

Web-based Stocktaking application in Businesses

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Abstract

As the impact of the technology hits towards the business's aspect into digitalized, its direct things easily and manageable which it able to reduce the workload. The purpose of this report was to do research and develop a web-based application on business stock checking where workers able to track their quantity of their stock from running out of stock as well as to track the business statistic. This application was followed SDLC model to develop while Vue 2 framework, Java script language, html 5, and tailwind CSS to code the web-based application. In this study, a database was developed for shopkeeper to store all the data related to the shop on cloud-based that able to prevent from disaster or human errors. Furthermore, a web-based system was developed to perform stock checking and monitoring which allow shopkeeper to check on statistic of the product and also the notify shopkeeper which stock are running low. In addition, a softcopy receipt was implemented as a default for customer instant of hardcopy where customer tossed the receipt, and hardcopy receipt are not recyclable due to some chemical substance. The contribution of the web-based application where shopkeeper able to keep track on their business status, preventing product from lacking stock, as well as to reduce the usage of paper.

Keywords: Stocktaking; Web-based application; E-Receipt

1. Introduction

Technology has changed the way how we complete a certain task. Interacting with technology improves the effectiveness and efficiency of the workload, as the world is moving toward industry 4.0 technology many sectors are relied [1]. Because of the increase of innovation coming from different platforms and providers making all this possible. Businesses either big business or startup business needs technology to carry on the task. While in this research it studies and develop a web-based stock checking system that will bring an innovative way for shopkeepers, or the owners use to check their stock in the store. The importance of checking the stock was to meet the supply of the product and the demand of the customer. From here the term supply pertains to how much the producers of a product or service are willing to produce and can provide to the market with the limited number of resources available [2]. Whereas term demand is how much of that product or service the buyers desire to have from the market [2]. The other importance of checking the stock was to prevent losses or stealing of

stock that might lead to the loss of business assets. Checking the stock able to prevent overstocking as well.

Stocktaking in a more understandable way is known as stock counting, basically stocktaking in the count and check all the stock shopkeeper or the owner of the shop had purchases and the total amount they sell the goods and the amount they earn [3]. Businesses who did not do frequently on their stock will be having a lot of issues like loss of stocks, issue of financial, etc. hence stocktaking plays an important role in businesses as it brings a lot of benefits towards the business growth and prevents unwanted problems like over-stocking, able to identify damaged goods, easy to track from theft.

Back in those days when technology was not that advanced, checking stock was a troublesome task for business owners or shopkeepers where they have to count one by one and record it down in a record book. Slowly the apperency of the computer was out shopkeeper or owner of the shop type out all goods information one by one and the quantity of it. Once the goods have been sold out, they have to when back to the

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computer and make the changes to it. After when the system application and barcode were introduced, everything changed toward a more convenient on finishing the task. The first barcode was designed to encode the product information into bars to quickly identify that product it is an identity for the product after the barcode has been introduced all the product packaging will be labeled with a barcode and it became the identity of the product itself. Ever wonder why barcodes need to be designed that way example Fig. 1 shows the representation of numbers, thus it combined the number and convert it into the barcode and that's how the barcode was designed. While it also has its own sequence of combining the barcode which comprises of the quiet zone, number system digit, manufacture code, product code, and check digit. Each of the components plays an important role [4].

Barcodes separate into two different dimensional which is the one dimensional (1D) and two-dimensional (2D). In barcode one dimensional (1D) is in a systematic manner represents data by varying the width and spacing of parallel lines such as universal product code, European article number, code 39, code 128, Codabar, etc. [5]. On the other hand, a two-dimensional barcode (2D) represents data using two-dimensional symbols and shapes such as the QR code, Data Matrix code, etc. [5].

