FACULTY OF COMPUTING
UTM Johor Bahru

SECP 1513: Technology Information System

Semester 01, 2024/2025

PROJECT PROPOSAL

WASHED (IOT-BASED LAUNDRY SYSTEM)

Team Name:

HASHTECH

Team Members:

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Client Name:

Mr. Razid (Owner of UNILAUNDRY)

TABLE OF CONTENTS

1. INTRODUCTION

The Need:

The need for an IoT-based laundry system can be analysed from two perspectives, which is the perspective of the laundry shop owner and the students in the university.

Based on our interview with the laundry shop owner, the current laundry system requires more workload to manage it manually. One of the problems the owner is facing is he needs to replace the tokens in the token machine every two to three days since the laundry shop is token- based. More problems pop up when the token machine malfunctions. These problems not only increase the workload of the owner, but also time consuming and affect the income of the laundry business. Therefore, the laundry shop owner needs a convenient IoT-based laundry system to solve his current problems, manage and monitor his business from time to time, attract more customers and to stand out from competitors to earn more money.

*Evidence to prove that the token machine malfunctions, to support the need for our smart laundry system.

Meanwhile, based on our observation, personal experience and interview feedback from some of the students that use the laundry service, we have concluded several problems that exist in the current laundry system. First, students are unable to know whether the washing and drying machines are available or not unless they check out themselves by going to the laundry shop. This causes the students to need to queue at the laundry shop physically to wait for their turn. If it is peak hour, then students are forced to wait for a longer time and it is very time consuming. Secondly, some students who are not aware of the end time of the washing machine did not pick up their clothes on time causing people on the queue to wait longer or their clothes being removed without their permission. Additionally, the token-based laundry system is inconvenient to students who do not have much cash or small changes. Therefore, there is a need for an IoT-based laundry system to solve all these problems and improve student's laundry experiences.

The need of both service providers and customers encouraged our team to come up with the idea of an IoT-based laundry system which will be introduced in detail in the section below.

The Approach:

WASHED will be an app available on Android, iOS and web browser for customers to install. The main technology that we will use is the Internet of Things (IoT). According to Oracle Malaysia, the meaning of Internet of Things (IoT) is the network of physical objects or things that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. These devices range from ordinary household objects to sophisticated industrial tools [1]. Our IoT-based laundry system consists of washing and drying machines that are equipped and embedded with IoT sensors to monitor and report machine status. Sensors that are connected via Wi-Fi transmit data to the backend of the app. Action made through the app also transmits data and makes changes to the washing and drying machines.

The first main feature of our system is real time machine monitoring. The status of the machine for example: empty, out of order, or in use will be updated from time to time and can be seen through the app**.** The second feature is slot reservation through the app. Users can reserve the machines and time slots that are available using the app**.** They are also able to preset the mode for the washing and drying machines based on personal preferences. Besides that**,** the app includes a cashless payment service, where users can pay online for the washing and drying service. Push notification will be sent to users to remind them when their laundry cycle is finished. The additional feature is that the reserved machine will be automatically locked to prevent others from using it. Only users that have paid will be provided with a QR code to access the machine. After the clothes are washed or dried, the door of the machine will be locked until the user opens it using the app.

The Benefit:

For the service provider, WASHED which provides an IoT-based solution sets the provider apart from traditional laundry services, making the business more attractive in a competitive market. Secondly, our system can improve the efficiency of operation and management of the laundry shop. For instance, our app will alert the owner when machines need services and therefore minimise downtime and repair costs. Addition of cashless payment service in the app also reduces the owner's workload as the owner no longer needs to replace the tokens for the machines frequently.

For the customers, WASHED app can help them to save time and energy as they would not have to go to the shop physically to check the availability of machines. By using our app, they are able to monitor the real time status of the machines and book the machines and time slots that are available. Besides that, automated notifications remind users about their laundry cycle status so that they can collect their clothes on time. The additional feature of automatically locking the reserved machine provides a significant benefit to customers by ensuring that only the person who made the reservation can access the machine. After the laundry cycle is finished, the door of the machine remains locked, until the user unlocked it using the app. This prevents other people from taking out the belongings of the customer without their permission. By using the app, customers are also recommended with laundry packages, able to collect points to redeem vouchers and enjoy special discounts on special occasions which will help them to reduce the cost for laundry.

