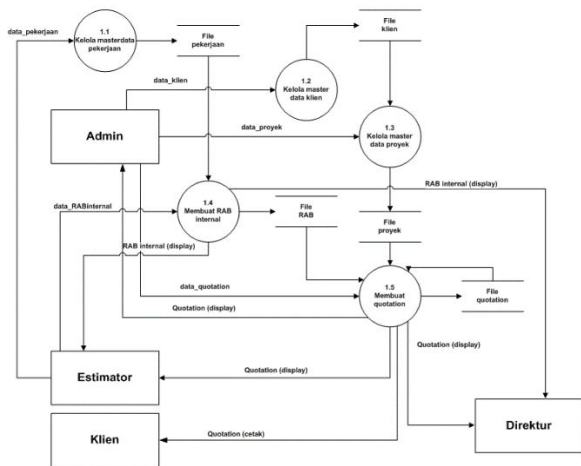


Fig 3 Data Flow Diagram Level 1

Process manage project's master data (process 1.3) can be broken down into two processes. They are:

- Create payment terms. This process take place when both side have agreed to payment terms and quotation. Time frame then created according to the quotation to break down the payment and project progress.
- Dunning alert. This will display alert to director and administrative to remind the progress and payments checkpoints, so the project will be running on schedule and penalty can be avoided.

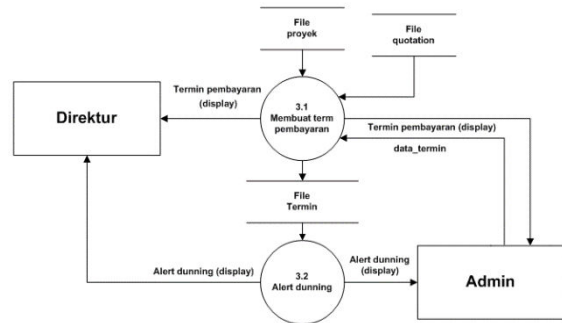


Fig 4 Data Flow Diagram Level 2 for Process 3

Process create quotation (process 1.5) can be broken down into four processes. They are:

- Manage project progress (mencatat pekerjaan tambah kurang; process 5.1). This is when administrative (based data from surveyor) insert additional job needed or remove unnecessary job from a project. This will cause budget recalculation within a term.
- Create invoice (membuat invoice; process 5.2). After project progress managed, invoice is created based on latest data. Invoice then sent to client for payment.
- Manage revenue (kelola masterdata penerimaan; process 5.3). After client pay the invoice, receipt then generated and sent to client.

- Create project acceptance and handover (membuat BAST; process 5.4). After all job in the project completed, acceptance and handover documents are created.

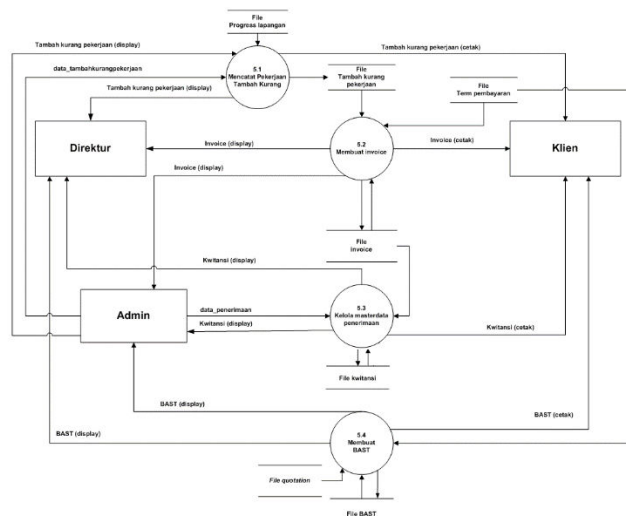


Fig 5 Data Flow Diagram Level 2 for Process 5

V. DATABASE DESIGN

There are 18 tables in the application design. They are:

- Receipt, contains records of verified payments from customer.
 - User, contains login data
 - Detail_quotation, contains detailed job for a specific project
 - Pek_tmb_krg, contains jobs added or removed compared to the jobs listed in table detail_quotation
 - Termin, contains terms of payment and dates for a specific project
 - Detail_invoice, contains detailed items in invoice sent to client
 - Progress, contains description (and photos) of progress in a term
 - Rab, contains detailed jobs and budget for the jobs for a project
 - Invoice, contains record of invoices sent to client
 - Jurnal, contains journal of transaction for every financial transaction
 - Bast, contains handover date for a project, indicated when the project completed
 - Coa, contains chart of accounts
 - Proyek, contains information of a project
 - Quotation, contains detailed quotation for a project
 - Tbl_client, contains master data of a client
 - Pengeluaran, contain list of expenditures for a project
 - Detail_pekerjaan, contains detailed jobs for a project
 - Kategori, contain category of a job
- Relationship between tables is shown in Fig 6.

