

**Can software improve the user experience  
for customers and employees of a milk  
subscription service?**



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### **Abstract**

The aim of this research was to find out if a local milk delivery business could improve the user experience of its customers by using a custom software application for their subscription ordering and payments. The design and development of the application used modern technologies such as Stripe, Laravel and Bootstrap which were selected based on the literature surrounding the topic. The user experiences of the customers were collected using interviews. The experiences were analysed using phenomenological analysis to determine themes relating to user experience and usability. The findings of the research showed that user experience had improved using the software by allowing the user more flexibility, comfortability and enjoyment due to features such as online payment and remote management. However, areas such as visibility, aesthetics and process recognition interfered with user enjoyment.

**Commented [AG1]:** 8333 + 134 = 8467 – acceptable.

**Commented [AG2]:** Clear summary

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## **1. Introduction**

The project is centred around the digitisation of the business of the client who delivers milk to the doorsteps of the local community. The aim of the research is to determine if a software application is an appropriate method to employ for the ordering process in this context and with this particular customer base. This will be achieved by the development of a prototype application and by analysis of the experience of the end-users with this system. To achieve this, aim the creation of an application that meets the requirements of the client and user is needed as well as the use of phenomenological analysis and interviews to gain insight into the perceptions of the users.

## 2. Problem & Literature Review

### 2.1 Client

The client for the research project is a wholesale dairy provider for the Bridgend area who deals with the delivery of milk to local businesses and the locals. The client wants to develop an application to allow the people in the area to subscribe and pay to the weekly milk round online. The current process involves the customer ordering milk through one of these options:

- Telephone order.
- Direct discussion with staff.
- Query through the website.

The customer is then added to the spreadsheet and the form is printed off for use by the staff. The milk is moved from storage into three vans for delivery. Payment for the product is collected at the end of the week from the customer's address.

**Commented [AG3]:** Some process analysis – specific information captured is not discussed.

## **2.2 Milk delivery industry**

The milk delivery industry has changed in the past century moving from traditional doorstep delivery to recent modern consumption via grocery stores. [1, pg. 213-215] According to Blake, this decline has resulted from supermarkets providing cheaper milk, greater convenience and more modern payment methods compared to doorstep providers. [2 pg. 106-107] However, the 2020 consumer insight report from the Agriculture and Horticulture Development Board (AHDB) showed an increase in doorstep delivery for UK customers from 527,000 to 716,000 users during 2020. Factors for consumers using doorstep services included convenience, locality, quality, and work from home.[3]

The adoption of technology in the industry has led to the development of software applications for doorstep delivery. Kaushal discusses the business MilkBasket in her paper on innovative business models. MilkBasket uses electronic commerce technologies to change the subscription payment model from a “USE and PAY” system to a “PAY and USE” wallet-based system to improve customer convenience. [4] From this research electronic commerce, subscriptions and payments will be explored further to understand the operations of delivery applications.

### **2.3 Electronic Commerce & Subscriptions**

Electronic commerce and subscriptions are important to understand as they form the basic model of a subscription delivery application. Electronic commerce or e-commerce is the exchange of products or services between organisations or individuals using forms of electronic communication such as the internet. [5]. E-commerce has two main types according to Tian:

- B2B – Business to Business
- B2C-Business to Consumer [6]

B2C involves the selling of products to consumers. B2C e-commerce can be further sub-categorised into subscription e-commerce which involves the selling of goods recurrently. Subscription e-commerce services are split into three categories which include replenishment, curation, and access. [7] Replenishment subscription is a recurring delivery of a specified product such as milk or groceries. [8] Services such as MilkBasket and Blue Apron are examples of modern e-commerce replenishment subscription services that utilise mobile or web platforms to interact with customers. [4,9]

## 2.4 Current applications & platforms

The application examples below are doorstep delivery applications currently used on the web or app stores. Analysis of both platforms will be covered.

Commented [AG4]: Good point to make.

### 2.4.1 Blue Apron – Web Application

A current web application is Blue Apron based in the USA. The business provides customers with custom meal kits on a weekly subscription schedule. [9] From direct inspection of the website using web development browser tools, the company has developed the web application using front-end technologies including HTML, CSS and JavaScript. Additionally, the payment gateway API called Stripe is observed in the code which handles the subscription payments. The use of stripe is mentioned through the company's privacy policy.[10]. The benefit of using web application technology is the accessibility of service, Blue Apron can be used on various devices.



