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# Digitize the eCommerce Bookkeeping – An Automation Bookkeeping Prototype Development

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## Abstract

*Abstract - This study explores the impact of digital transformation on e-commerce, specifically focusing on the automation of bookkeeping processes. Despite the widespread benefits of e-commerce growth, a significant management gap persists, particularly in smart transaction management for retailers. The absence of automated systems results in manual recording methods, posing risks of data corruption and unreliability. Current practices involve e-commerce retailers relying on conventional ledgers or manual bookkeeping systems. To address these challenges and leverage digital transformation, retailers are turning to smart ledgers and price prediction systems. Employing a mixed-methods approach, the study combines quantitative insights from a Facebook poll with qualitative data extracted from discussions. The poll reveals prevalent manual bookkeeping practices among 49 e-commerce retailers, emphasizing the need for automation. Comparative analysis of existing applications identifies gaps, particularly the absence of automatic pricing suggestions crucial for-profit generation based on e-commerce programs. The research culminates in the development of a mobile application prototype, Manledger, utilizing the Rapid Application Development (RAD) methodology. Manledger aims to streamline e-commerce bookkeeping by automating sales and inventory tracking, profit calculations, and pricing strategies based on seller programs. Results demonstrate the prototype's effectiveness in enhancing efficiency and accuracy, supported by positive user feedback. Acknowledging the need for further exploration, the study suggests future research directions. These include long-term impact assessments of automated systems, comparative studies across diverse platforms, integration of advanced technologies like AI and blockchain, cybersecurity considerations, and investigations into user experience and adoption challenges. This comprehensive approach seeks to advance understanding and contribute to innovative solutions in the dynamic realm of e-commerce financial management.*

**Keywords:** Digital Transformation, E-commerce, Bookkeeping Automation, RAD, mobile application

## 1. Introduction

In today's fast-paced and ever-evolving digital landscape, the of e-commerce stands as a prime testament to the transformative power of technology. The rise of e-commerce has not only redefined the way consumers shop but has also restructured the operational paradigms of retailers. One of the pivotal components of this digital metamorphosis is the automation of bookkeeping processes within e-commerce businesses (Azman et. al, 2021). This transformation holds immense significance, as it not only streamlines financial operations but also underpins the agility and competitiveness of e-commerce retailers in an increasingly competitive marketplace.

While the global impact of e-commerce is undeniable, there exists a noticeable gap in e-commerce management from the retailer's viewpoint, particularly in the realm of intelligent transaction

management. Traditionally, bookkeeping and accounting in retail involved labor-intensive manual processes, susceptible to human error (Sheikh et al., 2023). However, the digital age has ushered in a new era of financial management, where e-commerce retailers leverage cutting-edge software solutions to automate bookkeeping functions. This transition not only mitigates the risk of errors but also facilitates real-time access to financial data, providing decision-makers with crucial insights into the business's financial health. In light of these advancements, this paper addresses the vital role of automated bookkeeping in e-commerce and seeks to elucidate the challenges and opportunities it presents.

The subsequent sections of this paper are structured as follows: Section 2 examines constraints related to traditional bookkeeping and provides a comprehensive review of e-commerce and automated bookkeeping. Section 3 elucidates the research methodology, while Section 4 explores into results and discussion. Finally, in Section 5, it encapsulates concluding remarks, offering a comprehensive closure to the paper.




## **2. Literature Review**

Electronic commerce, or e-commerce, is the act of purchasing or reselling goods via the Internet in an electronic setting (Susilo, et. al, 2023). E-commerce makes use of a variety of technologies, including mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Although it may also use other technologies like e-mail, e-commerce normally uses the web for at least a portion of the lifecycle of a transaction. A typical e-commerce transaction entails the purchase of either goods (like books from Amazon) or services. Electronic markets, online auctions, and online shopping are the three subfields of e-commerce. Electronic business is a pillar of e-commerce. E-commerce features include user-friendly design, mobile compatibility, a variety of payment methods, round-the-clock customer care, user reviews, user features, and discounts, as well as in-depth product information (Gupta et. al, 2023).