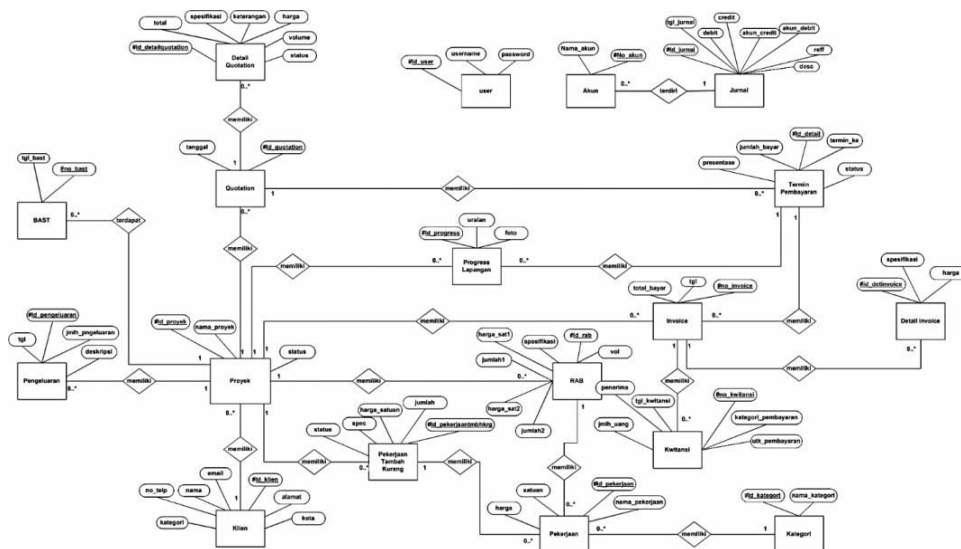


Fig 6 Entity Relationship Diagram

VI. USER PRIVILEGES

There are four level of access designed in this application, Director, Administration, Estimator and Client. Privileges for every type of user is described in Table I and Table II.

TABLE I. USER PRIVILEGES (DIRECTOR AND ADMINISTRATOR)

Item/Menu	Director	Administration
Master Data		
1. User master data	C,U,D,Ds	N/A
2. Client master data	C,U,D,Ds	C,U,D,Ds
Manage Project		
1. Job master data	N/A	C,U,D,Ds
2. Project master data	C,U,D,Ds	C,U,D,Ds
3. Quotation	A,Ds	C,U,D,Ds
4. Budget and terms		
a. Simple view (internal)	N/A	N/A
b. Simple view (client)	N/A	N/A
c. Detailed view (internal)	Ds	Ds
d. Detailed view (client)	Ds	Ds
5. Progress report	N/A	C,U,D,Ds
6. Additional job	N/A	C,U,D,Ds
7. Project handover	N/A	C,U,D,Ds
Payment		
1. Terms	N/A	C,D,Ds
2. Invoice	N/A	C,U,D,Ds
3. Terms table	N/A	Ds
4. Receipt		
Financial		
1. Chart of account	N/A	C,U,D,Ds
2. Expenditure	N/A	C,U,D,Ds
3. Income statement	Ds	Ds
4. Expenditure statement	Ds	Ds
5. Journal	Ds	Ds
6. General ledger	Ds	Ds
7. Profit and Loss Statements	Ds	Ds

TABLE II. USER PRIVILEGES (ESTIMATOR AND CLIENT)

Item/Menu	Estimator	Client
Master Data		
1. User master data	N/A	
2. Client master data	N/A	
Manage Project		
1. Job master data	C,U,D,Ds	
2. Project master data	N/A	
3. Quotation	Ds	Ds
4. Budget and terms		
a. Simple view (internal)	C,D,Ds	
b. Simple view (client)	C,D,Ds	Ds
c. Detailed view (internal)	Ds	
d. Detailed view (client)	Ds	
1. Progress report	N/A	Ds
2. Additional job	N/A	Ds
3. Project handover	N/A	Ds
Payment		
1. Terms	N/A	
2. Invoice	N/A	Ds
3. Terms table	N/A	
4. Receipt		Ds
Financial		
1. Chart of account	N/A	
2. Expenditure	N/A	
3. Income statement	N/A	
4. Expenditure statement	N/A	
5. Journal	N/A	
6. General ledger	N/A	
7. Profit and Loss Statements	N/A	

Remarks

N/A : Not Available D : Delete
 C : Create Ds : Display
 U : Update A : Approval

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Laporan Laba Rugi	
Periode: 01/01/2014 - 31/12/2014	
Pencapaian	Rp 84.900.000
Sisa	Rp 0
Saldo Perkiraan	Rp 84.900.000
Saldo Revisi	Rp 0
Laba/Rugi	Rp 84.900.000

Fig 15 Profit and Loss Statement Menu

Figure 15 shows the firm's profit and loss statement for a period of time.

VIII. TESTING

Testing was conducted by comparing the result produced by former and automated processes within main process. These processes consists of:

- Create/edit new client
- Add/edit new project
- Create/edit quotation and terms
- Quotation and terms approval
- Create/edit invoice and payment
- Add/remove additional survey data
- Project acceptance and handover
- Create final payment
- Generate profit and loss payment

Result produced by automated process was exactly the same with result by former process. Automated process also have been verified by the management, indicating that the result produced by automated process was acceptable.

IX. CONCLUSION

This research resulted in design and implementation of a web-based information system that can accommodate automation in administration process. This process includes project proposal budget plan, payments and terms, record project income and expenditure, and project acceptance. Based from those data, this application can also generate journal, ledger, and profit and loss statement.