

## **nStock: Notified Stocks Management System for Food and Beverages Industry**

**Azmi Abu Seman<sup>1\*</sup>, Nufael Abdul Wahab<sup>2</sup>, Norfiza Ibrahim<sup>3</sup>, Nadia Abdul Wahab<sup>4</sup>**  
*<sup>1,2,3,4</sup>Kolej Pengajian Perkomputeran, Informatik dan Matematik, Universiti Teknologi MARA, Cawangan Perlis, Kampus Arau, 02600 Arau, Perlis, Malaysia*

*Authors' Email Address: <sup>1</sup>azmi384@uitm.edu.my, <sup>2</sup>2020859414@student.uitm.edu.my, <sup>3</sup>norfiza@uitm.edu.my, <sup>4</sup>nadiawahab@uitm.edu.my*

Received Date: 30 October 2023  
Accepted Date: 22 November 2023  
Revised Date: 29 November 2023  
Published Date: 31 January 2024

\*Corresponding Author

### **ABSTRACT**

*The development of a web-based stock management system aims to provide effective control over sales and stock levels for the food and beverage industry. The web-based application provides a platform for staff members and business proprietors to effectively modify and manage data related to stock and transactions. However, it is apparent that bakery enterprises exhibit a shared approach in their stock management procedures. The baker has a responsibility to manually update the stock availability on the WhatsApp group following each production. In order to maintain continuous production, it is imperative for management to take proactive measures by initiating the procurement of fresh stock from the vendor when the existing stock nears depletion. One potential resolution is the implementation of a streamlined stock management system that effectively addresses the needs of both bakers and managers. The objective of this project is to meet the demand for effective stock management among bakery store owners by offering a user-friendly and dependable system. The nStock system has been intentionally developed with the objective of effectively overseeing the procurement of raw materials from suppliers and accurately tracking the stock allocated for bakery production. The solution aims to employ Telegram bot services as a mechanism for alerting the management in the event that the stock levels fall below the predetermined reorder threshold. The approach employed by the project is in accordance with the Waterfall Model of System Development Life Cycle (SDLC). A functionality test is conducted prior to implementation in order to verify its compliance with the specified design and functional requirements. Notably, each participant provided the system with a "pass" rating, indicating its successful functioning and meeting their expectations.*

**Keywords:** *food and beverages, inventory system, notification, online application, stock management*

### **INTRODUCTION**

The food and beverage (F&B) industry is large, diverse, and encompasses a wide range of specialized equipment. Despite its antiquity, this entity remains at the forefront of innovation. The scope of this sector encompasses beverages, packaged food products, and perishable food items. The sector in question encompasses a wide array of retail establishments, spanning from the sale of food products in grocery stores to the provision of prepared meals in restaurants, institutions, and event venues. The

F&B sector is characterized by its dynamic nature, as it continually adapts to changing consumer preferences and the availability of seasonal produce. Hence, the task of stock and resource planning might pose significant difficulties.

The process of overseeing and sustaining the stock levels of food company products within a commercial environment is accomplished through the utilization of a stock management system specifically designed for the food industry. The processes of procurement, reception, stock management, and distribution encompass the handling of food commodities. Stock refers to the raw commodities and materials utilized by an organization for the purpose of production and sales, encompassing the necessary objects to facilitate all stages of the operational process (Mor et al., 2021).

## **Problem**

The implementation of a stock system plays a crucial role in facilitating a company's everyday operations by ensuring the accuracy of food stock information and facilitating the replenishment process. Company that wants to cut down on food waste and save money on food costs can use the stock management system to digitise purchase data, including as invoices and receipts, to retain accurate stock information, keep track of suppliers and recipes, and facilitate bookkeeping.

Through the observation of three distinct entities, specifically Harold's Bread, Maistall, and the school canteen, it becomes apparent that these organizations exhibit a shared practice in their respective production and stock management procedures. The staff members utilize a WhatsApp group as a means of transmitting production data, wherein they manually document the details of F&B production on a daily basis. This manual recording process is susceptible to potential inaccuracies or mistakes, which may arise due to individual manager preferences. Furthermore, the process of updating F&B stock is performed manually within the time frame of 7:00pm to 8:00pm, which results in a time-intensive and potentially imprecise approach to stock management. Finally, the process of updating daily sales involves the utilization of both a physical sales book and a corresponding WhatsApp group, resulting in a duplication of effort.