Specifically, the lack of automated management accounts for sellers used in business transactions to quantify profit, loss, sales, and product inventory (Agarwal, 2023; Ahmadisheykhsarmast, 2023). This can result in inefficient and inaccurate data collection, as well as manual pricing determination. In order to address these gaps, it is important for e-commerce retailers to understand the challenges of manual operations and the potential solutions that can help streamline their operations. One of the main challenges of manual operations is the lack of a unified system for tracking sales and inventory (Dai & Vasarhelyi, 2023). Currently, many e-commerce retailers are forced to manually update their sales and stock levels, which can lead to an unorganized record and potential data loss. Additionally, manual operations can be time-consuming, which can lead to delays in customer service and a decrease in customer satisfaction. In order to address these challenges, e-commerce retailers can implement automated solutions to streamline their operations. Furthermore, automated solutions can help e-commerce retailers accurately determine their pricing strategies and can be used to offer discounts and promotions based on customer purchase history. In addition to automated solutions, e-commerce retailers can also implement process automation to further streamline their operations. Process automation can be used to automate repetitive tasks such as product categorization and pricing updates. This can help reduce the amount of time spent on manual operations and can free up resources for more value-added tasks. Overall, manual operations still pose a challenge for e-commerce retailers. By implementing these solutions, e-commerce retailers can ensure that their operations are running smoothly and efficiently.

Currently, e-commerce retailers utilise the conventional ledger or manual bookkeeping recording system, which could risk the data from getting corrupted and unreliable. In addition, data that is recorded and calculated manually may cause inaccurate inventory and financial control. Furthermore, e-commerce companies offered different programme packages for sellers that necessitated pricing determination based on each programme yet, the pricing determination was done manually by sellers.

Examples of Shopee programme packages based on cashback, shipping, and preferred or non-preferred types are presented in Figures 1a and 1b.

Details	Service Fees*
 RM15 FSP	4%
 10% Cashback	3% 
RM15 FSP + 10% Cashback	6% 

**Figure 1a.** Shopee Programme packages

Seller Type	Before 19 January 2022	19 January 2022 Onwards
Non-Preferred Sellers	-1%	2%
Preferred Sellers	2%	2%

Programme	Before 19 January 2022	19 January 2022 Onwards
RM15 Free Shipping Programme	-4%	5%
RM40 Free Shipping Programme	2%	3%
10% Cashback Programme	3%	3%

**Figure 1b.** Shopee Programme packages

This study explores the field of e-commerce, where the absence of automated management poses significant challenges. In this context, e-commerce relies heavily on various technologies, including mobile commerce, electronic funds transfer and inventory management systems. Manual handling of critical tasks, such as measuring profit, loss, sales, and product inventory, appears as a weakness that needs attention.

Manual operations, especially in tracking sales and inventory using conventional ledger systems, were identified as inefficient, error-prone, and time-consuming. This study underscores the imperative for e-commerce retailers to address these challenges through the implementation of automated solutions. The common use of conventional ledger systems or manual bookkeeping systems in e-commerce is highlighted, emphasizing the risks associated with data corruption and unreliability.

Furthermore, the paper draws attention to manual pricing by sellers, a process complicated by the various program packages offered by e-commerce companies. This manual approach not only introduces errors but also restricts the potential to devise efficient pricing strategies based on various programs, as illustrated in the Shopee program package.

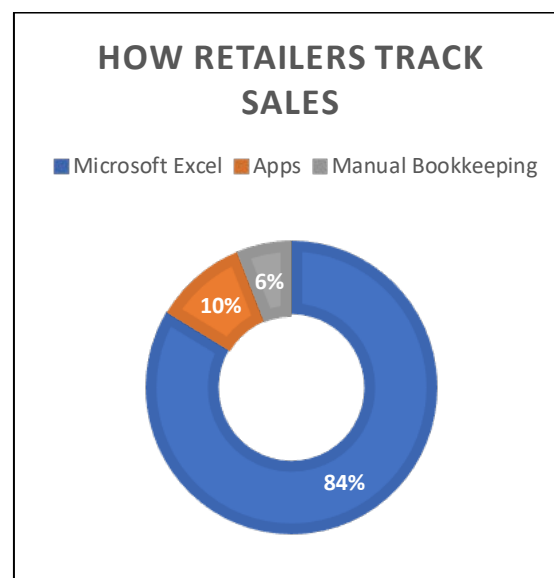
Succinctly, this study supports the shift towards automated solutions and process automation in e-commerce operations. It highlights the limitations posed by manual processes and emphasizes the need to embrace automated management practices in the e-commerce landscape.