The Competitor:

The idea to implement smart laundry with IoT technology is not a new thing. According to Friendly Technologies, in the early 2000s, IoT technologies began to be widely used in various industries due to the growth of broadband Internet and wireless networks [2]. Until now, there were plenty of laundry service apps or websites that implemented IoT technology to solve laundry service problems as well as improve customers' laundry experience.

Out of the apps and websites that are already available in the market, we found that our main competitors are De Dobi [3] and dobiQueen [4]. Both De Dobi and dobiQueen offer similar solutions as our system. De Dobi provides apps that allow customers to monitor the status of the laundry machines based on the location of De Dobi outlets they choose and offers cashless payment. Meanwhile dobiQueen provides apps and websites that allows customers to choose laundry packages based on their preference, offers self-service laundry and laundry pickup service and implemented cashless payment.

Although these competitors already existed for a certain time, and gained trust from many customers, they still lack some features. Therefore, our system not only offers features that the competitors lack, such as the feature to reserve machines and time slots for laundry, but also consists of improvised features that the competitors currently had. Our smart laundry system also ensures our customers have the best deals, promotions and discounts all the time. The comparison between our system and the competitors' system will be elaborated more in the next section.

2. EXISTING SYSTEM

Table 1: Comparison of proposed system and existing systems

Features	WASHED	De Dobi [3]	dobiQueen [4]
Able to browse and choose outlets	Yes	Yes	Yes
Real time machine monitoring	Yes	Yes	No
Slot reservation	Yes	No	Yes
Preset of machines mode	Yes	No	No
Cashless payment	Yes	Yes	Yes
Push notifications	Yes	Yes	Yes
Locking mechanism of machines	Yes	No	No
Packages, promotions and discounts	Yes	Yes	Yes

One of the existing systems for IoT-based laundry service is De Dobi. De Dobi provides apps which its main feature is to allow customers to browse laundry outlets near them and to monitor the status or availability of the washer and dryer machine based on the outlet chosen. The app also provides cashless payment feature for top up purpose, including a timer to remind customers about their washing time through notifications and displays promotions as well as allows customers to collect points and stamps to redeem free wash. However, there are some problems in the De Dobi system which need to be improvised.

The feature to monitor the availability of the machines only allows customers to know the numbers of vacant and occupied machines but does not inform them about the remaining time for the occupied machines to be done. Therefore, the feature of real time machine monitoring can be extended in which customers are able to know the remaining time of every occupied machines so that they can plan their schedule to the laundry without have to wait. Next, although the De Dobi app allows customers to choose washer and dryer mode via the app, it can only be done after customers paid and accessed the machines, and no extra information on which suitable mode the customers have to choose causes damages to some of the customers' clothes. Hence, an additional section can be made where description for every mode is shown so that customers are able to choose the correct mode for their laundry and preset the mode as their favourite so that they can determine their preferred mode before their turn for laundry.

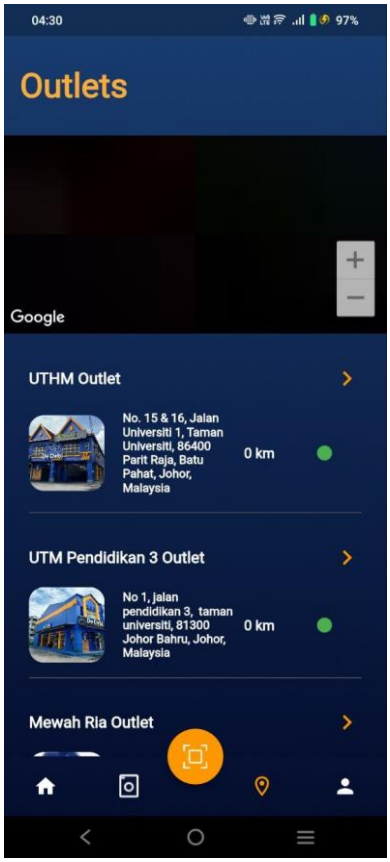
Besides De Dobi, dobiQueen is also a popular existing system for IoT-based laundry service where it provides apps and websites to ease customers to use their services for laundry. DobiQueen's main feature is to provide both self-service laundry and laundry pickup service for customers to choose. Customers can make a reservation or booking for laundry pickup service and choose bag sizes, schedule pickup timing and pick laundry packages via the website based on their preference. Through dobiQueen's app and website, customers are able to know the location of all dobiQueen's outlets and each of them are attached with their respective address and linked with Google Maps and Waze. The app also provides cashless payment feature for digital tokens top up along with transaction history for customers to record, included notifications regarding the laundry process and allows customers to collect points for digital tokens redemption. However, dobiQueen system still has some flaws which can be improvised.