The motivation of this study is in businesses like Retail business selling products most of the shopkeepers or owners of the business will set up or purchase a set of expensive software and hardware who are also known as POS system for them to work which bring a lot of benefits to the shopkeeper and for the customer. While to have this setup it needs a large amount of cost, constantly upgrades and updates of the system are needed, costly hardware, etc. Some start-up businesses, can't effort a big amount of expense on those systems [6]. Hence, it's hard for startup businesses or small businesses to track the quantity of the goods they have and because of that, they are unable to trace the supply and demands to cater to their customer as tracing the business statics is very important to avoid issues like over-stocking. Studies show that lot of the small business fails is because lack of capital, lack of technology, lack of financial planning, etc. [6]. Hence this study aimed to develop a web-based application that able to work on multiple devices as it is a web-based application to help businesses track the quantity of goods in the shops to cater the supply and demands of customer as well as to track their business status.

2. Methods

This application was followed SDLC model to develop while Vue 2 framework, Java script language, html 5, and tailwind CSS to code the web-based application. In this web-based application the database will be using google Firebase as the main database as a JSON database. Every user has its dedicated data to manage and do changes to it as they have no access to the data. Once the user was created the application will straight created few subcollection into the database with some example data. The sub-collection consists of account, categories, restock, sales, and products.

Shopkeepers first, can add all the information regarding the product so that the system has a record of this product for future use. Fig. 1 shows the flowchart of shopkeeper adding products. As the shopkeeper adds the product to the system shopkeeper can check on the quantity left for the product. If the quantity of the product is left to a certain amount the system will notify the shopkeeper that this product only left a few quantities. This system is also able to provide shopkeepers to keep track of their business status as well.

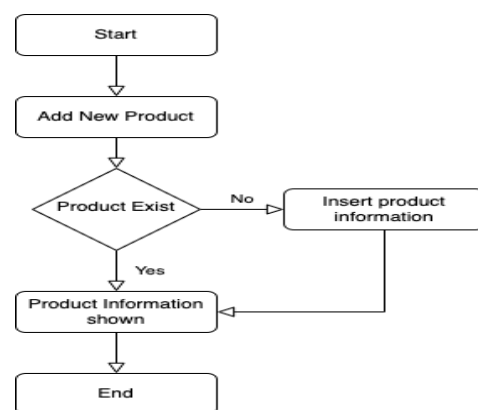


Fig. 1: Shopkeeper Add Product

The system provides shopkeepers to do cashier features like calculating the total amount of customer baskets and generating receipts for the customer. Fig. 2 shows that the flowchart of cashier. First the shopkeeper scan customer QR and the system would show the list of the customer shopping cart, follow by customer make payment if checkout denied it will straight end the process, if the check-out completed it will generate receipts and send the receipt to customer email if the customer provides an email address and the process end. Fig. 3 is the flowchart of shopkeeper do restock on their product. Where this feature was to provide shopkeeper to have an easy way to restock the stock instant of find the stock from the stock list and make edit on it. Hence,

it runs with shopkeeper scan product barcode and the application will search for the product, if no product found shopkeeper must scan again, if the product found all the information regarding to the product will be listed out. after that shopkeeper fill up the details and application will update the database. If the update not success it will back to the input restock details, if the update success the process will end here and the database will be updated.