### 3. Methodology

The methodology employed in this study comprises a mixed-methods approach, combining quantitative and qualitative elements. Initially, a preliminary investigation using Facebook poll was conducted to quantitatively assess the prevalent methods employed by e-commerce retailers for sales tracking and profit calculation. This survey garnered responses from 49 retailers and was quantitatively analyzed, resulting in Figure 2 visualizing the distribution of methods. Subsequently, qualitative data was extracted from in-depth discussions in the comment sections beneath the Facebook poll. These conversations shed light on the nuanced approaches used by individual retailers. Additionally, an evaluation of existing applications (Table 1) was performed to understand their capabilities and limitations, providing qualitative insights. Overall, the methodology holistically investigates the practices of e-commerce retailers, encompassing both quantitative and qualitative aspects to provide a comprehensive understanding of the subject matter.

#### 3.1. Preliminary investigation

A preliminary inquiry was conducted using a Facebook poll to discover how e-Commerce retailers track sales and compute profit. The poll received responses from 49 retailers. It reveals that 41 retailers use Microsoft Excel to calculate income and retain sales transaction data, while 5 retailers were using apps, and 3 retailers were using manual book records. In summary, manual bookkeeping is still extensively used among e-commerce retailers. The poll's results are displayed in Figure 2.



**Figure 2.** Facebook poll's result on how retailers track sales.

Retailers then go into detail about how they track sales transactions and figure their profits. The conversation that occurred under the poll section comment. It may be inferred from the preliminary investigation that manual transaction recording is commonly employed by e-commerce retailers. The lack of reliability and an automated bookkeeping system for sales and profit recording as well as product price determinations could affect e-commerce retailers.

Several informants provide insights into how they record sales on e-commerce platforms like Shopee or other platforms. Here's a summary of each informant's approach:

Informant A: Informant A isn't very meticulous about recording sales. They prefer to avoid complex calculations, allocate a portion of the money to savings, keep an eye on inventory, and ask others to check each order.

Informant B: Informant B is highly systematic in recording their sales. They combine data from Shopee and create formulas in Excel to summarize all the information they need. They also have formulas for tracking order numbers and detecting issues with orders.

Informant C: Informant C opts for a simple ledger book. They record all income and expenses, including restocking, rent, bills, and personal salary. After paying their salary, they calculate their profit.

Informant D: Informant D mentions being a beginner and using Excel as well as creating their own recording system.

Informant E: Informant E uses Excel to record daily orders and sees it as a way to calculate the net profit from sales on Shopee and other platforms.

In this analysis, it is evident that not all informants portray that they do bookkeeping manually. While some informants employ manual methods such as using a ledger book or being less meticulous in their record-keeping (Informant A and C), others opt for more automated and digital approaches (Informant B and E) using tools like Excel and formulas to track their sales data systematically. Informant D falls into the middle ground, using Excel but also developing their own recording system. However, using Excel for record-keeping is not typically considered an automated or centralized method. Excel is a spreadsheet software that allows users to manually input and manipulate data. It can be a valuable tool for organizing and calculating data, but it lacks the centralized and automated features of more sophisticated accounting or database systems.