Although dobiQueen provides both self-service laundry and laundry pickup service, but most of their app and website features only benefits laundry pickup service customers. As an example, the reservation or booking feature only available for laundry pickup service. Customers that choose self-service laundry have to go to one of the dobiQueen laundry outlets without knowing whether there are crowds or not and could not book machines and time slots based on their choice. This causes the customers would have to queue and wait for their turn especially during peak hours and it is very time-consuming. The solution to this problem is to add on more features that benefits self-service laundry customers such as real time machine monitoring feature that allow customers to know the status of the machines whether vacant or occupied. Booking feature can also be improvised so that both self-service laundry and laundry pickup service customers can enjoy this feature. Another flaw of dobiQueen is their cashless payment feature. DobiQueen allows customers to top up using 3 payment methods, which is e-wallets, cards and online banking. However, online banking method can only be use when the topup amount is more than RM50.

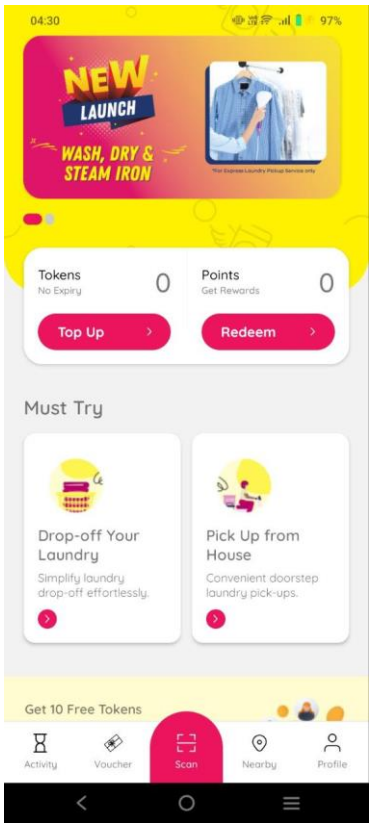
Therefore, it is better to cancel the limitation of the online banking so that to ease customers as they can prefer online banking even when top up a little amount.

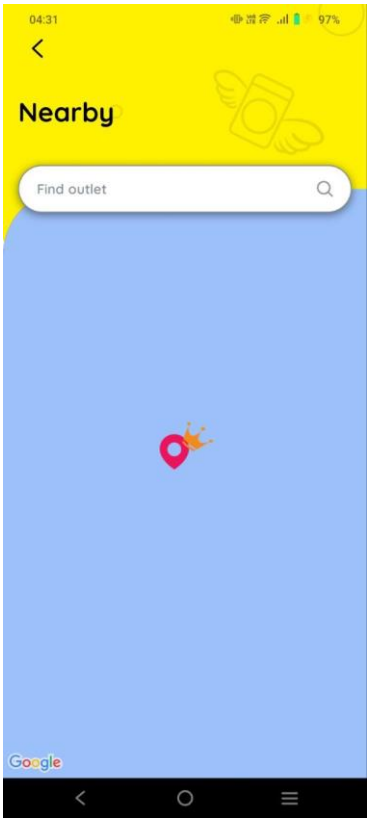
Overall, WASHED is better than these existing systems available in the market. Our system not only includes features that both of the existing systems have, but also makes changes and improvements to the weaknesses of the features stated above. Apart from original features such as being able to browse and choose outlets, real time machine monitoring, slot reservation, being able to preset machines mode, cashless payment and push notifications, our system also added a new feature which is the locking mechanism of machines. This feature has not appeared in any of the existing systems and the purpose of it is to protect customers' belongings as it prevents other people from taking out customers' clothes without their permission. Our system also ensures our customers are notified with the best deals, promotions and discounts from time to time. Further information about our IoT-based laundry system, WASHED will be explained in detail in the Proposed System section.