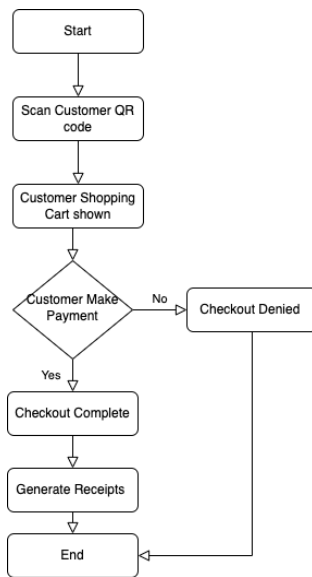


Fig. 2: Shopkeeper Cashier Flowchart

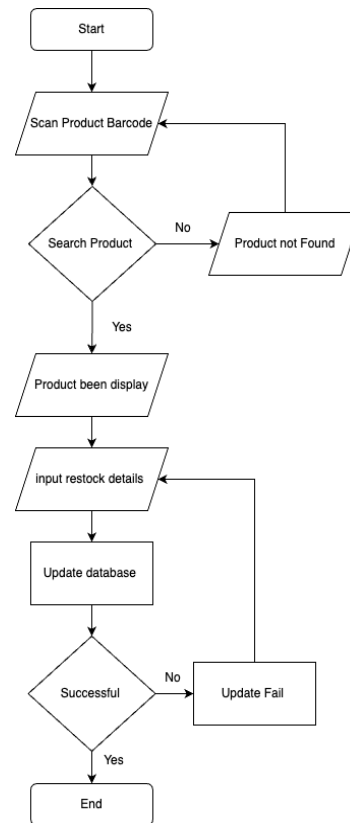


Fig. 3: Restock

The flowchart of Statistic is where the application generates a T-account for shopkeeper. As shown in Fig. 4, the first the application required shopkeeper to input the range of start date and end data to get data from the range and make calculation. Once the input is done all the details will be shown. There is a field that allow shopkeeper to insert other expenses during that period of time, if there are no expenses during the period of time the application will lead to the next process. At the following process is the whole t-account record saved to the database and a excel file is generate download form the page. The whole system will end once the record is saved and excel file are generated and downloaded to shopkeeper devices.

The customer can scan the product and the customer can get all the information regarding the product. Customers can add the product to the system cart once the customer is done with his or her shopping to checkout customer only need to show the generated QR by the system to the shopkeeper to scan and make payment as shown in Fig. 5.

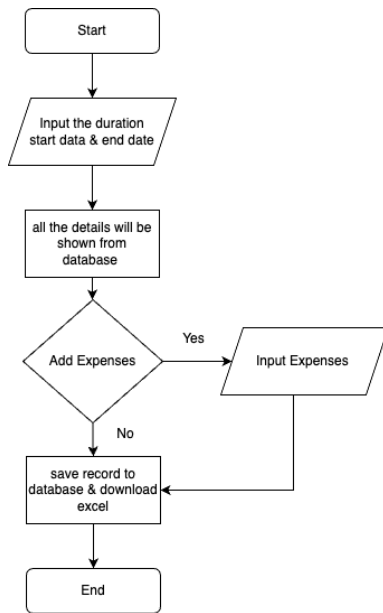


Fig. 4: Statistic

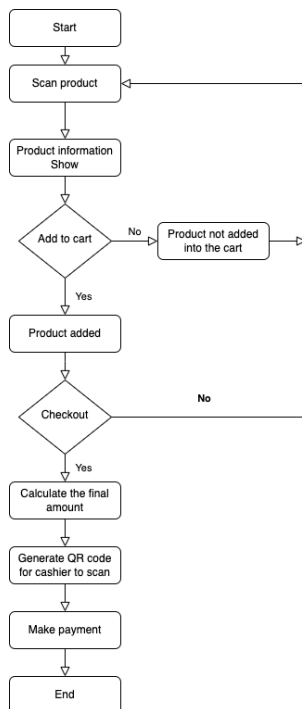


Fig. 5: Customer Flowchart

3. Results and Discussion

Inside the web-based application it came along with multiple features which make the whole application able to bring lots of benefits towards shopkeeper. Will be

using the UI and describe more towards the application features. Fig. 6 is the main dashboard that shopkeeper will first view after signing in the application. In dashboard page, basically it separates into 4 row that shows everything regarding the business information all will be shown in a summary way. On the first row, there will be a summary of the shop name, shopkeeper while it can be change at the account page and it also have a “sale of the day” which it shows the total of sales that earn on that particular day. Shopkeeper able to download the list of the sales into excel files and the files will be name exactly the date as a record for future use on calculating the account. On the second row is the list of the products that shopkeeper added into the application. to add a product shopkeeper will need to go to the add product page. After the shopkeeper added the product into the application, all the products will be shown in the list. There is also a category list which help shopkeeper on quick filter on the list to search for the products. As product more and more added into the application this category list will be a good feature for shopkeeper. On the third row is the list of the sales of paid and unpaid, while on the right side is the chart to view the sales statistic from which date to which date and the application will generate into a bar-chart for shopkeeper to view and do compare.

