

INVENTORY APPLICATION DESIGN AT INDUSTRIAL WATER DEPO USING EXTREME PROGRAMMING METHOD

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Abstract—Bening Water Depo involves in selling mineral water and refill water and trading with partner entities in the water sector. In the activities of inventory management and storage as well as recording of sales, problems are found because the management of inventory recording and recording of sales made in stores often experiences data loss caused by inventory recording still in paper form or you can say it is still doing manual recording, which has the possibility of collecting lost, damaged paper, or the recorded data cannot be read clearly. The urgency is to track expenses and income if the activity in the store is too crowded and records are still in paper form. The Extreme Programming method is used in this study. Steps of the extreme programming methodology cover the application planning phase, the application design phase, the application coding phase, and finally the application testing phase by doing blackbox testing to test the functional of the system. Results of this study are a website-based inventory application with several types of features including incoming and outgoing data management, then recording goods data, customer recording, recording incoming goods transactions, outgoing transaction reports, incoming goods reports, commodity data reports, customer data reporting, as well as book reports that include sales transaction reports, reseller sales reports, and purchase or restock reports. Implementing an inventory application in a gallon drinking water business can increase operational efficiency, improve customer service, and help in making better decisions for sustainable business growth.

Keywords: Information System, Extreme programming, Inventory.

Intisari - Bening Water Depo terlibat dalam penjualan air mineral dan pengisian ulang air serta perdagangan dengan entitas mitra di sektor air. Dalam kegiatan manajemen inventaris dan penyimpanan serta pencatatan penjualan,

ditemukan masalah karena manajemen pencatatan inventaris dan pencatatan penjualan yang dilakukan di toko sering mengalami kehilangan data yang disebabkan oleh pencatatan inventaris masih dalam bentuk kertas atau bisa dikatakan masih melakukan pencatatan manual, yang memiliki kemungkinan mengumpulkan kertas yang hilang, rusak, atau data yang dicatat tidak dapat dibaca dengan jelas. Urgensinya adalah melacak pengeluaran dan pendapatan jika kegiatan di toko terlalu ramai dan catatan masih dalam bentuk kertas. Metode Extreme Programming digunakan dalam penelitian ini. Langkah-langkah metodologi extreme programming meliputi tahap perencanaan aplikasi, tahap desain aplikasi, tahap pengkodean aplikasi, dan akhirnya tahap pengujian aplikasi dengan melakukan pengujian kotak hitam untuk menguji fungsional sistem. Hasil dari penelitian ini adalah aplikasi inventaris berbasis website dengan beberapa jenis fitur termasuk manajemen data masuk dan keluar, kemudian pencatatan data barang, pencatatan pelanggan, pencatatan transaksi barang masuk, laporan transaksi keluar, laporan barang masuk, laporan data komoditas, pelaporan data pelanggan, serta laporan buku yang mencakup laporan transaksi penjualan, laporan penjualan pengecer, dan laporan pembelian atau restock. Mengimplementasikan aplikasi inventaris dalam bisnis air minum galon dapat meningkatkan efisiensi operasional, meningkatkan layanan pelanggan, dan membantu dalam pengambilan keputusan yang lebih baik untuk pertumbuhan bisnis yang berkelanjutan.

Kata Kunci: Sistem Informasi, extreme programming, persediaan.

INTRODUCTION

The rapid growth of technology and industry has had an impact on human life, both positive and detrimental (Steven & Lee, 2023). The good influence is expected for humans in order to improve the quality and comfort of life, but the negative impact is not expected because it can diminish the quality and comfort of life. This can be seen in the advancement of industrial technology, specifically the availability of clean drinking water that is extensively utilized by the public, such as gallons of drinking water, as well as refilling drinking water supplies (Savira & Abdullah, 2019).

The use of information technology is required in business and organizational operations because one of the functions of a business or organization is highly dependent on its utilization (Hilabi & Huda, 2019), (Fathurrahman & Muhammad, 2019), (Fenardi & Lee, 2023). To build an information system that is durable and can provide an advantage in the increasingly fierce competition in the business world along with the times, information technology is the first choice (Machmudi, 2019).