### 3.2. Comparative analysis of existing applications

**Table 1. Comparative Analysis of Key Features in Bookkeeping Applications.**

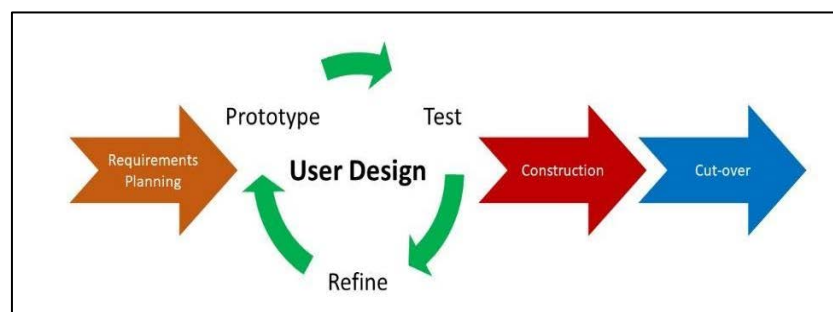
Apps/website	Price Suggestion	Dashboard	Support ecommerce programme	Report Generator	Inventory Control	Security Authentication
ccounting Bookkeeping (Tacktile Systems Private Limited, 2019)	Not available	Not available	Not available	Google Play Store	Available	No OTP
Cash Book (Khatabook Business Apps, 2022)	Not available	Not available	Not available	Google Play Store and Apple App Store	Available	Provide login security with OTP confirmation.
CashBook: Business Ledger Book (CashBook Business App, 2023)	Not available	Not available	Available	Google Play Store	Available	Provide login security with OTP confirmation.

The existing applications discussed in Table 1 are selected based on their ability to handle sales transactions. In a similar vein, all of the applications indicated in Table 1 that are currently available, with the exception of the Accounting Bookkeeping application, offer security measures. Generally, these applications are suitable to keep book sales for general business. Yet, a major shortcoming of the currently available applications is that they do not offer the automatic pricing suggestion that are essential for e-commerce retailers to generate profits based on various types of programme offered by e-commerce companies. Retailers may suffer a loss as a result of a manual pricing projection. The most critical feature lacking in the current applications, based on the comparative analysis characteristics tabulated in Table 1, is the ability to manage businesses according to program categories offered by e-commerce merchants. In light of this, it is suggested that a software or application solution that incorporates the following features:

- a. Providing price selling suggestions for users based on e-commerce program selection.
- b. Implementing dashboard interface.
- c. Offering default settings for platforms like Lazada and Shopee, along with customizable settings for other companies.
- d. Enhancing login security with OTP confirmation.

Therefore, the goal of this paper is to address solutions to the discussed problem through the automate the bookkeeping by developing a mobile application prototype namely ManLedger. ManLedger development's key aims are to 1) manage the stocks and financials of the store automatically; 2) To predict product prices compatible with the selection of an e-Commerce program; and 3) Lastly, to automate the calculation and inventory control of the application. to conclude, the online retailers like Shopee sellers may effortlessly manage all of their profit margins with the help of the Manledger without learning any new skills. The following section goes into greater detail about the method and existing bookkeeping mobile applications.

### 3.3. Rapid Application development (RAD)



**Figure 3.** RAD methodology diagram

Rapid Application Development (RAD) is a popular agile project management strategy in software development. This methodology minimizes the planning stages and will produce a greater efficiency, faster and effective communication. Figure 3 above shows the RAD diagram that was used in this mobile application development. Each phase was described as follows:

#### 3.3.1 Requirement planning

In this process, the e-commerce retailers, who are our users, were probed about the features they would like to see in the application as well as what they would expect to see as output from it. A general review of the project was then carried out to evaluate the amount of time and resources needed for the development process. Furthermore, the software and hardware requirements were also detailed out as follows:



a) Software:

- Android Studio version Bumblebee 2021.1.1.
- Firebase Cloud Firestore 24.2.0 database
- The Android phone emulator BlueStacks 5
- The Google Play Store
- Google meet

b) Hardware: An Android phone will be used to do compatibility testing for this application. Other than that, the PC was used for all the development processes.

In addition to the functionality requirement listed above, the non-functional requirements were also figured out to support performance and reliability of the application. In general, this application will be operated 24/7, apart from that the system should be able to load below 5 seconds and lastly, the system would provide OTP phone number confirmation.

Non-functional criteria were also created to support the application's dependability and performance. Typically, this application will be accessible around-the-clock. The system should be able to load in less than 5 seconds, aside from that. The technology would also give OTP phone number validation as a last step.

### **3.3.2 User Design**

For the purpose of collecting user requirements a Shopee seller was chosen as our client (Sin Boon Kee (M) Sdn. Bhd.). The user design will be developed through numerous prototype iterations once the project's scope has been determined.