Last row, which is a QR code been generated, and it is for the customer enter to the shop to do scanning of the product in the shop do shopping as well as to make payment through it. This generated QR code contain a link for customer to scan and it direct customer to the page which is the customer page follow by the shop identity key (ID). Fig. 7 is the example of generated QR code.

Fig. 8 shows the User interface of the Add product page, it is a form where shopkeeper required to key in all the details for the particular product include the product name, buying price, selling price, quantity, product image, and the barcode of the product. Application will provide a button for shopkeeper to use device camera to scan the product and the barcode will be shown on the form, Fig. 9 is the example of the camera scanning the product barcode and the result. Once all the fields were filled with the details, shopkeeper click on the submit button and the product will be added.

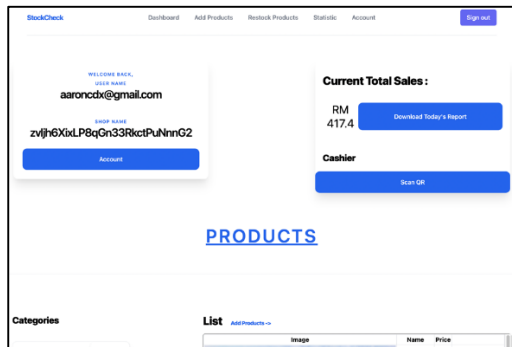


Fig. 6: Dashboard of the Stock-Checking application

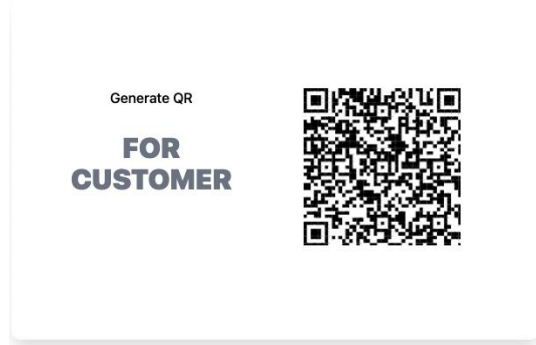


Fig. 7: Example of Generated QR Code

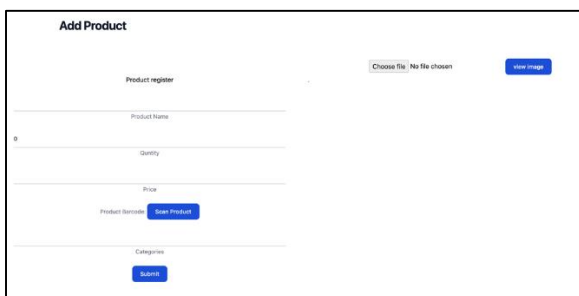


Fig. 8: Add Product Page

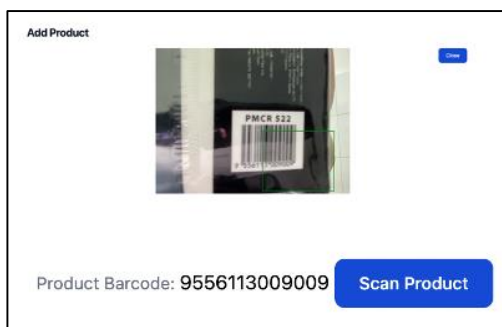


Fig. 9: Example of the Scanning process and the result
The restock page is when a particular product running out of quantity shopkeeper went. In this page shopkeeper just need to scan the product using the

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device camera and all the details regarding to the product pops up. This feature was to allow shopkeeper to have an easier way to update the stock quantity rather than find the particular product from the product list and made changes on to it. By using this features shopkeeper straight away can just update the quantity as well as all the restock data will be storage in a separate collection in database follow by all the details like buying price of the product. Hence, for the application to calculate the T account is more accurate as it sums up all the buying price onto the credit side. Fig. 10 example of the restock page user interface.