Consequently, it is possible that the personnel may have inaccurately recorded the production figures for the given day. Sales are contingent upon the level of food production; in the event that food production falls below the norm, a corresponding decline in sales may be observed. If food production exceeds the typical amount, it may result in wastage and losses. According to Ariesta et al. (2020), the current stock management system employed by the store relies on manual processes for recording incoming items, stock levels, and outgoing goods. This manual approach poses challenges in accurately recording goods and increases the likelihood of errors in generating reports. The stock management system allows for access by the manager to update the daily production. The process of food preparation is facilitated for staff members when they are able to log into the system without having to wait for any instructions or information from the manager. In order to address this issue, a stock system called nStock has been developed to effectively manage and track the availability of food items. According to Misahuman et al. (2021), there is a greater level of convenience for personnel and managers in terms of accessing information regarding stock availability. Additionally, the system possesses a functionality that enables the updating of sales reports without necessitating updates on the WhatsApp group.

## **Objective**

The primary aims of this project are to create a web-based stock management system specifically designed for the F&B industry, and to incorporate notification functionalities into the system. In order to assess the efficacy of the nStock system, a functionality has been conducted.

## Related Works

Stocks encompass both the essential inputs required for production and the final goods that are made available for purchase. Stock turnover is a crucial factor in creating revenue and, subsequently, profits for a firm's shareholders, making it a highly valuable asset for a corporation. The three classifications of stock are raw materials, work-in-progress, and finished goods.

The necessity for stock arises due to factors such as unpredictability, geographic disparities, and commercial concerns. Insufficient stock is a risk to business owners as it may result in occasional failure to meet client demands for goods or services. According to Pujawan and Mahendrawati (2010), the decision to retain stock is based on the condition that the projected profit of an item surpasses its acquisition cost.

The quantity of stock inside the supply chain significantly influences a company's profitability. The stock of numerous businesses constitutes over 25% of their total asset values. Stock management is an integral component of supply chain management. Frye (2022) posits that stock comprises constituent elements, including finished commodities and raw resources, which are either sold or employed in the production process. Accountants utilize stock level data to accurately document values on the balance sheet (Singh, 2022).

The subsequent sections present a comprehensive examination of extant scholarly investigations and operational frameworks pertaining to stock management within the F&B sector. Each of the case study was summarised with some context for the project, the strengths and weaknesses of those systems in addressing the challenges faced by the F&B industry.

## Mobile Based Inventory Management System with QR Code

This system manages the stock information of a complex system comprising diverse agents and elements, with the objective of creating an inventory. The primary objective of said system is to safeguard the progress of multiple enterprises' inventory management systems through the implementation of a dual login authentication system. The system predominantly utilizes Quick Response (QR) codes for the purpose of data storage and the monitoring of diverse actions. The primary goal is to maintain a precise documentation system that monitors and records the activities of all employees inside an organization (Kar et al., 2022).

The system comprises an Inventory page that retrieves item details from the database through an API request and displays the most up-to-date information. Any modifications made to the inventory by any employee are instantly and accurately updated in real time. Every individual item possesses a delete option that can be utilized for its removal. Kar et al. (2022) stated that employees are only permitted to modify the details of the item. According to the findings depicted in Figure 1, the act of scanning a QR code results in the addition of an item that corresponds to the scanned item ID. The item ID is verified against the specified constraints to ensure its compliance as the primary key in the database. To mitigate the risk of inaccurate data, a warning message is implemented to alert users when the scanned Item ID is associated with multiple items, indicating that the item ID already exists in the system (Kar et al., 2022). The system displays latest information about the item availability, but the employee had to check it regularly without receiving any notification when the item reaches the restock value.