Inventory usage has a big impact on the company (Kartinah & Kuncara, 2022). Inventory is a significant asset within a company that can influence an organization's approach to gaining targeted profits. As a result, a comprehensive inventory control method is required (Almadany & Khair, 2022). Inventory is a process sequence that collects, records, reports, and documents stock data as a tool to support organizational activities. This information is a record of all the tools and resources available for company activities (Tannady et al., 2022). The word inventory counting refers to tracking and adjusting a company's inventory of goods and assets, either for display in a warehouse or for use in a company's business process database system. (Haerani & Desianasari, 2022).

After air, water is a necessity as well as very important for human survival. Drinking Water Depo (DWD) established by individuals or groups to carry out trade, namely to manage water so that later it is prepared for purchase to the hands of consumers. The need for water as one of the people's main food ingredients can be met with mineral water and refill water sold by DWD. Products Mineral water and refill water provided by DWD are a necessity for the community because of their uses and are relatively affordable when compared to bottled water. (Ummah & Adriyani, 2019). The provision of mineral water or refill water as a household need is strictly required to meet the standards set out in international as well as national and regional regulations (Fatimura & Masriatini, 2021).

One of business that is expanding and is seen as becoming increasingly crucial for the needs of clean drinking water is a water refill depo. Bening Water is a drinking water distribution system that began operations in 2021. Until it has more than 100 clients who believe in quality and competitive pricing that are lower than other sources of drinking water. To compete with similar companies, Bening Water employs information systems and technology, regardless of company size. With the use of information systems and technology, all corporate operations can be simplified (Sinica, 2018).

The need for clean water is rising with Indonesia's population increase. As a result, the author intends to develop and create a website at Bening Water Depo as a clean water supplier, on which the supplier may easily process customer and outcome data (Adenansi & Christianti Johan, 2021).

Bening Water Depo is a business that distributes clean water to the general public. Bening Water Depo harnesses the advancement of IT as a medium for handling business activities such as paying water bills, ordering water stock, and so on. This company has also used application technology to help internal operations such as recording transactions, recording customer data, and so on (Mediana & Nurhidayat, 2018), (Nurlaela & Utami, 2023).

Bening Water Depo is engaged in selling refill water. This means that Product records, Sales records, and Purchase records are required if you want to generate reports.

The process is still do manually on paper. This cause several problems such as stock discrepancies, loss of recording data, and the inability to generate reports. The solution that can be offered is a website-based inventory application for Bening Water Stores to record products, sales, purchases, and report generation.

Based on the problems above, it is recommended to keep records using a Inventory Application. The suggested Inventory application is made using the Extreme Programming Software Development Life Cycle (SDLC) method to ensure that the owner can use the application while still under work.

MATERIALS AND METHODS

Research and development is the approach used in this study. The research and development process is the method used to manufacture and test a particular product, to make sure how well it works. To be able to develop a particular item, the research required for analysis is used to assess the effectiveness of the product and ensure proper use.

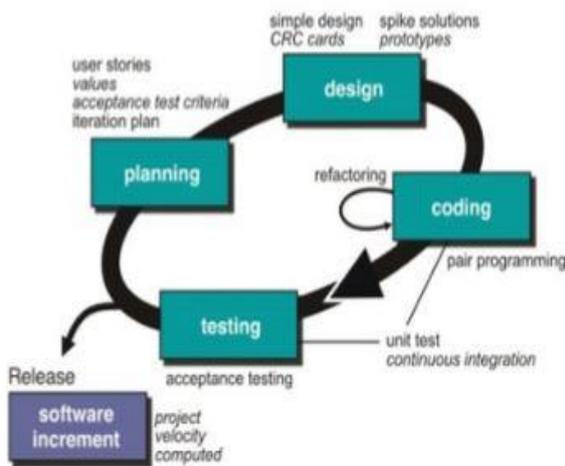


Figure 1. Extreme Programming Method (Carolina & Supriyatna, 2019)

Extreme Programming is used as an application design and manufacturing method in the study as shown in Figure 1. In the extreme programming method, there are several stages (Ahmad et al., 2020), (Garzo & Garay-Vitoria, 2021).

