

## **CHAPTER V**

### **CONCLUSION**

#### **5.1. Conclusion**

This study has successfully developed an integrated Enterprise Resource Planning (ERP) system for Pasyha Pharmacy using the Hybrid Agile methodology with the simultaneous implementation of Behavior Driven Development (BDD) and Test Driven Development (TDD) in each sprint iteration. Based on all stages of the research conducted, from requirement gathering, system design, development, to testing, two main conclusions can be drawn in accordance with the established research problems.

First, the application of BDD and TDD methods in the development of Pasyha Pharmacy's ERP system has proven effective in optimizing the management of all operational sectors of the pharmacy while maintaining the quality of the resulting system. From the BDD perspective, the implementation of the Gherkin format with the Given-When-Then structure successfully bridged the communication gap between developers and non-technical stakeholders of Pasyha Pharmacy. This was quantitatively evidenced by the acceptance rate of scenarios without major revisions at 86.84% out of a total of 38 scenarios designed, as well as an average stakeholder satisfaction score of 4.39 out of 5, or 87.8%, categorized as very good. From the TDD side, the application of the Red-Green-Refactor cycle using PHPUnit resulted in a total of 715 tests with 2,055 assertions, all of which were executed successfully without a single failure, demonstrating that all implemented business logic was technically validated and that there was no regression among the integrated modules. The combination of these two methodologies within the Hybrid Agile framework creates two layers of complementary quality assurance: alignment with business needs via BDD in the External Loop and technical correctness via TDD in the Internal Loop. As a result, the system produced not only functions correctly from a technical standpoint but also truly aligns with the real operational needs of the pharmacy.

Second, the integration of the ERP system with the e-commerce platform within a unified centralized architecture was successfully designed and

implemented to increase the efficiency of online transactions and strengthen Pasyha Pharmacy's competitiveness in the digital market. The developed system integrates online transaction flows from product catalog, shopping cart, order checkout, automatic invoice generation, to order monitoring dashboard within a single platform directly connected to the inventory module. Every confirmed transaction automatically updates product stock and records stock mutations without requiring separate manual input, thus eliminating duplicate recordkeeping that previously contributed to errors in online transaction processes via WhatsApp. Compared to the condition before the system was developed, when the pharmacy only had a basic cashier system with three functional domains, the resulting ERP system encompasses twelve integrated functional domains, including product management, POS transactions, automated financial reports, supplier and stock management, e-commerce, CRM, digital prescription management, human resources and payroll administration, analytics dashboards, as well as user activity audit trails, all within a single centralized platform accessible to all user groups according to their respective access rights.

## **5.2. Suggestions**

Based on the research findings and limitations encountered during the development process, several suggestions are provided that are expected to serve as input for relevant stakeholders.

### **1. For Pasyha Pharmacy**

It is recommended to continue utilizing all ERP modules that have been developed, especially the real-time stock dashboard, online transactions, and automated financial reports. Minor adjustments such as optimizing alert visualization indicators and low stock notifications could further improve operational convenience. The pharmacy could also consider adding a mobile notification module or integrating digital promotions to enhance customer engagement.

### **2. For Future Researchers**

Future research is advised to explore the development of ERP systems involving multi-member teams, advanced analytics integration

based on AI, or the implementation of medication demand prediction features to support more proactive stock management. System performance evaluation with a larger user sample could also provide more comprehensive insights regarding user experience and system effectiveness.

### 3. For Academic Development

For academic developers, it is recommended to implement the Hybrid Agile methodology combined with BDD and TDD in complex ERP projects, even when working solo. This approach has proven effective in ensuring both business requirement alignment and technical validation. Backlog documentation, BDD scenarios, TDD results, and incremental deployments should always be updated to support system maintenance, experimental validation, and research replication.

By implementing these suggestions, the Pasyha Pharmacy ERP system is expected to continue operating efficiently, stably, and sustainably, as well as to support faster, more accurate, and regulation-compliant operational decision-making and business strategy.