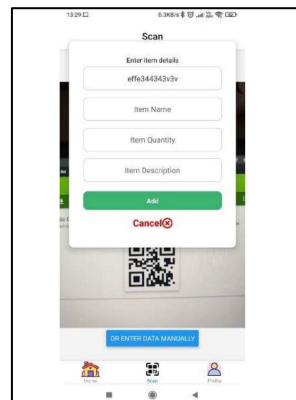


Figure 1: QR Scanning for Adding New Item

### Web Based Inventory System in Antariksa Stores

The web-based inventory information system of Antariksa Stores has been developed and implemented as a website platform, facilitating convenient access for users. In order to effectively handle the receipt of supplies, inventory management, and distribution of outbound supplies at the Antariksa Store, it is recommended to utilize the web-based inventory information system website. According to Ariesta et al. (2020), the website has the capability to provide the owner with information regarding the quantity of products being received and dispatched.

The available data pertains to the stored incoming items. The information system application is designed to receive and process incoming item data based on user input. Incoming item data encompasses various forms of information, including data pertaining to purchases, data related to items, and the numerical count of objects. The database will be utilized to document the incoming item information.

The data pertaining to stock items present in the system, as depicted in Figure 2, represents the information derived from the data items that have been stored by the user. The authors give the information in the form of item data, including the corresponding stock quantities.

Kode Barang	Nama Barang	Harga	Kategori	Merk	Ukuran	Satuan	Stok	Gudang	
BA00001	BMB DA 2000 PRO	2300000	Karaoke Amplifier	BMB	7.5mm	Meter	6	Jakarta	 
BA00003	JS 818	185000	Bracket	JEFFERSOUND	2000gr	Buah	6	Jakarta	 
BA00007	MG 12 XU	4000000	Mixer	YAMAHA	7.5kg	Buah	3	Jakarta	 
BA00020	JBL RMA 330	10800000	Karaoke Amplifier	JBL	2000gr	Buah	3	Jakarta	 
BA00021	JBL RM 10	5500000	Aktif Speaker	JBL	1000gr	Pair	2	Jakarta	 

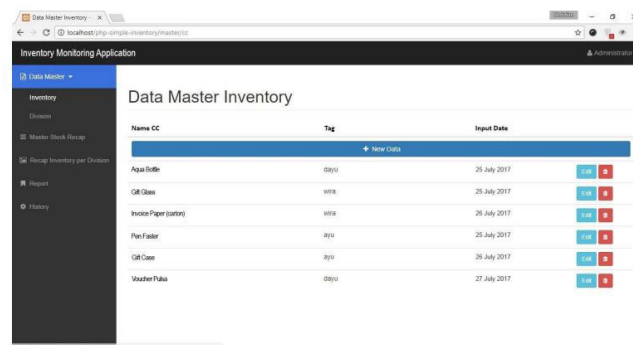
Figure 2: Input from Stock Items

The webpage that presents details regarding stored outgoing items indicates that the data items produced by this information system application are stored. The dataset pertaining to released items encompasses information regarding sales, items, and the quantity of products and the database will store newly generated data items. The system is very good in updating the incoming and outgoing item, display the latest item quantity, but lack in notifying the employee when the item is nearly approaching out of stock status.

## Web Based Online Inventory Information System

Humans invented the web-based online inventory system in an effort to create a tool that would benefit businesses. It can be applied to business, industrial, or corporate settings. The company's best partner in achieving its purpose is still its web-based online inventory system. As a result, the costs and energy were decreased (Soegoto & Palalungan, 2020).

Based on Figure 3, a Data Master option will be available once the user logs in and is helpful for keeping track of the inventory. The following menus will use all inventory and division information that was entered into this menu. The user will be able to use other work functions once they successfully entered the menu (Soegoto & Palalungan, 2020).



Name CC	Tag	Input Date		
Aqua Bottle	0800	26 July 2017	New Data	Delete
Gil Case	W83	26 July 2017	New Data	Delete
Invoice Paper (carton)	W83	26 July 2017	New Data	Delete
Pin Folder	W80	26 July 2017	New Data	Delete
Gil Case	W80	26 July 2017	New Data	Delete
Washer Pulas	0800	27 July 2017	New Data	Delete