As a development method based on SDLC with iteration phase procedures to release where Extreme Programming itself upholds the Agile Software Development model. (Prabowo & Kuswanto, 2020). The small to mid-sized teams that the Extreme Programming approach seeks to create can also be used to create systems with rapidly changing requirements or unclear requirements (Asriyanik, 2022). Extreme programming is an iterative process that ends up in a ready-to-use system. At this point, system testing, analysis, design, and coding is complete (Septiani & Habibie, 2022).

RESULTS AND ANALYSIS

Planning

Planning focuses on obtaining an overview of the features and functions of the product to be produced. The planning process starts with gathering the visuals or narrative offered by the end user, which will serve as a basic description of the program (Djamen et al., 2020).

The purpose of this research is to plan the functional requirements that will later be in the application. Where in the application, there will be functions that have been determined according to needs. Owner as the highest authority and as the only user in the application can access all functions, starting from the Dashboard, Product Input, Sales Input, Restock Input, Customer Input, Sales History, Restock History, Sales History, Product List, Customer List, and Sales Reports.

Design

Design is the second stage of extreme programming. Design is a guide to content implementation. make a sketch of the system interface which will later be used as a reference during the coding process (Tristiyanto et al., 2020).

In this design stage, the system design has been designed using data flow diagrams or Data Flow Diagrams (DFD), entity relationship diagrams or Entity Relationship Diagrams (ERD), and wireframes that are made as needed. Data flow diagrams contain context diagrams and overview diagrams. In the making, data flow diagrams are adopted and developed because the application created is a structured application.

Data Flow Diagram

Based on Figure 2, it shows that the user (Owner) can interact. The process carried out by the Owner can add Product Data, add Sales Data, add Customer Data, add Restock data, search Product Data, search Sales Data, Search Customer data, and search Restock data. Owners can access the Dashboard, Sales Reports, Restock Reports, Customer Lists, Product Lists, Books, Sales Data Search Results, Restock Data Search Results, Customer Data Search Results, Product Data Search Results, and Book Data Search Results.

Then in Figure 3 is an Overview Diagram illustrating the course of the nine main processes contained in the Bening Water Shop Website. And from the Overview Diagram, it can be seen that the user (Owner) can provide input, get Reports, and get Lists. The owner is the main actor who will be given the highest access rights and can access all existing functions. The owner can input product data, input sales data, input restock data, and input customer data. Owners can also access all Sales Reports, Restock Reports, Product Lists, Customer Lists, and Book Reports. Each input made will be stored in its respective data stores.

Data Flow Diagram (DFD) is a graphic that represent how application data flow and what data that exist in the application that are designed. The purpose of making a DFD is to explain scope and boundaries of data in the system.