This is the RAD methodology's core component and what distinguishes it from other project management approaches. Clients and developers collaborate closely throughout this stage to make sure that their needs are satisfied at every stage of the design process. The users can evaluate each product prototype at each level to make sure it matches their expectations, almost like custom software development.

Through an iterative process, all the bugs and glitches are sorted out. A prototype is created by the developer, the customer (user) tries it, and then both parties discuss what worked and what didn't.

### **3.3.3 Construction**

Developers may build the final functioning model more quickly than they might by using a conventional project management methodology because the majority of the issues and adjustments were handled during the rigorous iterative design process. The phase is divided into numerous more concise steps:

1. Getting ready for rapid construction
2. Development of program and applications
3. Unit, integration, and system testing

During this phase, the software development team, which consists of programmers, coders, testers, and developers, collaborates to ensure that everything is running flawlessly, and that the final product meets the goals and expectations of the users.

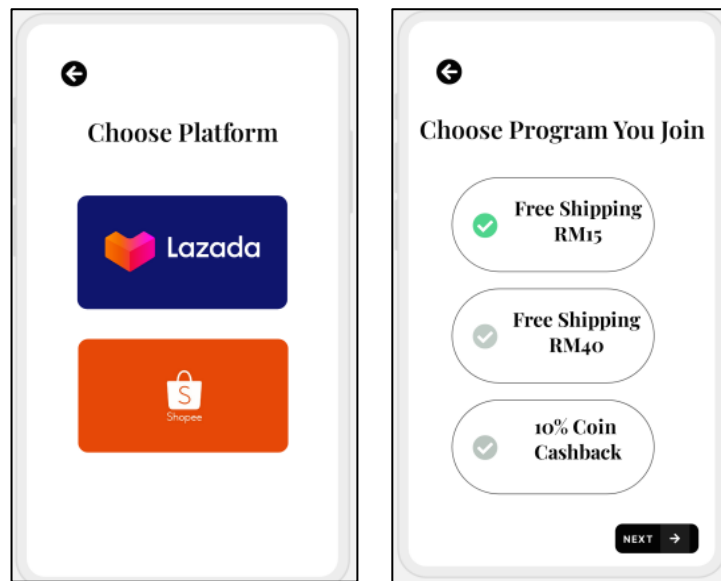
During this third step, which is vital, the client is still able to offer their input. In order to deal with problems as they develop, they can recommend enhancements, modifications, or even entirely new ideas.

### **3.3.4 Cut over**

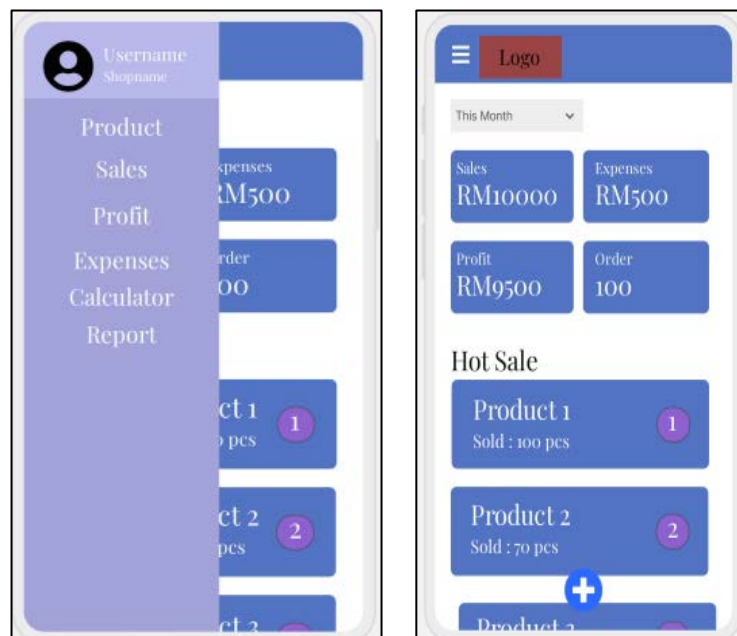
The finished product is launched during this phase of execution. While the coders and customers continue to scan the system for problems, all final adjustments are done. If there was problem in the testing, the teams will require return to construction phase for checking and solve the identified problems. Lastly, the systems will publish in Google Play Store after all the system completed.