Commented [AG5]: How accessible is this? Responsive?

Figure 1

#### 2.4.2 MilkBasket – Android / iOS Application

The business uses a wallet payment system, which means users must top-up their accounts to continue the subscription of dairy products. Payment is done through debit and credit card gateways.[4] The application is available on all mobile platforms allowing for a large user base. However, even though the application allows for subscription payments the user needs to manually update the wallet when it reaches empty.

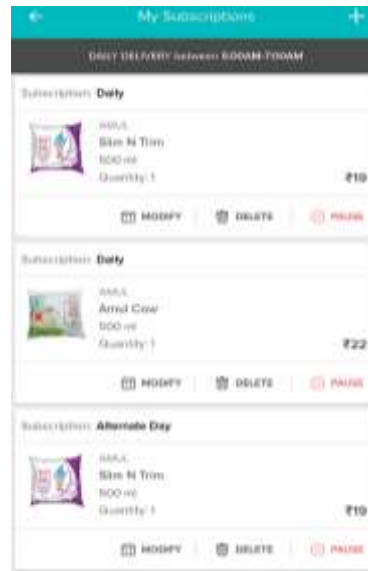


Figure 2

### 2.4.3 Web application – BokBox

BokBox is a web application for subscriptions to mystery book boxes. The system uses Python with Flask on the backend in combination with Stripe API for enabling purchasing of items. The web application was tested for usability and user experience by the creators in the research paper. The system had issues with the confirmation of details such as account creation and delays after product purchasing. However, the system proved usable through usability tests. [11]

The screenshot displays the BokBox subscription selection process, organized into three distinct steps, each with a title, a brief description, and a set of options with buttons.

**Step 1: Vad vill du beställa?**  
Välj mellan en genomsnittligt eller en mer exklusiv BokBox (En bok eller fem boken 2020er)  
Options:   
- En genomsnittligt eller en mer exklusiv BokBox (En bok) [En bok]   
- En mer exklusiv BokBox (Fem boken) [Fem boken]

**Step 2: Hur ofta vill du få hem en BokBox?**  
Välj hur ofta du vill få din bok hemskickad (En eller två gånger)  
Options:   
- En BokBox varje månad [Varje månad]   
- En BokBox varannan månad [Varannan månad]   
- En BokBox var tredje månad [Var tredje månad]

**Step 3: Hur länge vill du prenumerera?**  
Välj hur långt du vill ha hem BokBox, eller hur länge du vill ha hem BokBox. Välj den eller flera månader du vill ha hem BokBox (En eller flera månader)  
Options:   
- En månad [En månad]   
- Fem månader [Fem månader]   
- Tjugo månader [Tjugo månader]

Figure 3

#### 2.4.4 Platforms and security

E-commerce offers two main platforms for development which are mobile and web. Lengstorf discusses that the selection of a platform should be centred around the users most likely to use the application.[12] Users that are likely to own a mobile device will have a better user experience via a native application. The development of native applications is costly as mobile devices have different platforms which drive up development time.[13] Web applications offer better accessibility through standards such as W3C which ensure cross-browser compatibility. Additionally, websites can be accessed on all devices with a browser. Development costs are cheaper through web applications as it is through one release.

Development on either of these platforms involves security considerations. Mobile issues include client-side injection, weak server side-controls, poor authentication, broken cryptography and improper session handling. To remedy these use of authentication schemes, digital signatures, data encryption, validating input data and secure logging must be incorporated into the application.[14] Web applications also suffer from security issues such as SQL injections, price manipulation and session hijacking. Sharma recommends proper authentication, privacy and encryption protocols, payment gateways, firewalls, certificates and data encryption methods for e-commerce applications. [15]

**Commented [AG6]:** This ref is from 2011 – porting code is easier now!

**Commented [AG7]:** Cons? (making the site accessible?, using HTML forms rather than native controls).

**Commented [AG8]:** Only if built this way

## 2.5 E-commerce payments

Online payments used in B2C e-commerce systems utilise a cyclical process involving six entities when concerning the use of card payments as shown below in the diagram. [16, pg. 468] From the **customer** to the **acquiring bank** the business is responsible for ensuring that e-commerce payment implementation is Payment Card