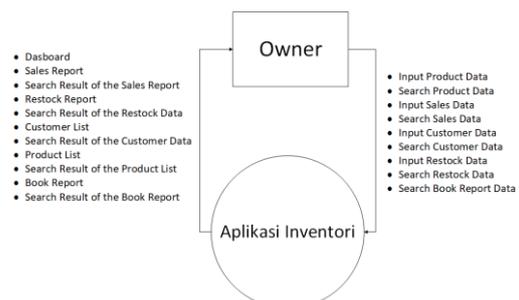


Figure 2. Diagram Context

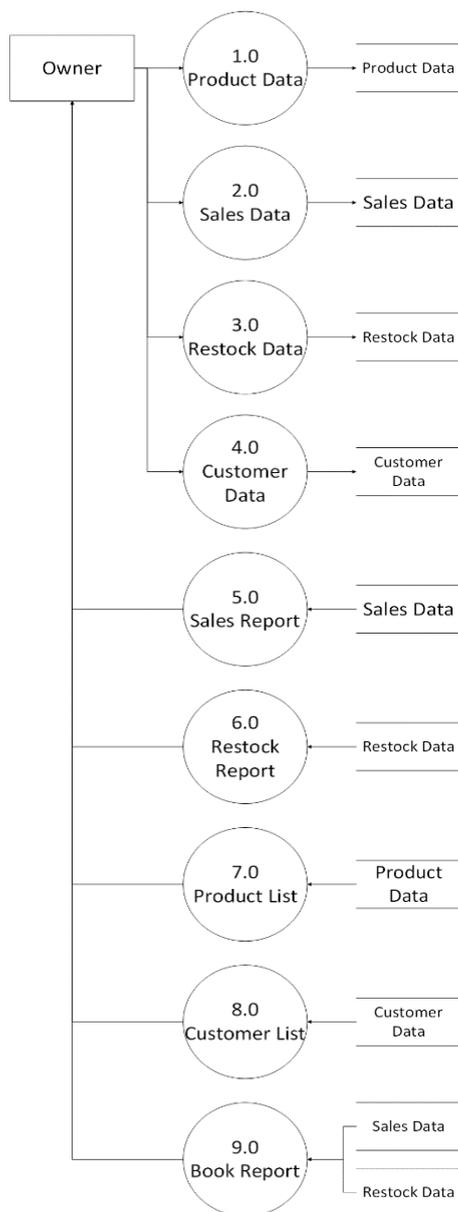


Figure 3. Diagram Overview

As Shown in Figure 3 from Process 1 until 4, Owner can Input Product Data, Sales Data, Restock Data, and Customer Data into the Data Store which is the DBMS that act as the Data Store in this study.

Same goes as the Output that shown from Process 5 until Process 9, the Owner can see data that already exist or data that the Owner previously inputted into the data store, which divided same as Input such as Sales Report, Restock Report, Product List, Customer List, but especially Book Report that will Show Income from sales and Outcome from Restock.

Entity Relationship Diagram

The database axis conceptual model is described in an entity relationship diagram

(Yoraeni et al., 2020.). In the designed Bening Water Store Inventory application, data is stored in the MySQL DBMS. Meanwhile, these data are interconnected to produce information that is easy to understand. The Entity Relationship Diagram in Figure 4 shows how data is connected to one another.

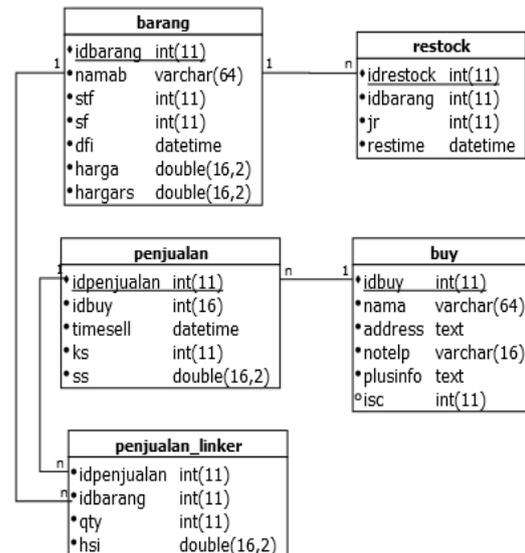


Figure 4. Entity Relationship Diagram

Wireframe

Wireframe is a blueprint or design for application pages that will be worked on by application developers, and indeed this design is also mostly a reference for how the application will be made later (Andrian et al., 2020). The Dashboard display has menus for Product Input, Sales Input, Restock Input, Customer Input, Restock History, Sales History, Product List, Customer List, and Books. On the Dashboard at the top right corner there is a Logout feature.

In the wireframe Product Input menu, there's Product Name field, price for buying the product field, price for selling field, and current stock quantity field. Then there's submit button and reset button at the end of the form.

In the wireframe Sales Input menu, there's Item selection field, Price for Sales, Customer field selection, Product status field, and Purchase Status field. Then there's submit button and reset button at the end of the form.