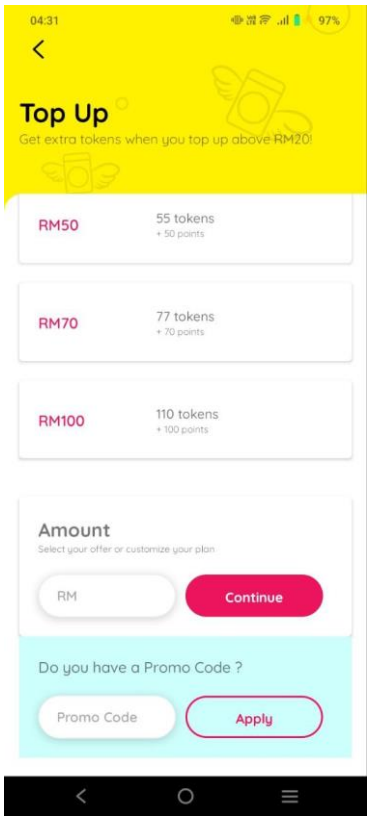
*Screenshots of De Dobi app.

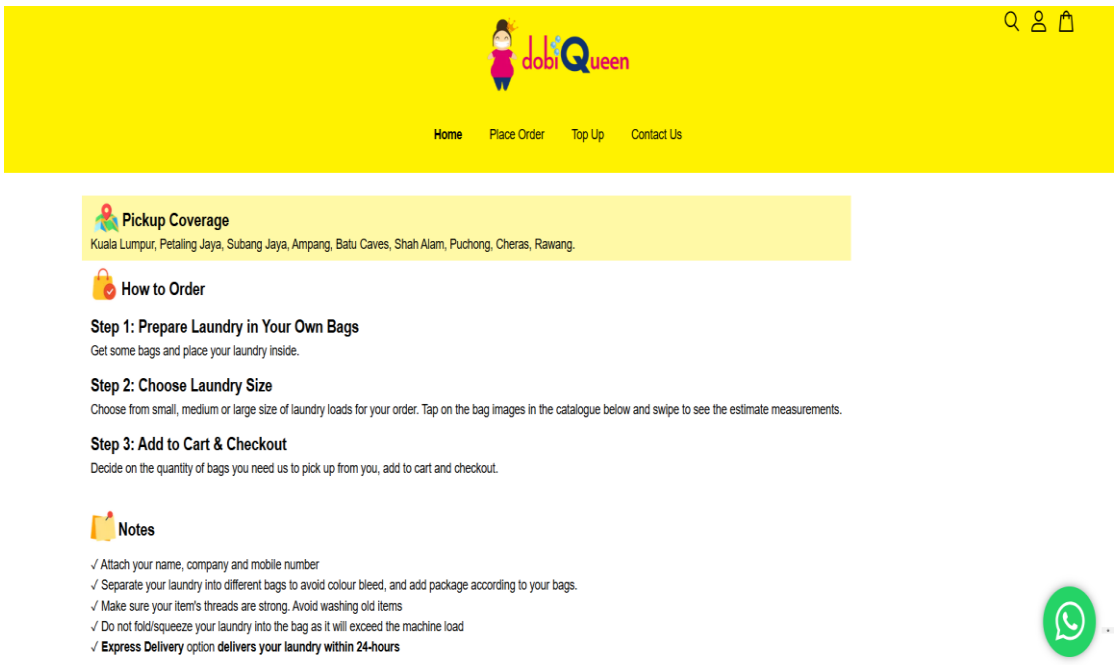


*Screenshots of dobiQueen app.









3. PROPOSED SYSTEM

WASHED will be an app which is connected with the washer and dryer machines in the laundry outlets. Data between the app and the machines will constantly exchange from time to time to ensure the system runs smoothly. There are two categories of users of our system with different roles. The first category of user is the laundry shop owner while the second category of user is the students/customers.