Industry Data Security Standard (PCI DSS) compliant.[17]

Compliance with the standard is dependent upon the implementation of the payment system as merchants can use 3<sup>rd</sup> party solutions or custom integration the former of which relieves some duties on the merchant like processing and

encrypting card data[16 pg. 468, 17]. Integration of a 3<sup>rd</sup> party payment service provider (PSP) is beneficial for small businesses as they can provide multiple card brands for customers for cheaper by removing the interchange rates. [16, pg. 477]

Figure 4

### 2.5.1 3<sup>rd</sup> Party Gateways

There are numerous e-commerce payment gateway providers for the development of both mobile and web applications. Benefits of these gateways include easy authentication, reduced infrastructure, security and alternative payment types.[18] The two biggest payment gateways within the market are PayPal and Stripe with a combined market share of 83% [19] Below an analysis of these two largest providers can be found.

### 2.5.2 Stripe vs PayPal

PayPal and Stripe differ in the way that payments are completed by consumers, with PayPal the user is redirected to a PayPal site. Stripe the payment is completed on the hosted site using Stripe API. Niranjnamurthy discusses this difference in his research.

Additionally, he mentions that Stripe was more user friendly in terms of development and support.[20] Other research shows that PayPal supports more features including extra payment services and support methods.[21] In terms of support for subscriptions, both gateways support this functionality.

**Commented [AG9]:** Comprehensive enough

## 2.6 Usability & User Experience

Usability and user experience (UX) are two concepts within the field of human-computer interaction (HCI). Both of these concepts can be used for evaluating the quality of a product or service. The ISO 9241-11 definitions of UX and usability are found below:

UX - *“Person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service.”* [22]

Usability - *“The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.”* [22]

In the field of UX and usability research, there are different perspectives on how usability and UX are related.

- I. Usability includes user experience
- II. Usability is an extension of the user experience
- III. Usability and user experience are closely related intersecting concepts

Nielsen shares the second view believing that the usability of the interface is a segment of the overall user experience. The third view is supported by Hassenzahl who developed the hedonic/pragmatic model. In this model, he argues that a user's perception of an application is built from both pragmatic attributes (usability) and hedonic attributes (enjoyment). [23, pg 217] From these scholars, it is clear that the development of an application for a user will need usability built into the design for the evaluation of the user experience.

The design of interfaces can affect the UX for users and the usability of an application. To ensure usability many researchers have developed rules regarding the design of interfaces such as Nielsen's ten heuristics for user interface design.[24] Nielsen further suggests five main components of usability which include learnability, efficiency, memorability, error and satisfaction. These components can be evaluated using either heuristics or qualitative and quantitative evaluations. [25] Using these

evaluations would cover the pragmatic attributes of UX. Qualitative evaluation would involve a discussion with an end-user in an interview format regarding the usability of the application after using it in person.

Norman suggests a usability test where the user interacts with the system and the researcher observes the user remotely or in person. In this format, the user speaks out during operation or after in an interview-style format.[26] To evaluate the hedonic aspects of user experience typically a qualitative approach is taken as it allows for the best analysis of human experiences and emotions.[27] However, quantitative and mixed-method approaches are also common. Researchers argue that it is difficult to accurately measure user experience via numerical **methods**. [28]

**Commented [AG10]:** Absolutely!

## 2.7 **Conclusion**

The milk delivery and subscription service industry has seen an emergence in recent years using modern B2C e-commerce technologies such as subscription enabled payment gateway providers to enhance the delivery service for customers on both mobile and web platforms. Both web and mobile platforms have numerous advantages and disadvantages relating to security and setup. UX can be split into pragmatic and hedonic attributes and usability and interface design must be considered as they are incorporated within the scope of UX.

For the client project, a web application is the selected platform due to being accessible from multiple devices compared to mobile applications which need to be deployed on both android and iOS. Payment processing will be done through Stripe because of its user-friendliness and the support provided. To evaluate the user experience of the application a qualitative approach will be taken to understand the emotions and perceptions experienced by the users for both pragmatic and hedonic qualities.

## **2.8 Aims & Objectives**

### **2.8.1 Aim**

To determine if the use of software can improve the subscription process of ordering milk for users in the Bridgend area in the context of user experience.