In the wireframe Customer Input menu, there's Customer Name Field, Customer telephone number field, customer address field, extra note field, and Customer type selection field.

In the wireframe Input Restock menu, there's Product selection field, quantity of the restock field, and type of the restock selection field.

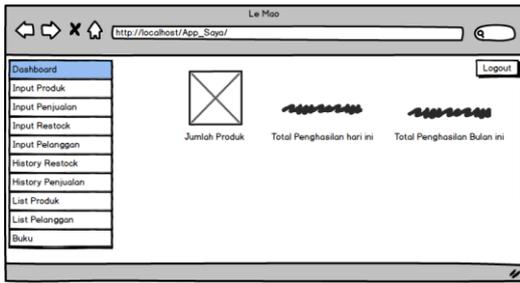


Figure 5. Wireframe Dashboard

As for the History and List menu in the wireframe. Each menu have table that contain correspondent page. Like in the Restock History and Sales History page there's table that will show the Restock and Sales data. The same goes for Product List and Customer List page, the page have table that contain Product Data and Customer Data at each own page. But Book Report page are showing data that are combined, the data itself are Sales Data and Restock Data that are combined and Calculated to produce the Correct Revenue.

Results

The research that has been carried out by the author produces results in the form of Inventory applications. The following are the results of the study in the form of an screenshot of the application: Figures 6 are upper Dashboard displays, where Daily and Monthly Income Graphs are shown. The graphs are shown in bar style and can be highlighted to show the maximal income of the day.

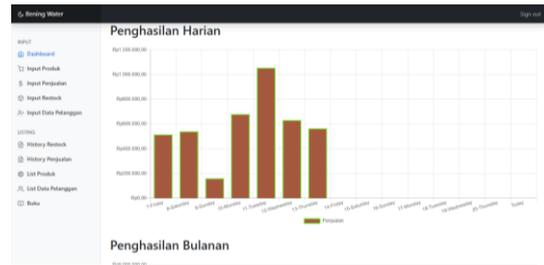


Figure 6. Screenshot of the Bening Water Depo Inventory Application

Figures 7 are bottom Dashboard displays, where the top 5 best selling product are shown in table and donut chart. The Donut Chart are showing how much the product are sold while the table are showing the total amount of the income from the product. The results obtained from blackbox testing of the Basic application features in Bening Water Store Inventory, produce good results for each of its functions as shown in Table 1.

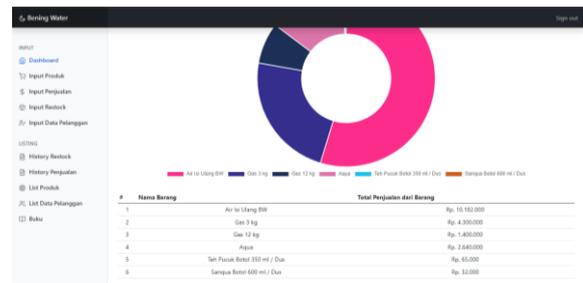


Figure 7. Screenshot of the Bening Water Depo Inventory Application

Table 1. Blackbox Testing Basic Features

No	Test Case	Test Steps	Expected Result	Actual Result	Status
1	Login	<ol style="list-style-type: none"> 1. Open the website of the application 2. Shown Login page 3. Input the Username 4. Input the Password 5. Click "Masuk" 	The user has successfully logged into the application	The user has successfully logged into the application	OK
2	Logout	Click "Sign Out" button	The user has successfully signed out of the application	The user has successfully signed out of the application	OK

The results obtained from blackbox testing of the Basic features in the Bening Water Depo Inventory Application, produced good results on each function as described in Table 1. Login are tested to make sure the user can log on to the application without any problem and the result of the test are showing the login function of the

website are working correctly and as intended. Sign Out are tested to make sure the user can log out from the application and close the site without any problem whatsoever. The Reason for the Sign Out function are being tested is to prevent the jam of the login session that tried to destroy by the sign out function that can led to the application being accessed by other user.

