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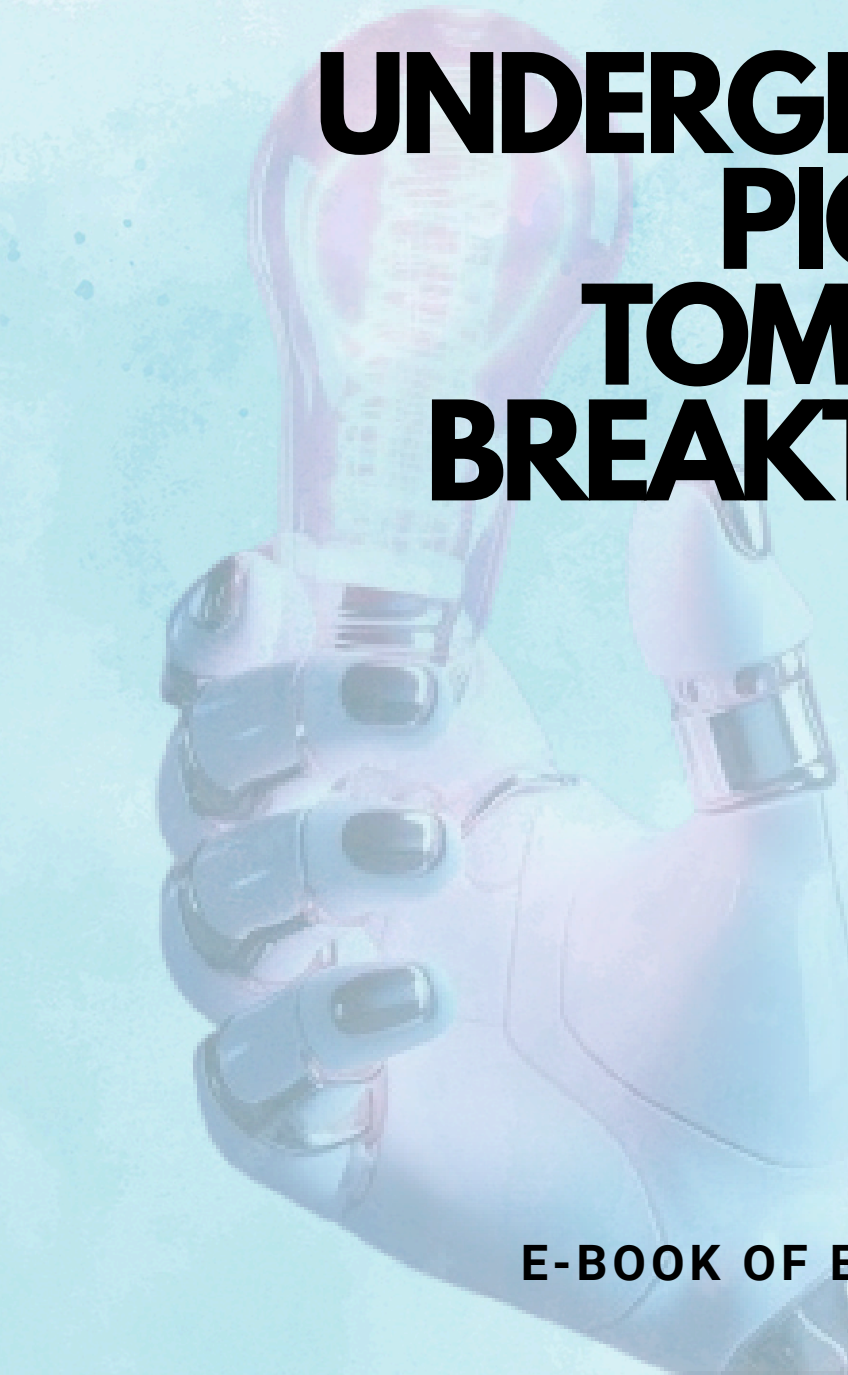

E-BOOK OF EXTENDED ABSTRACTS

PHARMAFLOW SALES & INVENTORY MANAGEMENT SYSTEM

Nur Khairunnisa Bahdum, Nurul Atira Rabu, Nurrin Fatihah Mohammad Faisal, Nurafiqah Izzati Mohd Fadzli, and Nor Azlina Aziz Fadzillah*