### **2.8.2 Objectives**

- Determine client requirements through investigation and discussion.
- Literature review to determine appropriate strategies, technologies and platforms for design.
- Design and develop an application that meets the client's requirements using appropriate software development tools and methodologies.
- Use and create semi-structured interviews to collect perceptions on the project in the context of usability and user experience from both customers and the client.
- Analyse customer and client perceptions using phenomenological analysis to determine emergent themes.
- Evaluate the overall user experience from the phenomenological analysis by discussing the themes found in the analysis to determine if the project improved the subscription process for both customers and the client.

### **3. Methodologies**

#### **3.1 Research Methodology**

##### **3.1.1 Philosophy**

The selected research philosophy will be phenomenology which is centred around understanding how people experience a phenomenon, also defined by Sokolowski as “The study of human experience and of the ways things present themselves to us in and through such experience”. This relates well to the research question which is focused on understanding user experiences.[29]

##### **3.1.2 Approach**

The approach for this research will be induction as we aim to collect data on people’s experiences with the application and from that data perform analysis and develop a theory. Saunders discusses induction highlighting that it suits qualitative research with small sample sizes which will be true for this research.[30]

##### **3.1.3 Strategy**

Phenomenological analysis is the selected strategy for the research as the aim of the research is to seek an understanding of user experiences in the context of an application which this strategy works well with. The goal of this strategy is to understand experience “in terms of *what* was experienced and *how it was experienced*”. [31]

##### **3.1.4 Time Horizon**

The cross-sectional time horizon will be used as the sample size will be small and the research will be looking at individuals at a single time point. [32]

### 3.1.5 Data Collection

Semi-structured interviews will be used as the method of data collection. They allow for a more structured schedule while also allowing further exploration when conversing with the interviewee compared to structured interviews. This will be needed to gain a rich understanding of the user experience and perceptions of the application's usability. [33]

**Commented [AG11]:** Sample size? Sample group selection?

### 3.1.6 Evaluation Criteria

The criteria for evaluation will be a set of interview questions based on user experience and usability principles involving pragmatic and hedonic qualities. Nielsen's ten heuristic rules have been used for the usability questions. Mainly focusing on these rules of his:

- Flexibility and efficiency of use.
- Aesthetics.
- Help and documentation.
- Recognition.
- Error recovery. [34]

The responses to the questions will partially guide the interview as it is a semi-structured interview. Below are the key interview questions:

1. What were your first impressions of the website?
2. What are your thoughts on the digitisation of the milk delivery service?
3. How did you find navigating the website?
4. Was it clear during use how to operate the system and access your account details?
5. How did you find the structure and the visuals of the application?

6. Would you change any of the features or add any new features to improve the service?
7. Did you feel confident and comfortable using the system?
8. Was the system enjoyable to use?
9. During the operation of the website did you have any frustrations which negatively impacted your experience?
10. Do you trust the website enough to use real information and card details?  
(Probe on why)
11. Do you think that the online service would improve your overall experience as a customer?
12. Would you use this service over the traditional method of milk delivery? Can you also explain the reasoning for your answer?

**Commented [AG12]:** Were these trialled? Where did these come from? Are they based on a test strategy framework? This is discussed later in the dev section.

### 3.1.7 Methods of Testing

The method of testing for the project will be thematic analysis combined with user acceptance testing (interview questions). Thematic analysis is a method for analysing the responses from the interview by highlighting phrases. The phrases get grouped into themes and those themes provide interpretations of the user perception. [35]

**Commented [AG13]:** Definition of themes?

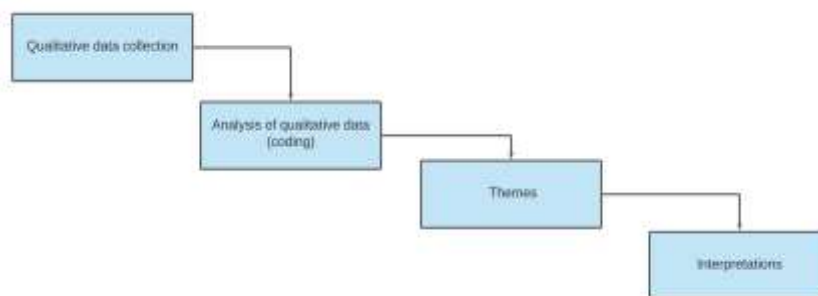


Figure 5 – Thematic Analysis

## 3.2 Development Methodology

### 3.2.1 Spiral & Object-oriented

The project will incorporate a combination of the spiral model and an object-oriented approach to the design. The waterfall model has been selected over other models as it is simple to follow and implement due to its linear format which will work with the project stages. However, with waterfall, you cannot move between stages so the requirements will need to be defined correctly.[36] The object-oriented approach to system development has been selected as it maps to the real world effectively and has been used to design models for e-commerce websites. [37] One of the issues with the object-oriented approach is it is susceptible to becoming hard to manage especially when the project