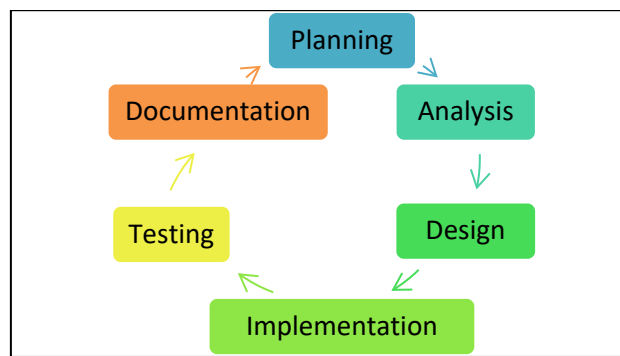
Figure 3: Data Master

Besides that, the page called Recapitulation Stock Inventory will displays all of the inventory that has been entered into the master data. For newly registered inventory, there is no initial stock. It will nonetheless keep getting updated in the "Receive Goods" tab. The number of items in the inventory is promptly updated by any recorded revenue information. In addition to entering the receipt, the user can enter the quantity of merchandise delivered to other divisions in this menu. The Details menu contains a record of the receiving and sending data (Soegoto & Palalungan, 2020).

The inventory report however contains the notes and this menu are separated by division. A thorough inventory of each inventory is kept by each division. If there is inventory sending in the previous menu, the data will rise. Recapitulation Stock in Distribution page indicates the quantity of data will be significant after a specific amount of time if this application has been used. The Division's inventory income recap reports are available to users. All data will be displayed in sequence if the user wants to view it in a more thorough format to more clearly observe how the stock has moved. The system user interfaces are very friendly and easy to use, but the employee does not know the stock balance quickly without the notification to their mobile devices in real time about the stock availability.

## Project Methodology Overview

The software industry employs the Software Development Life Cycle (SDLC) methodology to strategically organize, develop, and evaluate software of superior quality. The primary objective of the SDLC is to develop software of superior quality that not only fulfils but also surpasses customer expectations, all within the designated timeframe and allocated resources. SDLC is a widely employed methodology within the software industry for managing and executing software projects. The comprehensive plan delineates the processes involved in the development, maintenance, replacement, and enhancement of specific software (Sarkar, 2021). The life cycle delineates a methodology for augmenting both the overall software development process and the calibre of the ultimate result. The many stages of a standard SDLC are visually shown in Figure 4.



**Figure 4: System Development Life Cycle (SDLC) Model**

The chosen model for project methodology execution in this study is the waterfall model. The waterfall model, a project management approach, is characterized by a sequential design process that has a striking resemblance to the cascading flow of a waterfall. In order to ascertain exceedingly precise business requirements, the project manager will engage in discussions regarding the concept with the customer, subject matter experts, and other relevant stakeholders. Prior to proceeding to the subsequent stage of design, it is imperative for the project team to reach a consensus and successfully conclude the requirements phase (Sinha & Das, 2021).

The design process involves the integration of both conceptual and practical design stages. Entity Relationship Diagram (ERD), the Data Flow Diagram (DFD), and the Use Case Model were created for this purpose. The linkages between entities, the data flow inside the system, the number use cases, and the interactions with the system are all revealed by these diagrams. The representation of data was created using HeidiSQL and the software involved for the construction of the nStock starting with Figma for the interface design and proceeded Visual Studio Code (VS Code), Laragon, and SQLyog.

Testing is a fundamental procedure that involves the comparison of a software program to the requirements specified in the initial phase of the SDLC. As for this study, Functionality test is used to confirm that a system or software application complies with the functional requirements that have been set forth. It focuses on determining if the system operates correctly carries out of its intended functions. According to Sinha and Das (2021), the advancement of the project to the subsequent phase is contingent upon the fulfilment of all verification tasks inside that particular phase, as well as the acceptance of the outcomes by the testers.

The software development process encompasses a crucial phase known as documentation, wherein the creation and maintenance of system-related documentation are undertaken. This documentation encompasses both technical and non-technical resources that provide a comprehensive description of the system's layout, functioning, and utilization.

## Development

The development of the nStock system encompasses several distinct stages of design and development. To gain a comprehensive understanding of the system's structure and intricacies, an extensive database design was initially conducted, encompassing the design of interfaces, website interfaces, and notification functionalities. The user interface part showcased the implementation and evolution of the system, including the Restock Bot, a Telegram bot utilized as the system's notification feature. This feature facilitated efficient stock management in the F&B industry by enabling prompt interaction and providing users with the capability to swiftly replenish stock or communicate with suppliers.