The shop owners are the system administrator. They are allowed to access, remotely monitor and manage the system. They can monitor the entire operation remotely, observe the status of the machines in real time and make informed choices about how the machines are being used. Therefore, the shop owner will know exactly when machines need repair and can schedule maintenance before little problems turn into big problems that can cause heavy damage to the machines. They can also change prices or offer promotions in order to bring in more customers and record each transaction made by customers through cashless payment to track total income.

Meanwhile, customers are the consumers that use our system to ease laundry and improve their laundry experience. There are several things that the customers can perform or experience via our system, WASHED:

1. **Able to browse and choose outlets and know the status of machines from time to time**

   Customers are provided with a list of laundry outlets that use our system. For every outlet, customers are able to know the location as the address will be shown and will be linked to navigation applications such as Google Maps and Waze. A search bar is also included so that customers are able to search for specific outlets they want. As customers turn on their location, they can locate the nearest laundry outlets that use our system automatically. After customers have chosen an outlet, they can know the total number of washer and dryer in that outlet and be able to monitor each machine status in real time either vacant or being in use. If the machines are occupied, customers will be able to know the remaining time of the machines to be done.

2. **Machine activation and slot reservation**

   All machines are initially locked and powered-off. There are two ways to activate the machines. First, for customers that go physically to the laundry outlet, they can just scan the QR code on the machine itself and pay via the app. After payment, if the machine is vacant, then customers can directly use the machine. If the machine is still in use, then customers will have to wait for their turn, but their laundry slot for that machine is secured and the remaining time for their turn will be shown via the app. Second, for customers that do not want to wait at the outlet physically especially during peak hours, they can prefer to utilize the reservation feature. By using the reservation or booking feature, customers are able to schedule their own laundry time by selecting outlet, day and time. After making payment, customers will be given a specific QR code with the assigned machine number. Customers are required to follow the scheduled details and show the QR code to the correct machine in order to activate the machine. The machine will remain reserved and locked during the scheduled day and time unless activated using that specific QR code. After the reserved period, the machine will return to its original state and can be activated by any customers that have paid.

3. **Preset machine mode, getting notifications and locking mechanism of the machines**

   While waiting for their turn for laundry, customers are able to pre-set their preferred washer and dryer mode. Description and information for every mode will be displayed in the app so that customers can choose the suitable mode for their laundry. They are also able to save the machine modes as their favourite for future laundry purposes. The operation of the machine will follow the preset mode as soon as customers press the start button via the app. During the laundry process, customers will be able to track the end time of their laundry cycle. Once the laundry cycle is finished and the clothes are ready to be removed, the app will send automated notifications and vibrate to remind customers. The machine will then remain locked until the customer opens it via the app to prevent other people removing the clothes without the customer's permission. However, the locking mechanism only lasts for 15 minutes. If the customer does not pick up the clothes on time, then the machine will unlock and allow other people to remove the clothes by themselves to avoid unnecessary waiting.

4. **Cashless payment, points collection and enjoy promotions**

   When making payment, customers are no longer limited to pay by cash. By using our system, customers are allowed to make cashless payments through e-wallets, cards and online banking. Our system supports all kinds of e-wallets including Touch n' Go, GrabPay, Boost, WeChat Pay and many more. There are also no limitations to card payments and online banking as long as the bank is available in Malaysia. After customers already made the payments, at the same time, they also gained points. These points can be gained whenever customers use the cashless payment feature to pay for the laundry service. The points collected will not expire and can be used to redeem free wash or free drying service, cashbacks, and participate in lucky draws where customers will have a chance to win unlimited free wash for a year. By creating an account in our app, customers will also get free laundry service every time during their birthday. Discounts and promotions during special occasions such as Christmas and New Year will also be updated from time to time through the app. Therefore, customers can always keep an eye on our app so that they would not miss out on any special deals that allow them to "spend less, wash more".