**Commented [AG14]:** Spiral or waterfall? Why has waterfall been selected?

**Commented [AG15]:** Example?

is large.[38] To combat this it will be necessary to define the classes and objects before the commencing development.

**Commented [AG16]:** Rubbish! At least it is a supported viewpoint.

### 3.2.2 Software

#### CSS

To enable styling of the web application bootstrap CSS will be used in the project. The use of bootstrap is down to factors such as community support, themes and browser compatibility as discussed in a comparative study.[39]

#### JavaScript

JavaScript will be used in the front end of the application to allow for functionality in processes such as cart, registration and the integration of the stripe which also uses JavaScript to produce custom payment portals. [40]

#### PHP

The selected language for the development of the server-side code in this project is PHP using the Laravel framework. This language has been selected as it is supported by Stripe documentation. Additionally, Laravel in a study on PHP frameworks suggests that it is the best framework for security, documentation and user-friendliness for novice developers hence its selection for this project. [41]

#### MySQL

The selected method of data storage for the project is MySQL as it integrates well with Laravel.[41] MySQL has been selected over NoSQL databases as data integrity is important for this application and the performance benefits of NoSQL will not be beneficial as the project will not be dealing with large data as shown in comparative research [42] Additionally, SQL based systems are useful for transactional data such as the ordering of milk.

**Commented [AG17]:** Okay, so what about Oracle, Postgres etc? MySQL has drawbacks, especially when deployed on a Windows client OS.

This section has a lot of (reasonable) justification with little balance.

## 4. Design & Implementation

### 4.1 Design

#### 4.1.1 Project requirements

Below the requirements from the client can be found. These requirements have been obtained from one-to-one discussions with the client.

- Whole milk, semi-skimmed and skimmed milk products that users can purchase within a store page.
- Quantity selector within checkout page spinner style.
- Add to cart buttons.
- Registration / login page before purchase.
- Account management:
  - Cancel subscription
  - Subscription details
  - Change address.
- Payment system using Stripe.
- Home page with company logo and description of services.
- Contact us page with company details.
- Light blue and white colour scheme for the majority of the website.

**Commented [AG18]:** Full list of produce and prices?

**Commented [AG19]:** The CLIENT required this?

4.1.2 Database

Below shows the entity-relationship diagram for the intended subscription system. The data model is made up of users, subscriptions, subscription items and product tables. The user's table stores the user details during registration. The subscriptions table will hold the order and the subscription items will hold the products within that subscription. The products table will be a store for the products information. The relationship between the user and subscriptions is one-to-many as a specific subscription can only have one purchaser. The relationship between the subscription and subscription items is one-to-many. This is because a user might want multiple products within a subscription.

Commented [AG20]: Surely this is one to one? Why would someone have multiple subscriptions?