## Interface Design

During the initial phases of the stock management system development, the primary objective was to prioritize the creation of a user-friendly interface with the Figma design tool. The proposed design features a contemporary arrangement complemented by a gentle red hue, which aims to enhance users' visual satisfaction. The initial step was the development of login and registration forms, alongside the implementation of a dashboard that would function as the central component for managing inventories. The user interface was developed using a pre-existing Laravel template. Opting for this decision would optimize the development process by focusing on the construction of the system's core functionalities. The adoption of this new method marked a pivotal moment in the progression of the project. Figure 5 depicts the preliminary design of the user interface for the dashboard overview of stocks.

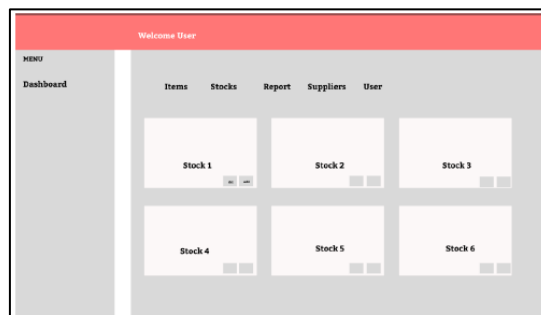


Figure 5: Stock Interface Design

## Website Interface

The dashboard overview is depicted in Figure 6. Upon successfully logging into the system, the user will be redirected to the main dashboard. The primary purpose of the main dashboard is to serve as the central component of this system. The system exhibits various data, including stock availability, new stock arrivals, stock outflows, suppliers, and users. The left side of the dashboard displays a side bar navigation that includes the same items as the dashboard overview. The user is able to browse through the system with ease by utilizing either the side bar or the dashboard overview. The dashboard displays the user's entire name, as entered in the registration form, at the bottom of the sidebar.

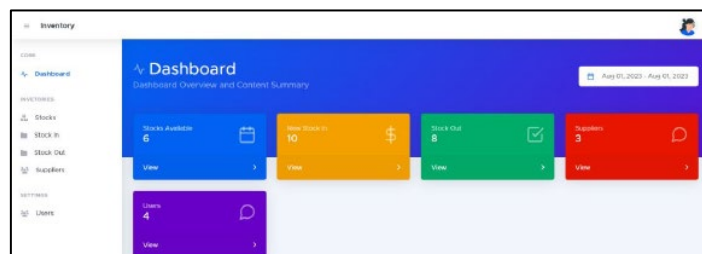
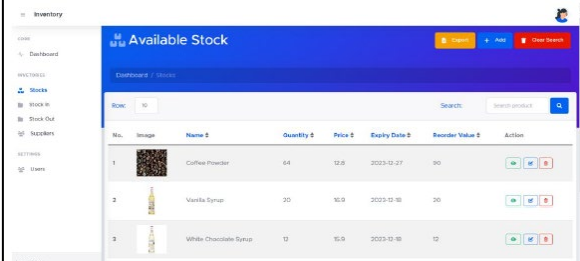


Figure 6: Dashboard Overview

The stock dashboard depicted in Figure 7 provides consumers with a comprehensive platform for effectively overseeing their stock investments. Users have the option to readily supply stock availability-related details such as the image, name, quantity, price, expiration date, and reorder value. The data is presented in real-time on the dashboard, facilitating users' ability to conveniently access, remove, and modify stock data as required. The export functionality provides users with the ability to

generate reports effortlessly, with a single click. This feature generates a spreadsheet report that can be further scrutinized for analysis and evaluation. Users are provided with the capability to personalize the reorder value of the system, which serves as a threshold for identifying low stock levels. The notification feature becomes operational if the quantity reaches the reorder threshold, thereby informing consumers of the need for replenishment.