#### 4. Result and Discussion

The result of the Manledger's mobile application prototype development was illustrated in Figure 4 - 10.

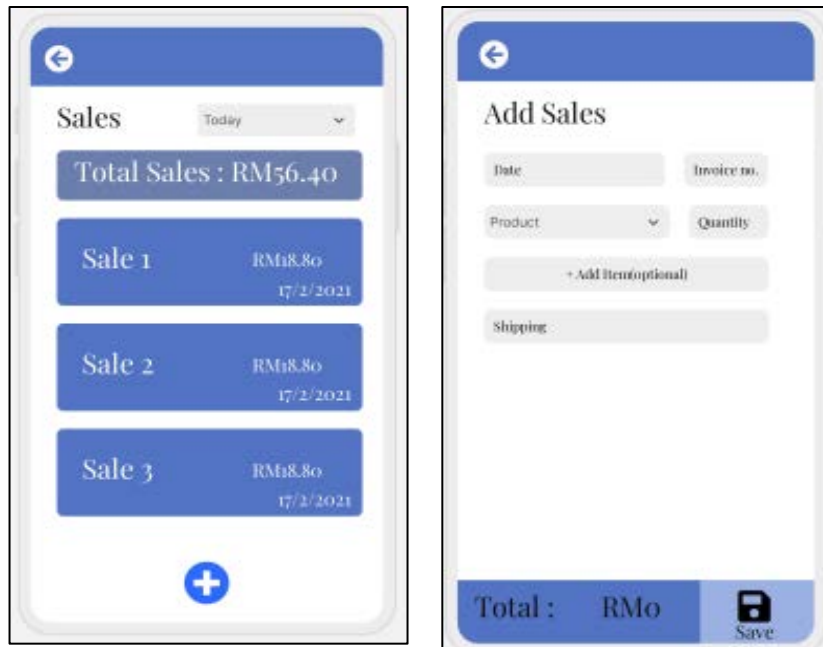


**Figure 4.** Registration Page based on seller program.



**Figure 5.** Sales Dashboard





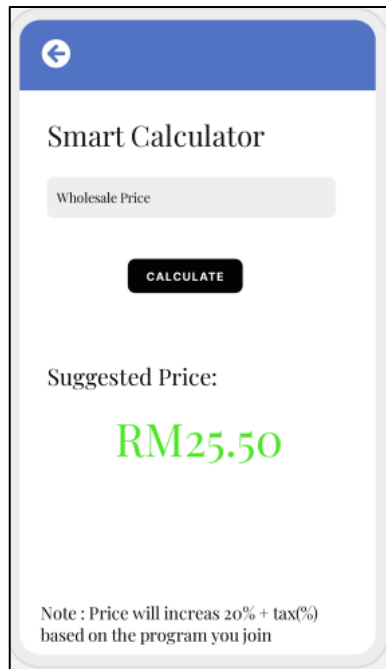
**Figure 6.** automated bookkeeping function

Sales Information		
Date : 17/2/2022      Invoice : 17220221		
Item	Qty	Price(RM)
Green Tea	2	20
Red Tea	2	20
		40
Service Fee(-)		1.20
Transaction Fee(-)		0.43
Commision Fee(-)		0.43
Sales Profit		5
Total : RM18.80		

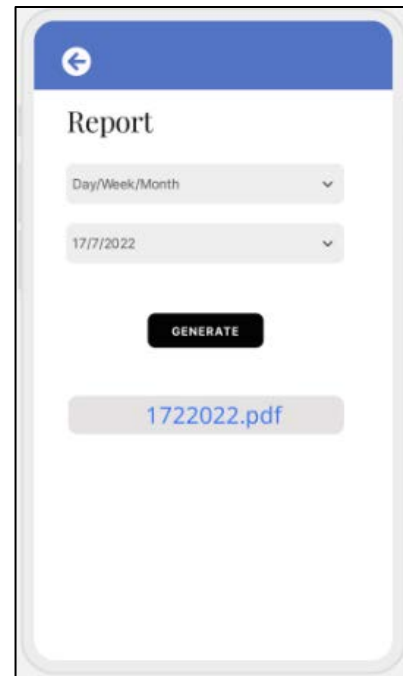
**Figure 7.** Sales Information page

Profit	
Today	
Total Sales : RM17.00	
Sale 1	RM5 17/2/2021
Sale 2	RM2 17/2/2021
Sale 3	RM10 17/2/2021