Fakulti Sains Komputer dan Matematik, Universiti Teknologi MARA (UiTM) Cawangan Negeri Sembilan, Kampus Seremban 3, Persiaran Seremban Tiga 1, Seremban 3, 70300 Seremban, Negeri Sembilan, Malaysia

*norazlina@uitm.edu.my

ABSTRACT

The *PharmaFlow Pharmacy Sales and Inventory Management System* has been developed to address inefficiencies in manual transaction and stock control processes. The existing manual system was time-consuming, error-prone, and lacked real-time tracking of sales, customer records, and inventory. The Database Life Cycle (DBLC) is used to design, implement, and manage the system efficiently. Microsoft Access has been chosen to automate data organization, transaction processing, and inventory monitoring. The system integrates customer, staff, supplier, drug, stock, and transaction data into a centralized database, enabling accurate, secure, and easily retrievable records. The sequential query language (SQL) was implemented to generate real-time reports on sales, stock levels, supplier deliveries, and customer transactions. Results show significant improvements in operational efficiency, stock accuracy, and financial reporting. Automated stock updates, expiry date alerts, and secure staff logins enhanced data reliability and reduced administrative workload. This system ensures timely restocking, prevents the sale of expired drugs, and strengthens data privacy, ultimately improving service quality and supporting better decision-making for the pharmacy.

Keywords: Database Life Cycle (DBLC), Microsoft Access, Sales Tracking, Inventory Control, SQL Queries

INTRODUCTION

Pharmacy is a retail establishment, also known as a drug store, where medicines and health-related products are sold, dispense prescribed medications, and offer advice on their safe and effective use. Pharmacy welcomes any individuals that require medicines prescription and granting patient training and education on health from our experienced and licensed pharmacists (KareXpert, n.d.). The pharmacists provide prescriptions based on the customer's condition and presenting symptoms. Pharmacy offers a wide range of medications, catering to all age groups, from baby to elderly care medications. The medications are organized according to their name, type and functions, making it more accessible for our customers.

The sales and inventory management systems that PharmaFlow currently uses is not efficient as it relies heavily on a manual system. . It requires the pharmacist to manually monitor each drug that is available in the pharmacy. Pharmacy management has kept paper records in filing cabinets. Managing a very large pharmacy with records on papers will be tedious and difficult to keep track of inventories with regards to the drugs in the store, expiry date, quantity of drugs available based on the categories (Rathnayake, 2021). Therefore, PharmaFlow has decided to build the management system for drugs by using Microsoft Access. Microsoft Access can make the inventories and sales data for the pharmacy more organised and easier to track.

The main objective of developing the PharmaFlow Pharmacy Sales and Inventory Management System is to create an efficient, accurate, and secure database-driven solution that streamlines pharmacy operations. Specifically, the system is designed to capture and record all sales transactions and payment methods to ensure proper financial tracking and reporting. It aims to monitor drug inventory in real time, prevent stock shortages, and provide alerts for expired medications to maintain safe dispensing practices. Additionally,

the system organizes and safeguards customer, staff, supplier, and drug data, ensuring that sensitive information is accessible only to authorized personnel. By automating these processes, the system reduces manual workload, minimizes human error, and enables the generation of precise reports for operational analysis. Ultimately, these objectives work together to enhance productivity, improve customer service, support timely decision-making, and elevate the overall professionalism of PharmaFlow Pharmacy.

PharmaFlow Pharmacy has improvised the dispensing and inventory management of medications and services provided by our pharmacy. Our database inventory manages stocking and inventory of the pharmaceuticals health products such as recording the quantity supplied by the supplier and unit of medications sold to customers. Furthermore, our inventory maintains accurate records of medications storage compliance such as expiry date and proper labelling for each medication. This reduces the risk of dispensing outdated medicine to customers. Our pharmacy also records medicine dispensing history that includes date of purchase and dose given to customers to keep track of the medications sold to customers.

In addition, our business database manages the financial and sales flow in the pharmacy. The system handles sales tracking, billing procedure and insurance claims made by the customer as well as medicine sales and appointment related costs. Moreover, financial records including cash flow with corresponding transaction time and date as well as payment method are documented precisely in the sales database. Along with that, the pharmacy's total sales, specific sales contributed by each customer can be calculated accurately.