The screenshot shows a web dashboard titled 'Available Stock'. It features a search bar at the top right and a table with the following columns: No., Image, Name, Quantity, Price, Expiry Date, Reorder Value, and Action. The table contains three rows of data:













No.	Image	Name	Quantity	Price	Expiry Date	Reorder Value	Action
1		Coffee Powder	64	12.8	2023-12-27	50	  
2		Vanilla Syrup	20	15.0	2023-12-18	20	  
3		White Chocolate Syrup	11	15.0	2023-12-18	12	  

Figure 7: Stock Dashboard

The Stock In dashboard serves as a crucial component that empowers users to efficiently oversee recently received stock. The dashboard subsequently exhibits a lucid and structured presentation of the stock data. Users have the ability to conveniently observe, remove, and modify the recently acquired stock, so ensuring precise and up-to-date stock control. The dashboard offers a convenient export feature that expeditiously generates comprehensive reports in the Excel file format. The stock dashboard facilitates a methodical workflow by providing oversight of recently received stocks, allowing users to effectively monitor stock availability and stock depletion procedures.

The Stock Out dashboard offers users the functionality to input data pertaining to the utilization of stock items for diverse objectives, such as culinary preparations or beverage production. The dashboard exhibits crucial data, encompassing the item's name, quantity utilized, usage date, and a descriptive account. Users have the ability to update, delete, and view the stock Out data as required. The dashboard's export option allows users to generate reports in Excel format. It is worth noting that the quantity connected with a Stock Out entry is promptly decreased in the stock table. The system is designed to deliver notifications to users in the event that the stock amount reaches the predetermined reorder value. This feature serves the purpose of facilitating restocking procedures and mitigating the occurrence of stock shortages.

## Notification Features

Figure 8 depicts the Restock Bot, a Telegram bot employed by the system, as observed in both desktop and mobile views. The purpose of this bot is to serve as a medium for facilitating communication between users and the system. A notification is generated by the system when the quantity of a certain stock reaches the predetermined reorder threshold. By employing the Telegram messaging network, the system transmits an alert message to apprise the user. The notification comprises essential details, including the identification of the stock item that has reached a low stock level, along with the accompanying supplier's name and contact number. This functionality guarantees fast correspondence and empowers users to promptly execute actions, such as replenishing stock or initiating contact with the supplier for stock replenishment.



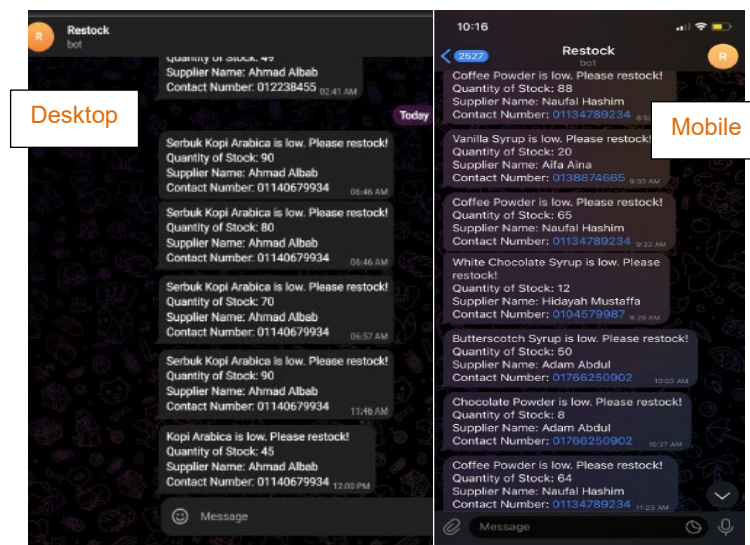


Figure 8: Restock Bot Desktop and Mobile View

## FINDINGS

### Functionality Test

In order to perform functionality test for the system, a group of 25 UiTM students was picked through a random sampling method. The students were afforded the opportunity to conduct a comprehensive examination of the system and offer useful feedback, critique, and novel ideas for enhancement. The process of functionality test included administering a questionnaire to the students subsequent to their evaluation of the system's functionality.

### Result

The questionnaire is divided into two distinct portions. Section A of the study is primarily concerned with conducting a brief survey to collect personal data and evaluate the participants' experience and knowledge within the F&B sector. On the other hand, Section B is specifically designed to analyse the effectiveness and efficiency of the system under investigation. In the second section of the questionnaire, the participants were provided with a set of inquiries pertaining to the operational capabilities of the system. The purpose of these inquiries is to evaluate different facets of the system, including its user-friendliness, precision of data entry, timeliness, and dependability. This feedback is crucial in ensuring that the system adequately caters to the specific requirements and expectations of users within the F&B industry.