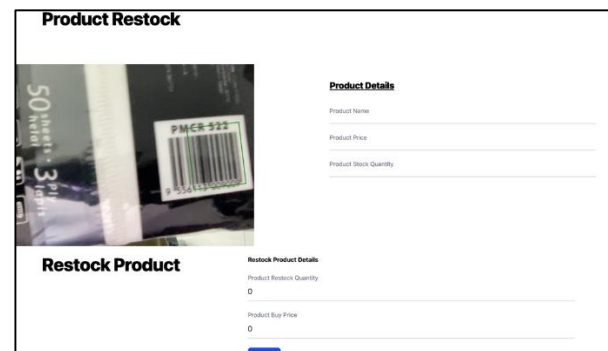


Fig. 10: Example of Restock Page UI

In this application, it allows shopkeeper to make fully customizable towards shopkeeper data. Hence product details page is where to do some little changes on the product details. Application allows it to delete the product as well. While below it shows the number of quantities that sell and the number of visit that this product has in the current month. Once the customer takes the product scan and view the details it increases the visit number, as for the number of quantity sell is where the product been sold by customer it increases. There are two empty charts are ready with the start date and end date field for shopkeeper to track on the particular product from time to time. With this statistic features allow shopkeeper to make decision on the number of bringing the product should increase or to decrease. Fig. 11 shows the example result of the bar chart statistic for few months generate by the application.

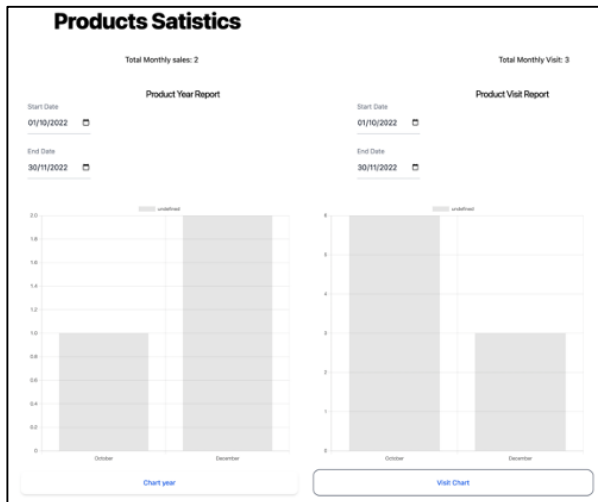


Fig. 11: Example of generated Bar Chart Statistic

Stock Checking web-based Application it allows customer to interact with the application as well. As mentioned, shopkeeper dashboard has generated an QR code for customer to scan and enter to their shop to do shopping. Fig. 12 is the first view where customer enter, this is where customer has option to key in their email address or continue as guest. Customer who keys in their email address able to get an email receipt. After selecting the option, customer can do scanning on the product to view all the details regarding the product specially to look at the price for the product. It will pop out a data-toggle model to show all the product details as shown in Fig. 13.

The figure shows a customer page UI. It has a "WELCOME," message and a prompt "key in your email for receipt". Below this is an "E-mail:" field with the text "example@email.com". There are two buttons: "Continue" and "Continue As Guest".

Fig. 12: Customer page UI

The figure shows an "Item Info" data-toggle model. It displays the following information: "Barcode number : 9551008331081", "Product name : Medicos mask", "Price : RM 34.60", and "Product categories : medicine". At the bottom, there are two buttons: "Cancel" and "Add to cart".

Fig. 7: Example of Product Details Data-Toggle

Customer are allowed to add the product to the shopping-cart list and will be shown in Fig. 14. After done shopping, customer can click on the "checkout" button and the application will summarize the shopping cart and continue to make payment. While in payment, customer have 3 option to make the payment which is the pay by cash, e-wallet, or online-banking. For cash payment and e-wallet a QR code were generate and customer have to go to the cashier and show the QR code to the shopkeeper to scan. Once the shopkeeper scanned the application will lead the shopkeeper to the cashier page which will be discuss later on. where for online-banking, application will lead customer to another page to do online-banking by Pay-pal as shown in Fig. 15.