Commented [AG21]: Fair

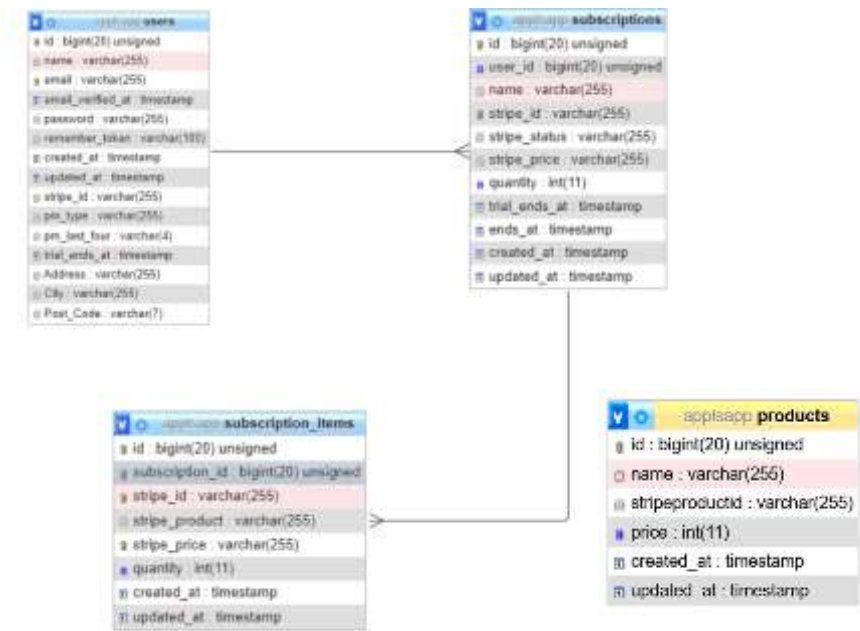


Figure 6 – ERD diagram

#### 4.1.2.1 Users

Below is the user data table. The primary key of the table is ID. The table also has a stripe ID, this is for storing the stripe customer ID as this is needed for creating and associating a subscription within Stripe. Additionally, we have a user field for email, name, address, city and postcode. The postcode field has been reduced to 7 characters to suit a postcode format.

Commented [AG22]: What about the space?

| Column            | Type         | Null | Default | Links to | Comments | Media type |
|-------------------|--------------|------|---------|----------|----------|------------|
| id (Primary)      | bigint(20)   | No   |         |          |          |            |
| name              | varchar(255) | No   |         |          |          |            |
| email             | varchar(255) | No   |         |          |          |            |
| email_verified_at | timestamp    | Yes  | NULL    |          |          |            |
| password          | varchar(255) | No   |         |          |          |            |
| remember_token    | varchar(100) | Yes  | NULL    |          |          |            |
| created_at        | timestamp    | Yes  | NULL    |          |          |            |
| updated_at        | timestamp    | Yes  | NULL    |          |          |            |
| stripe_id         | varchar(255) | Yes  | NULL    |          |          |            |
| pm_type           | varchar(255) | Yes  | NULL    |          |          |            |
| pm_last_four      | varchar(4)   | Yes  | NULL    |          |          |            |
| trial_ends_at     | timestamp    | Yes  | NULL    |          |          |            |
| Address           | varchar(255) | No   |         |          |          |            |
| City              | varchar(255) | No   |         |          |          |            |
| Post_Code         | varchar(7)   | No   |         |          |          |            |

Figure 7

#### 4.1.2.2 Subscriptions

Below is the subscription table. ID is the primary key. The table has a user ID field which is a foreign key for forming the relationship found in the ERD diagram. Stripe ID for the subscription (unique). Additionally, the stripe price, quantity and time fields have been included to describe the subscription.

| Column        | Type         | Null | Default | Links to | Comments | Media type |
|---------------|--------------|------|---------|----------|----------|------------|
| id (Primary)  | bigint(20)   | No   |         |          |          |            |
| user_id       | bigint(20)   | No   |         |          |          |            |
| name          | varchar(255) | No   |         |          |          |            |
| stripe_id     | varchar(255) | No   |         |          |          |            |
| stripe_status | varchar(255) | No   |         |          |          |            |
| stripe_price  | varchar(255) | Yes  | NULL    |          |          |            |
| quantity      | int(11)      | Yes  | NULL    |          |          |            |
| trial_ends_at | timestamp    | Yes  | NULL    |          |          |            |
| ends_at       | timestamp    | Yes  | NULL    |          |          |            |
| created_at    | timestamp    | Yes  | NULL    |          |          |            |
| updated_at    | timestamp    | Yes  | NULL    |          |          |            |

Figure 8

#### 4.1.2.3 Subscription items

Below is the subscription items table. The primary key is the ID field. The table contains a foreign key called subscription ID to associate the item with the subscription. The Stripe ID field contains the stripe product ID. Additional fields such as product, price and quantity are also inside this table to allow for order descriptions for the user.