5. **Additional features that smoothen the operation of systems:**

   Our system allows customers to sign up for an account. By creating an account in our app, customers not only can gain one time of free wash, any points they receive will also automatically be transferred into their account. Customers' accounts will be saved and they can login into their account using any device. Personal information entered by every customer such as password and phone number will also be protected and secured. Our app also provides a section where customers are able to leave reviews so that our system can be improved based on suitable reviews and improve customers' experiences. There will also be a section in our app for customers to check their activity and transaction history so that they can keep evidence for every cashless payment made. Lastly, our app will provide a hotline section where customers can call the hotline if they have any questions and enquiries regarding the laundry system or the laundry machines.

4. REFERENCES

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[2] Friendly. (2024, March 5). *A brief history of IoT*. Friendly Technologies. https://friendly-tech.com/a-brief-history-of-iot/

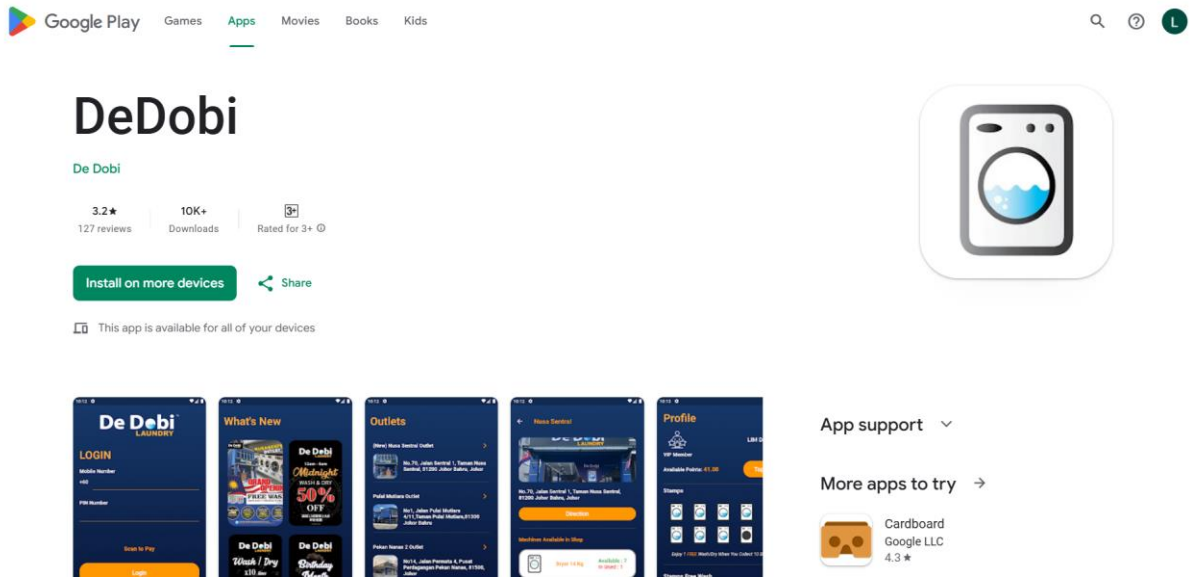
[3] https://www.facebook.com/dedobilaundry/

[4] *Laundry Pickup Service for Business | Airbnb, Hotels, Uniforms, Confinement, Gyms & more | dobiQueen*. (n.d.). https://www.dobiqueen.my/business