#### Section A

Among the respondents, a significant 84% considered having a stock management system in the industry extremely important, while 16% regarded it as very important. This outcome clearly indicates that most of the participants recognize the high significance of implementing a stock management system in the industry. Notification feature is the crucial aspect in this study and remarkably, all respondents unanimously agreed to have this feature, with a 100% agreement rate. Furthermore, among the participants, 88% regarded it as very beneficial because it helps them stay updated on stock levels, while 12% considered it very useful as it assists in avoiding stockouts.

Respondents were also requested to indicate their favoured messaging platform for the notification functionality. The available communication channels are Short Message Service (SMS), electronic mail (Email), and the messaging application Telegram. The findings of the study reveal that

a majority of the participants, specifically 72%, expressed a preference for the messaging network Telegram. In contrast, a smaller proportion of respondents, namely 20%, indicated a preference for Email, while a mere 8% opted for SMS as their messaging platform of choice. The findings of this study indicate a distinct inclination among the participants towards Telegram as the preferred messaging medium for receiving notifications. In addition, an evaluation was conducted to gauge the satisfaction levels of the participants with respect to the user interface of the system. The results revealed that 80% of the participants expressed a high degree of satisfaction, 16% reported being pleased, while the remaining number indicated a neutral stance.

### Section B

The functionality testing results are summarised and presented in Table 1, showing the outcomes of testing each system function. These functions involved various aspects, including input and validation for login and register processes, as well as Create, Read, Update, Delete (CRUD) operations for stock, stock-in, stock-out, supplier, and user management. Additionally, the testing covered the notification feature. Notably, all the respondents provided a "pass" response for the system, indicating that it performed successfully without any issues.

**Table 1: Functionality Test Result**

No	Activities	Expected Result	Pass/Fail
1	User Registration Input	Validation was made to inform user if the required registration fields are not into specifications	Pass
2	User Registration	User able to register if all field was filled with required format for certain input.	Pass
3	User Login Input Validation	Validation was made to inform user if the required login fields are not into specifications.	Pass
4	User Login	User able to login if entered valid username and password.	Pass
5	User Account Update Input Validation	Validation was made to inform user if the required fields are empty.	Pass
6	User Account Update	User able to update/change their account's information.	Pass
7	Create User Input Validation	Validation was made to inform user if the required fields are empty.	Pass
8	Create User	User able to create new user and the new user data was save into database.	Pass
9	Create Stock Input Validation	Validation was made to inform user if the required fields are empty.	Pass
10	Create Stock	User able to create stock and the stock data was save into database.	Pass
11	List Stock	User able to view the list of stocks created by them	Pass
12	Update Stock Input Validation	Validation was made to inform user if the required fields are empty.	Pass
13	Update Stock	User able to update stock and the stock data was save into database.	Pass
14	Delete Stock	User able to delete the stocks created by them.	Pass
15	Create Stock In Input Validation	Validation was made to inform user if the required fields are empty.	Pass
16	Create Stock In	User able to create stock In and the stock In data was save into database	Pass
17	List Stock In	User able to view the list of stock In created by them	Pass
18	Update Stock in Input Validation	Validation was made to inform user if the required fields are empty.	Pass
19	Update Stock In	User able to update stock In and the stock In data was save into database	Pass
20	Delete Stock In	User able to delete the stock In created by them	Pass
21	Create Stock Out Input Validation	Validation was made to inform user if the required	Pass
22	Create Stock Out	User able to create stock Out and the stock Out data was saved into database.	Pass
23	List Stock Out	User able to view the list of stock Out created by them.	Pass

24	Update Stock Out Input Validation	Validation was made to inform user if the required fields are empty.	Pass
25	Update Stock Out	User able to update stock Out and the stock Out data was saved into database	Pass
26	Delete Stock Out	User able to delete the stock Out created by them.	Pass
27	Telegram Notification Feature	The system able to send notification to user when stocks level is low.	Pass
28	Create Supplier Input Validation	Validation was made to inform user if the required fields are empty	Pass
29	Create Supplier	User able to create supplier and the supplier data was save into database	Pass
30	List Supplier	User able to view the list of suppliers created by them	Pass
31	Update Supplier Input Validation	Validation was made to inform user if the required fields are empty	Pass
32	Update Supplier	User able to update supplier and the supplier data was save into database.	Pass
33	Delete Supplier	User able to delete the supplier created by them	Pass
34	Logout	User able to logout successfully from the system	Pass
35	User Account Deletion	User able to delete his/her account from the system.	Pass