**Commented [AG23]:** At this point I realise that a presentation of Stripe requirements should have been made. Without this how can this data model be evaluated fully?

| Column                | Type         | Null | Default     | Links to | Comments | Media type |
|-----------------------|--------------|------|-------------|----------|----------|------------|
| id ( <i>Primary</i> ) | bigint(20)   | No   |             |          |          |            |
| subscription_id       | bigint(20)   | No   |             |          |          |            |
| stripe_id             | varchar(255) | No   |             |          |          |            |
| stripe_product        | varchar(255) | No   |             |          |          |            |
| stripe_price          | varchar(255) | No   |             |          |          |            |
| quantity              | int(11)      | Yes  | <i>NULL</i> |          |          |            |
| created_at            | timestamp    | Yes  | <i>NULL</i> |          |          |            |
| updated_at            | timestamp    | Yes  | <i>NULL</i> |          |          |            |

Figure 9

#### 4.1.2.4 Products

Below is the products table that will contain the pricing information and will act as a retrieval source for the store and cart pages. Stripe product ID contains the pricing ID located in Stripe.

| Column                | Type         | Null | Default     | Links to | Comments | Media type |
|-----------------------|--------------|------|-------------|----------|----------|------------|
| id ( <i>Primary</i> ) | bigint(20)   | No   |             |          |          |            |
| name                  | varchar(255) | No   |             |          |          |            |
| stripeproductid       | varchar(255) | No   |             |          |          |            |
| price                 | int(11)      | No   |             |          |          |            |
| created_at            | timestamp    | Yes  | <i>NULL</i> |          |          |            |
| updated_at            | timestamp    | Yes  | <i>NULL</i> |          |          |            |

Figure 10

4.1.3 **Controllers**

Below shows a UML diagram for the classes and functions required from the system. This process has been used to describe the relationship between the classes as we are using an object-oriented approach to development. UML diagrams can be used to describe the system at a higher level which can aid development as Tanaka discusses in his paper. [43]

The system will use four controllers. The product, account, authentication, and pages controller. Pages controller will retrieve the views and each function is responsible for bringing a view.

The product controller will be in control of the logic for the cart, shop and checkout pages. Functions will be included for quantity changing, deleting items, creating subscriptions, and paying.

The account controller will need to allow the user to cancel the subscription, delete the account and edit or update the profile hence the functions located in the table.

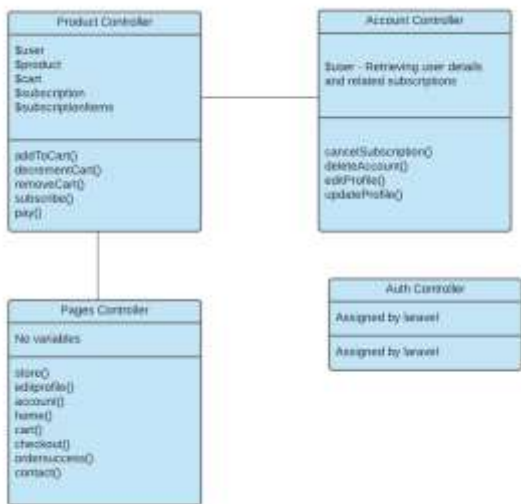


Figure 11 – UML diagram

#### 4.1.4 Stripe API & Cashier

Below is the diagram that shows the Stripe API resources or objects with a description related to how they will be used. To enable the API to work with the client's system the secret and public API keys need to be set in the environment file to hide the secret `key`. The product and price objects will be created in the Stripe dashboard. The price ID associated with that object will be used within the product table of the database.

**Commented [AG24]:** This will work but the methodology is not explained (.env is above the webroot and so unreachable over http)

The library called Cashier which provides an interface for the Stripe subscription API will be used [44]. Cashier provides methods for interacting with the API. In the diagram below is all the create commands needed for the subscription.

On registration, the create Stripe customer method will be used to insert the customer stripe ID into our user table along with the user details such as address. This is done as you need a stripe customer ID to create the subscription object. The subscription object will be created when the user goes to the checkout and the details of the subscription will be stored in the subscription table and subscription item tables.

The payment intent object will be created using the cashier method called create setup intent. This will track the status of the subscription payment through checkout. This object when created contains a client secret key that is unique to the user and is required for initiating the payment method object which collects the user card details. After the user pays the status of the subscription is updated.