[5] https://www.facebook.com/DobiQueen/?locale=ms_MY

[6] https://www.instagram.com/dedobilaundry/

APPENDICES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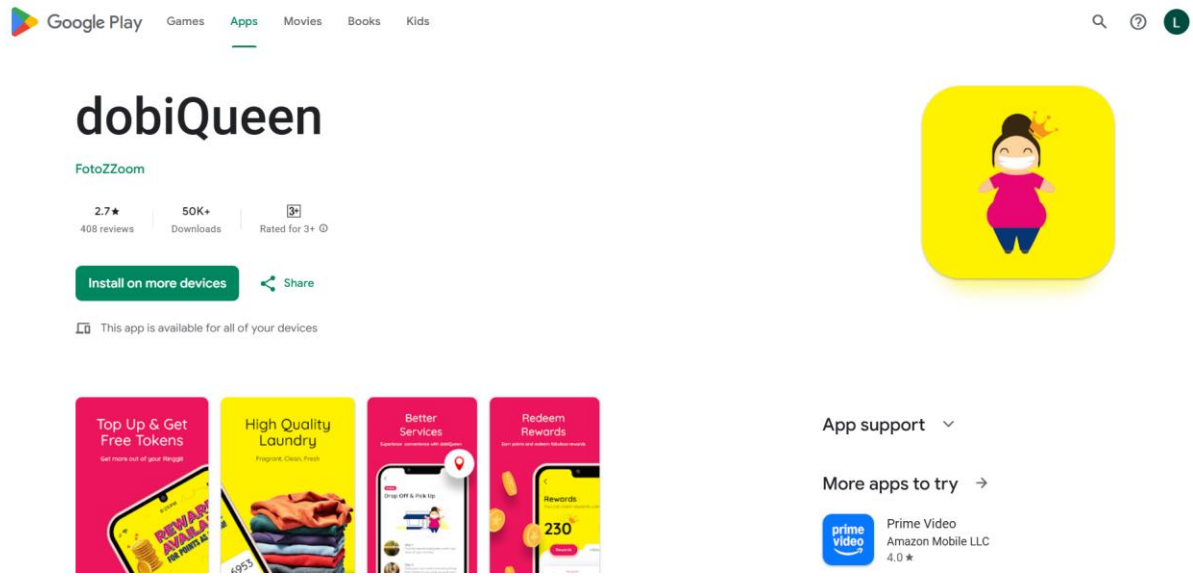
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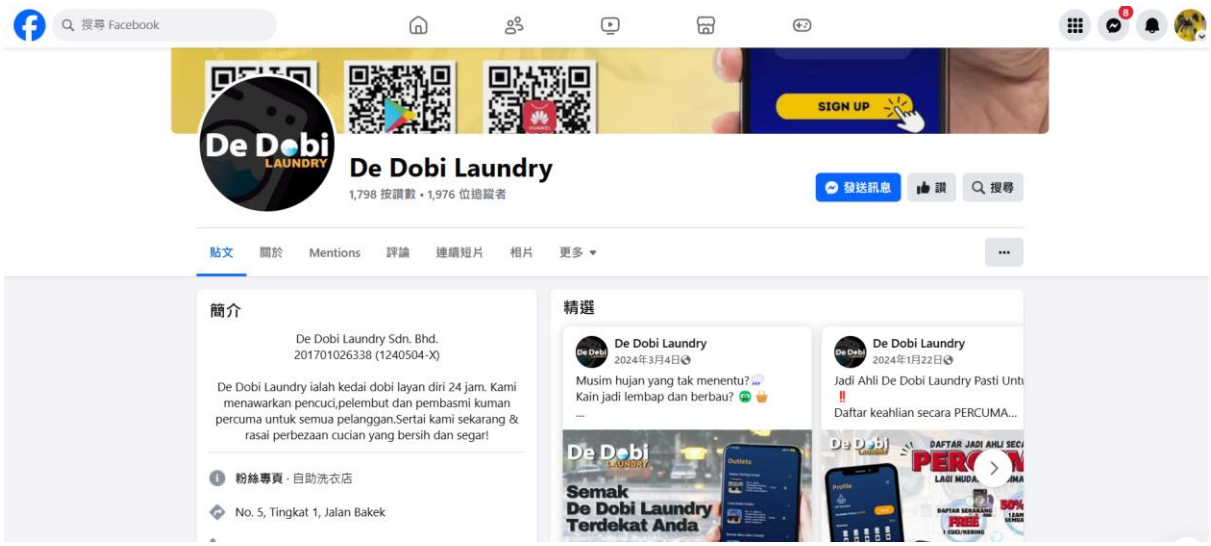
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De Dobi Laundry
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201701026338 (1240504-X)