METHODOLOGY

Database Life Cycle (DBLC) was chosen for our pharmacy system development. DBLC is a structured development process because it provides a step-by-step framework which are planning, design, implementation and more. DBLC also improved data accuracy and consistency by following normalization and design standards (*Avenga,* 2024) and DBLS also can provide better identification problems and solutions because the analysis stage highlights weaknesses in existing systems and ensures the new system addresses them effectively.

Firstly, the phase database planning is to identify the need for a reliable sales and inventory system to replace manual processes. Planning involved defining project goals such as reducing errors, ensuring data security, and enabling real-time tracking of sales and stock. Secondly, the system definition phase is to define the system scope including managing customers, staff, suppliers, drugs, stock, and transactions. Thirdly, requirements collection and analysis phase is to analyze the original system problems, rrequirements were collected to ensure the new system could generate transaction reports, track expiry dates, and manage supplier data. Next, the database design phase included creating an Entity Relationship Diagram (ERD), normalizing data up to Third Normal Form (3NF), and building relational schemas. Tables such as *Customers, Staff, Drugs, Stocks, Supplier, Transactions,* and *Pharmacy_Transactions* were defined**.**

Furthermore, Microsoft access was chosen as the DBMS platform due to its accessibility, ease of use, and suitability for academic-level system development. Next, in the implementation phase, tables, relationships, and queries were created in MS Access. SQL queries were designed to produce outputs like total pharmacy sales, customer transaction histories, supplier stock reports, and stock balances. Forms and reports were also developed to simplify user interaction. Then, in the testing and evaluation phase, queries and reports were tested with sample data to ensure the system produced accurate outputs. Functionality such as secure login, expiry date tracking, and transaction recording was evaluated to confirm objectives were met. Lastly, in the operation and maintenance phase, the system is intended to be used daily by staff for recording transactions and tracking stock. Maintenance includes updating drug information, supplier details, and ensuring staff accounts remain secure (Engineering LibreTexts, 2023).

RESULTS AND DISCUSSION

The development and implementation of the *PharmaFlow Pharmacy Sales and Inventory Management System* successfully addressed the inefficiencies of the previous manual processes. The new database-driven system, developed using Microsoft Access, integrates customer, staff, supplier, drug, stock, and transaction records into a centralized platform. This integration has significantly improved data accuracy, reduced human error, and allowed for real-time monitoring of stock levels and sales transactions.

The SQL queries designed within the system produced accurate and meaningful reports that support decision-making. Examples include generating total pharmacy sales, tracking the quantity of drugs supplied by each supplier, listing drugs with stock levels exceeding a set threshold, and providing detailed customer transaction histories. Automated calculations of stock balances after sales ensured precise inventory control, while expiry date tracking prevented the sale of outdated medications. Secure login functions further enhanced data privacy by restricting access to authorized staff. Figure 1 shows the example of SQL command for sales tracking and figure 2 shows the output of sales tracking query.

```
SELECT C.CustName, D.DrugName, PT.Quantity, D.DrugPrice, Quantity*DrugPrice AS TotalPriceEachCustomer, TranscDate, TranscTime
FROM CUSTOMERS AS C, PHARMACY_TRANSACTION AS PT, DRUGS AS D, [TRANSACTION] AS T
WHERE C.CustID=T.CustID
AND PT.DrugCode=D.DrugCode
AND T.TranscID=PT.TranscID;
```