The figure shows a shopping cart list. It contains two items: "Medicos mask" at "RM 34.60". Each item has a red "X" button next to it. At the bottom, there are two buttons: "Add product" and "Check Out".

Fig. 14: Example of the Shopping-Cart List

Fig. 15: Example of Online-Banking Payment

Customer who wants to pay by cash or e-wallet they are required to provide the QR code to the shopkeeper to scan. As for the shopkeeper, the button to scan the QR code is located at the dashboard. Once shopkeeper click on the “scan QR” it opens the device camera to scan customer QR code and the application redirect the page to the cashier page as shown in Fig. 16.

Fig. 16: Cashier Page UI

Once all the payment has made and the transaction is complete the database will update the status to “paid”. For customer who insert their email address will immediately receive an Email receipt regarding the item that customer has purchased.

4. Conclusion

In this study, a database was developed for shopkeeper to store all the data related to the shop on cloud-based that able to prevent from disaster or human errors. Next, a web-based system was developed to perform stock checking and monitoring which allow shopkeeper to check on statistic of the product and also the notify shopkeeper which stock are running low. The developed system also implemented a softcopy receipt as a default

for customer instant of hardcopy where customer tossed the receipt, and hardcopy receipt are not recyclable due to some chemical substance. The contribution of the web-based application where shopkeeper able to keep track on their business status, preventing product from lacking stock, as well as to reduce the usage of paper. This system is beneficial and able provide an innovative way to interact and bring benefits towards to community.

References

1. Kumar A, Rajagopal H. Automated Seeding and Irrigation System using Arduino. *Journal of Robotics, Networking and Artificial Life*, 2022, 8(4): 259–262.
2. J. Fernando, “Understanding The Law of Supply And Demand,” Investopedia, 08-Feb-2022.
3. G. M. Cidal, Y. A. Cimbek, G. Karahan, O. E. Boler, O. Ozkardesler, and H. Uvet, “A Study On The Development of Semi Automated Warehouse Stock Counting System,” 2019 6th International Conference on Electrical and Electronics Engineering (ICEEE), 2019.
4. Milind Amrutkar, Anup Palsokar, Pankaj Raibagkar, “QR Code Based Stock Management System” (IRJET).
5. R. Focardi, F. L. Luccio, and H. A. Wahsheh, “Security Threats And Solutions For Two-Dimensional Barcodes: A Comparative Study,” *Computer and Network Security Essentials*, pp. 207–219, 2017.
6. Ma’aji, M.M., Abdullah, N.A.H. and Khaw, K.L.H., 2018. Predicting financial distress among SMEs in Malaysia. *European Scientific Journal, ESJ*, 14(7), pp.91-102.

Authors Introduction

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She received her PhD and Master's degree from the Department of Electrical Engineering, University of Malaya, Malaysia in 2021 and 2016, respectively. She received the B.E (Electrical) in 2013. Currently, she is an Assistant Professor in UCSI University, Kuala Lumpur, Malaysia. Her research interest includes image processing, artificial intelligence and machine learning.

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Currently, she is an Associate Professor in UCSI University, Malaysia. She has completed PhD degree in Engineering from Electrical and Computer Engineering (ECE) department at International Islamic University Malaysia (IIUM) in 2016 under Malaysian International Scholarship (MIS). She completed her MSc. at the department of Electrical and Computer Engineering in International Islamic University Malaysia in 2012. She completed her BSc. in Computer Science and Engineering from International Islamic University Chittagong, Bangladesh. Dr. Shayla has awarded a Silver medal for her research work at International Islamic University Malaysia. In consequence, she has also awarded a Young Scientist Award for the contribution of research paper at 2nd International Conference on Green Computing and Engineering Technologies, 2016 (ICGCET'16), Organized by the Department of Energy Technology, Aalborg University, Esbjerg, Denmark. Her current research interests include data communications and networking, computer networks and wireless communication, network mobility in heterogeneous network, computer architecture & cloud computing. She published more than 70 papers in international journals and conferences (WoS/ISI/ESCI and Scopus indexed). She works as a reviewer for many international conferences as well as journals.