**Figure 8.** Automated profit calculation function



**Figure 9.** Smart Calculator for Price Suggestion



**Figure 10.** Report Generator.

The results of the development of Manledger, an automated bookkeeping prototype designed to digitize e-commerce bookkeeping, are presented through Figures 4 to 10. Figure 4 illustrates the Registration Page tailored for sellers based on their chosen e-commerce program. This feature streamlines the onboarding process and sets the stage for program-specific functionalities within Manledger, emphasizing the role of automation in simplifying initial setup.

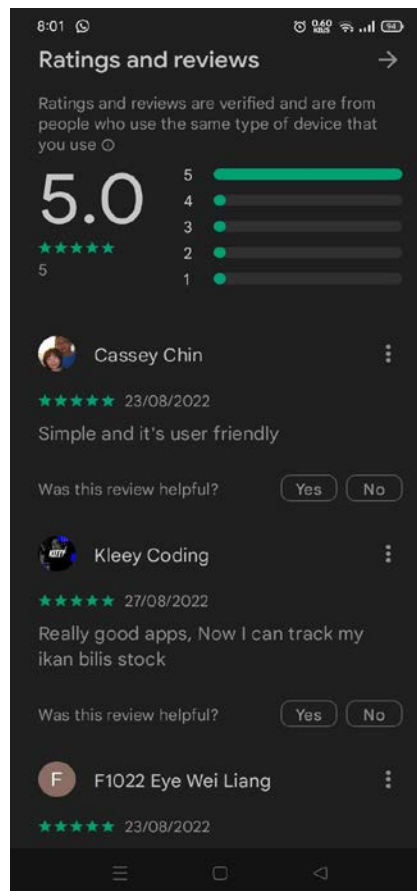
Figure 5 introduces the Sales Dashboard, a central hub for e-commerce retailers to monitor their sales performance. This dashboard, as a cornerstone of the prototype, automates the tracking of key metrics, including sales revenue, order status, and product trends. This real-time visibility aids sellers in making informed decisions promptly, underscoring the value of digitalization in enhancing operational efficiency. Figure 6 exemplifies the Automated Bookkeeping Function, this function eliminates manual data entry, minimizing errors, and ensuring accurate financial records. It epitomizes the automation potential of the prototype, addressing the central theme of bookkeeping automation.

Figure 7 unveils the Sales Information page, allowing for detailed insights into individual sales transactions. Automated tracking of order history, customer details, and product performance within this feature further emphasizes the prototype's capacity to streamline data management, reducing the manual workload on e-commerce retailers. Figure 8 presents the Automated Profit Calculation Function, a crucial feature in the digitization of e-commerce bookkeeping. It automates profit calculations by factoring in various financial aspects, contributing to precise financial insights. The automation of profit calculation aligns with the prototype's core objective of simplifying financial management.

Figure 9 showcases the Smart Calculator for Price Suggestion. It leverages e-commerce program data to assist sellers in setting competitive and profitable prices, highlighting how automation can enhance pricing strategies. Lastly, Figure 10 shows the Report Generator, a feature designed to automate report generation for e-commerce retailers. This capability empowers sellers with comprehensive reports and visualizations, streamlining the decision-making process by providing actionable insights derived from data analysis.

## 5. Conclusion and Recommendations

Although the e-commerce platform appeared to be fully automated, the sellers still needed to undertake some manual work in order to manage records of sales, inventory, and compute profitability. Therefore, automated systems should completely replace all human transaction recording. In light of this, Manledger, a mobile application, was developed to help e-commerce retailers better and more easily run their stores. They also have access to the data on sales, expenses, and profits whenever and wherever they want. The main benefit of Manledger is that it offers a dashboard that includes sales and inventory records broken down by daily, weekly, monthly, and yearly intervals. Moreover, it facilitates sellers in forecasting and defining product prices based on the seller's programme. The application was published in the Google Play Store and has proven to help e-commerce sellers. Some users have given positive feedback after using Manledger. See Figure 11.