De Dobi Laundry ialah kedai dobi layan diri 24 jam. Kami menawarkan pencuci,pelembut dan pembasmi kuman percuma untuk semua pelanggan.Sertai kami sekarang & rasai perbezaan cucian yang bersih dan segar!
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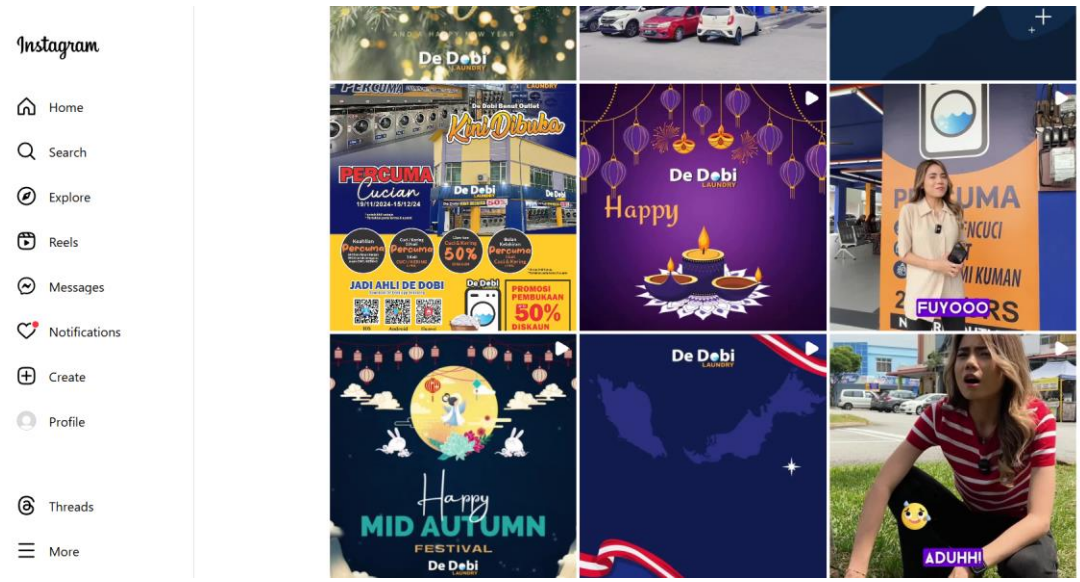
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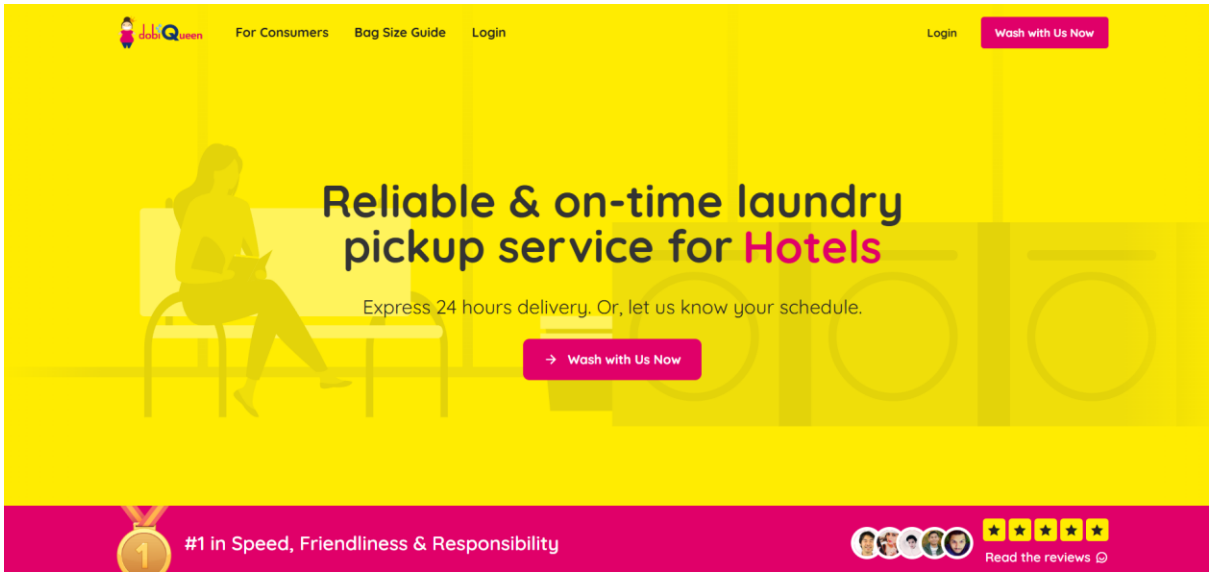
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