## CONCLUSION

In summary, the project has achieved success in the development of the nStock system. During the design and development phase, a system that is completely functional was successfully constructed. The successful integration of the notification feature into the system was also achieved. Furthermore, the evaluation of the system was conducted through the implementation of functionality testing, which yielded successful results. In its entirety, the project may be deemed successful as it effectively accomplished its predetermined objectives and demonstrated the efficacy of the nStock system in the realm of stock management within the F&B industry.

## ACKNOWLEDGEMENTS

Thank you to Jurnal Intelek for the opportunity to publish this paper, Computer Science Studies, College of Computing, Informatics and Mathematics, Universiti Teknologi MARA Perlis Branch, Arau Campus and our colleagues.

## FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

## AUTHORS' CONTRIBUTION

Abu Seman, A. and Abdul Wahab, N. conceived and planned the idea and prototype. Abdul Wahab, N. prepared the data and conducted the testing. Abu Seman, A. contributed to the interpretation of the results and took the lead in writing the manuscript. Ibrahim, N and Abdul Wahab, N provided critical feedback and helped shape the writing. Each author contributed ideas that helped refine the study, the analysis, and the manuscript.

## CONFLICT OF INTEREST DECLARATION

We certify that the article is the Authors' and Co-Authors' original work. The article has not received prior publication and is not under consideration for publication elsewhere. This research/manuscript has not been submitted for publication nor has it been published in whole or in part elsewhere. We testify to the fact that all Authors have contributed significantly to the work, validity and legitimacy of the data and its interpretation for submission to Jurnal Intelek.

## REFERENCES

- Ariesta, D., Rusdi, Z., & Sutrisno, T. (2020). Web-based inventory information system in Antariksa stores. *IOP Conference Series: Materials Science and Engineering*, 1007(1).  
<https://doi.org/10.1088/1757-899X/1007/1/012115>
- Kar, S., Bhimrajka, S., Kumar, A., & Mukherjee, S. (2022). Mobile based inventory management system with qr code. *IEEE International Conference on Electronics, Computing and Communication Technologies*. <https://doi.org/10.1109/CONECCT55679.2022.9865739>
- Mor, R.S., Kumar, D., Yadav, S., & Jaiswal, S.K. (2021). achieving cost efficiency through increased inventory leanness: Evidence from manufacturing industry. *Production Engineering Archives*, 27(1), 42-49. <https://doi.org/10.30657/pea.2021.27.6>
- Singh, J. (2022). Concepts Of Inventory and Related Technical Terminologies: A Literature Review. *International Journal for Research Trends and Innovation*, 7(1). <http://www.ijrti.org>
- Sinha, A., & Das, P. (2021). Agile methodology vs. traditional waterfall SDLC: A case study on quality assurance process in software industry. *5th International Conference on Electronics, Materials Engineering and Nano-Technology (IEMENTech)*.  
<https://doi.org/10.1109/IEMENTech53263.2021.9614779>
- Soegoto, E. S., & Palalungan, A. F. (2020). Web based online inventory information system. *IOP Conference Series: Materials Science and Engineering*, 879(1). <https://doi.org/10.1088/1757-899X/879/1/012125>
- Frye, M. (2022). Exploring inventory management's effects on a company's profitability. *Undergraduate Honors Theses*. Paper 695. <https://dc.etsu.edu/honors/695>
- Pujawan, I.N., Mahendrawati, E.R., 2010. Supply Chain Management, Edisi Kedua. Surabaya:Guna Widya.
- Misahuaman, G., Daza, A., & Zavaleta, E. (2021). Web-based systems for inventory control in organizations: A systematic review. *IEEE/ACIS 22nd International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD)*, 15-20. <https://doi.org/10.1109/SNPD51163.2021.9704993>.
- Sarkar, A. (2018). Overview of web development life cycle in software engineering. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 3(6), 626-631. <http://ijsrcseit.com>