**Figure 11.** Reviews from Users.

While this paper has offered valuable insights into the adoption of automated bookkeeping systems and the development of mobile applications for e-commerce businesses, there exists a multitude of promising avenues for future research to explore and expand upon these concepts. Firstly, researchers should consider conducting in-depth assessments of the long-term impact of adopting automated bookkeeping systems on e-commerce businesses. Investigating how such systems influence financial stability, growth, and sustainability over extended periods could provide valuable insights into their enduring benefits. Secondly, comparative studies could illuminate the effectiveness of diverse automated bookkeeping systems and mobile applications in various e-commerce environments. Analyzing their performance, user-friendliness, and adaptability across different platforms and business sizes would yield essential comparative data.

Moreover, as advanced technologies like artificial intelligence and blockchain continue to evolve, future research endeavors should delve into their integration with e-commerce bookkeeping systems. Assessing how AI and blockchain can further enhance automation and bolster security within financial management processes presents a compelling area of study.

Given the sensitivity of financial data in e-commerce, it is also imperative that researchers focus on cybersecurity and data privacy aspects in subsequent studies. Investigating the robustness of automated systems in safeguarding financial information and ensuring compliance with stringent data protection regulations is essential. Finally, acknowledging the significance of user experience and the potential barriers to the adoption of automated systems and mobile applications in e-commerce, future research could delve into user satisfaction, resistance to change, and strategies to effectively overcome adoption challenges. Collectively, these future research directions hold the promise of advancing our comprehension of the ever-evolving landscape of e-commerce financial management while contributing to the development of innovative solutions that benefit businesses and consumers alike.

## References

- Ahmadisheykhsarmast, S., Aminbakhsh, S., Sonmez, R., & Uysal, F. (2023). A transformative solution for construction safety: Blockchain-based system for accident information management. *Journal of Industrial Information Integration*, 35, 100491.
- Azman, N. A., Mohamed, A., & Jamil, A. M. (2021). Artificial intelligence in automated bookkeeping: a value-added function for small and medium enterprises. *JOIV: International Journal on Informatics Visualization*, 5(3), 224-230.
- CashBook, Business Apps, (2023), CashBook: Business Ledger Book, <https://play.google.com/store/apps/details?id=com.cashbooknew&hl=en&gl=US>
- Dai, J., & Vasarhelyi, M. A. (2023). Management Accounting 4.0: The Future of Management Accounting. *Journal of Emerging Technologies in Accounting*, 20(1), 1-13.
- Gupta, S., Kushwaha, P. S., Badhera, U., Chatterjee, P., & Gonzalez, E. D. S. (2023). Identification of Benefits, Challenges, and Pathways in E-commerce Industries: An integrated two-phase decision-making model. *Sustainable Operations and Computers*.
- Khatabook Business Apps, (2022), Cash Book: Sales & Expense App, 3.3.0,
- Martin, J. (1991). *Rapid application development*. Macmillan Publishing Co., Inc.
- Sheikh, M. A., Faraz, M., Shamsi, A. F., & Abbas, Q. (2023). Manual Timekeeping and Compliance in Pakistan's Textile Export Industry: A Possible Threat Needs to Be Addressed. *KASBIT Business Journal*, 16(3), 1-26.
- Susilo, B., Kusuma, G. H., Fikri, M. H., Saputri, R., Putri, R. A., Rohimah, S., & Hamzah, M. L. (2023). Rancang Bangun Sistem Informasi Keuangan Pada Kantor Lurah Kotabaru Reteh Dengan Metode Rapid Application Development (RAD). *Jurnal Testing Dan Implementasi Sistem Informasi*, 1(1), 17-28.
- M. Agarwal. (2023). "Identification of Benefits, Challenges, and Pathways in E-commerce Industries: An integrated two-phase decision-making model." *Sustainable Operations and Computers*
- Tacktile Systems Private Limited, 2019, Accounting Bookkeeping - Invoice Expense Inventory for Android, 1.30.