Table 2. Blackbox Testing Output Features

No	Test Case	Test Steps	Expected Result	Actual Result	Status
1	View Restock data	Select "History Restock" Menu	The appearance of a Table containing a list of Restock transactions	The appearance of a Table containing a list of Restock transactions	OK
2	View Sales data	Select the menu "History Penjualan"	The appearance of a table containing a list of Sales transactions	The appearance of a table containing a list of Sales transactions	OK
3	View Customer data	Select "List Pelanggan" Menu	Appearance of a Table containing a list of Customer Data	Appearance of a Table containing a list of Customer Data	OK
4	View Product data	Select "List Produk" Menu	Appears of a Table containing a list of Product Data	Appears of a Table containing a list of Product Data	OK
5	View the "Buku" report page	Select "Buku" Menu	The appearance of a Table containing a list of Restock and Sales transactions merged	The appearance of a Table containing a list of Restock and Sales transactions merged	OK

The results obtained from blackbox testing of the Output feature on the Bening Water Depo Inventory Application, produced good results for each function as described in Table 2. View Restock Data, View Sales data, View Customer data, View Product data, and View "Buku" Report page are

tested to make sure the user of the application can access the History of each correspondent function, such as Restock History that will show the History of Restock that ever been done, same as Sales data. But Customer data and Product Data are tested to make sure the user can see the Data of the Product and Customer that been inputted. For the "Buku" Report Page, it contain the History of the Sales and Restock that the data are joined and shown together in the table with each transaction are labeled to

coresspondent type and calculated to show the correct amount of revenue.

The results obtained from *blackbox testing* of the *Input* feature in the Bening Water Depo Inventory Application, produced good results for each function as described in Table 3. Input Sales Data, Input Restock, Input Customer Data, and Input Product Data also being tested to make sure user can use each function correctly without any failure on the input progress. Form of the Input Product, Input Sales, Input Restock, and Input Customer Data must filled before pressing the submit function, where the submit function itself will record the inputted data and store it in the database that designated previously.

Table 3. Blackbox Testing Input Features

No	Test Case	Test Steps	Expected Result	Actual Result	Status
1	Input Product Data	<ol style="list-style-type: none"> Select "Input Produk" menu Fill "Nama Produk" Field Fill "Harga Satuan Produk untuk Dijual" Field Fill "Harga Satuan Produk saat Dibeli" Field Fill "Kuantitas Produk" Field 	User successfully inputs product data	User successfully inputs product data	OK
2	Input Sales Data	<ol style="list-style-type: none"> Choose "Input Penjualan" menu Choose "Produk" Fill "Jumlah Penjualan Produk" Field Choose "Pembeli" Choose "Status Pembayaran" Choose "Status Pengiriman" Click "Submit Button" 	User successfully inputs sales data	User successfully inputs sales data	OK
3	Input Restock	<ol style="list-style-type: none"> Choose Product Fill "Jumlah Restock" Field Choose "Jenis" Click "Submit" button. 	User Successfully Restock Data	User Successfully Restock Data	OK
4	Input Customer Data	<ol style="list-style-type: none"> Fill "Nama" Field Fill "Alamat Rumah" Field Fill "Nomor Telpon" Field Fill "Keterangan Tambahan" Field Choose Tipe" 	User successfully inputs customer data	User successfully inputs customer data	OK

No	Test Case	Test Steps	Expected Result	Actual Result	Status
		6. Click "Input Pelanggan" button			

CONCLUSION

the application developed based on the conducted studies provides comprehensive functionalities for Toko Bening Water, allowing efficient recording of product, customer, sales, and restock data. Additionally, it facilitates report generation, including sales and restock reports, product and customer lists, and graphical representations of

sales data. Users are required to input relevant information for each data recording, such as product details, sales information, restock details, and customer information. The application has been successfully implemented at Bening Water Depo, demonstrating its effectiveness without any functional issues during testing. It is designed exclusively for the depo owner, ensuring a single user interface tailored to their needs

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