Figure 1: SQL Command for sales tracking

Q2ListCustNameQuantityDrugPrice

CustName	DrugName	Quantity	DrugPrice	TotalPriceEachCustomer	TranscDate	TranscTime
Faizal Zainal	Prednisone	6	RM0.60	RM3.60	1/5/2025	10:15 AM
Nur Aisyah Rahman	Salbutamol	4	RM0.90	RM3.60	1/5/2025	2:05 PM
Lim Wei Jian	Pantoprazole	3	RM1.50	RM4.50	2/5/2025	9:43 AM
Siti Mariam Bt. Zakaria	Clopidogrel	3	RM3.00	RM9.00	2/5/2025	11:32 AM
Arvin Kumar A/L Rajan	Naproxen	2	RM1.20	RM2.40	2/5/2025	4:20 PM
Aiman Zulkifi	Glimepiride	2	RM1.20	RM2.40	3/5/2025	12:45 AM
Nur Aliya Abu	Cetirizine	4	RM0.80	RM3.20	3/5/2025	1:01 PM
Jonathan Lim	Atorvastatin	2	RM1.20	RM2.40	3/5/2025	3:55 PM
Siti Mariam Ismail	Paracetamol	3	RM1.00	RM3.00	5/5/2025	8:27 PM
Harith Danial	Erythromycin	2	RM3.00	RM6.00	5/5/2025	5:39 PM
Chloe Tan	Metroformin	4	RM0.50	RM2.00	6/5/2025	10:58 AM
Faiz Ahmad	Montelukast	2	RM2.80	RM5.60	1/5/2025	9:00 AM
Lee Mei Yin	Levothyroxine	2	RM0.80	RM1.60	6/5/2025	1:49 PM
Priya Nair	Ibuprofen	3	RM0.80	RM2.40	6/5/2025	11:21 AM
Amirul Hakim	Omeprazole	3	RM1.00	RM3.00	5/5/2025	8:37 PM
Farah Nadia Halim	Cetirizine	3	RM0.80	RM2.40	4/5/2025	4:30 PM
Hafiz Ramli	Amlodipine	2	RM0.80	RM1.60	4/5/2025	12:40 AM
Lee Zia Jee	Amoxicillin	2	RM1.00	RM2.00	4/5/2025	3:10 PM
Aina Sofea Zainal	Azithromycin	3	RM2.50	RM7.50	7/5/2025	10:29 AM
Zulkarnain Mohd Noor	Cetirizine	3	RM0.80	RM2.40	7/5/2025	11:14 AM
Brenda Chua	Naproxen	2	RM1.20	RM2.40	7/5/2025	9:05 PM
Faizah Rosli	Salbutamol	4	RM0.90	RM3.60	8/5/2025	4:27 PM
Azhar Karim	Glimepiride	4	RM1.20	RM4.80	8/5/2025	7:50 PM
Kelly Ng	Ranitidine	2	RM1.00	RM2.00	8/5/2025	2:10 PM
Shafiq Hadi	Losartan	2	RM2.00	RM4.00	9/5/2025	10:55 AM
Alia Aziz	Erythromycin	5	RM3.00	RM15.00	9/5/2025	10:17 AM
Daniel Yap	Paracetamol	3	RM1.00	RM3.00	9/5/2025	4:40 PM
Huda Nazira	Loratadine	2	RM1.00	RM2.00	10/5/2025	11:23 AM
Ikhwan Saleh	Naproxen	3	RM1.20	RM3.60	10/5/2025	3:10 PM

Figure 2: Output for sales tracking

Operationally, the system has streamlined workflow by automating record-keeping, reducing administrative workload, and enabling faster service delivery to customers. Staff can now easily retrieve drug information, update sales records, and monitor stock movements without manual counting or cross-checking. The enhanced reporting capabilities also allow management to track performance trends, identify restocking needs, and maintain compliance with audit requirements. Overall, the system demonstrates how a well-structured Database Management System can transform pharmacy operations into a more efficient, secure, and data-driven process.

CONCLUSION

PharmaFlow Pharmacy is an advanced retail or community pharmacy that utilizes advanced system technology to enhance the sales and inventory management operations. Our pharmacy aims to deliver high-quality pharmaceutical care, prioritizing accuracy and customer satisfaction by providing quick and efficient service as well as to serve as reliable medical guidance and easily accessible healthcare for the Seremban 3 community.

The auto-calculation of stocking quantity such as quantity of stock supplied by the supplier company and amount of stock sold to the customer is one of our pharmacy advantages. Furthermore, the incorporation of a centralised database has made the organization of medications easier according to their price and corresponding supplier company. Medication recognition becomes more efficient as each drug is allocated with their unique ID. In addition, personalized user staff accounts have greatly enhanced the quality of service provided by the staff, allowing fast and efficient customer service. Staff can monitor the medications availability as well as checking the expiry date before dispensing to customers. Lastly, maintaining medication inventory and managing sales operations.

Improvement is needed in development to increase accuracy, efficiency, data security, and scalability. Other than that, ultimately ensuring that the database system remains relevant and valuable to the pharmacy's operations. For example, the improvement can be made to improve the accessibility that will allow access via web or mobile apps for user flexibility. In addition, improve the user experience enhancements, provide a simple dashboard with KPIs such as top sales and medicine that is expiring soon.

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