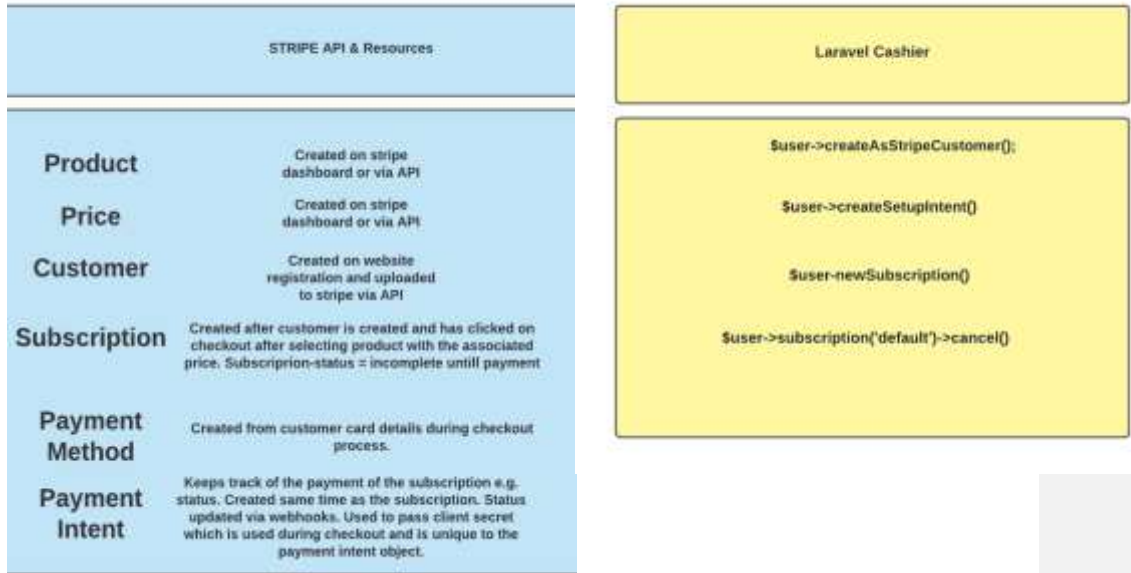


Figure 12 – Stripe vs Cashier



Figure 13 – Stripe Process

#### 4.1.5 Site Map

Below is the site map for the milk subscription website. The website will contain routes to the home, contact, store, cart, and authorisation pages. On the cart page, the user can go through to the checkout and then the order summary page as they complete the payment. Within the authorisation page, the user can then go through the account page and edit profile sections.

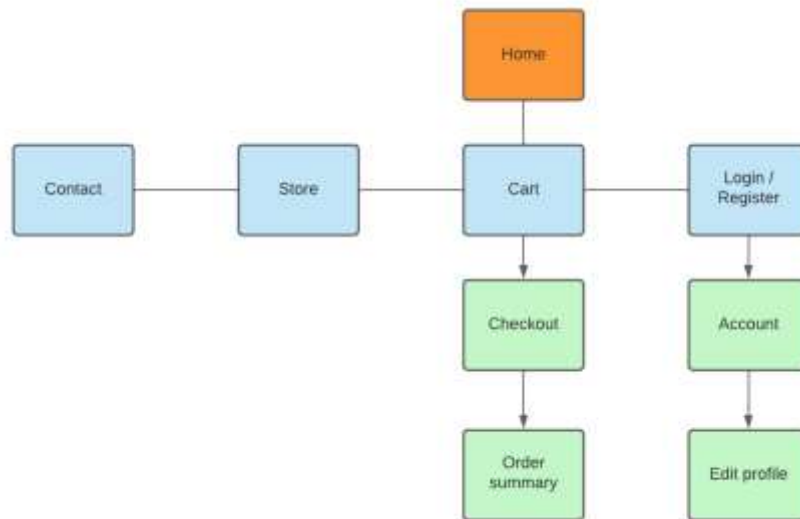


Figure 14

#### 4.1.6 Process diagrams

In this section, the processes of the user will be designed. These diagrams will form the basis for the main conditional and loop statements required on the backend of the system and will guide my implementation process when developing.

##### 4.1.6.1 User payment journey

Below is the payment journey the customer will go through when trying to purchase milk. The user will begin by going to the store and then adding milk to the basket. This process will be a loop as the user might need to add multiple items. After this, the user will move to the basket view. They might change quantities of items hence the conditional statement. The user will then move to the checkout where they will be checked if they are authorised and then will enter payment details. If payment details are correct the process will finish.

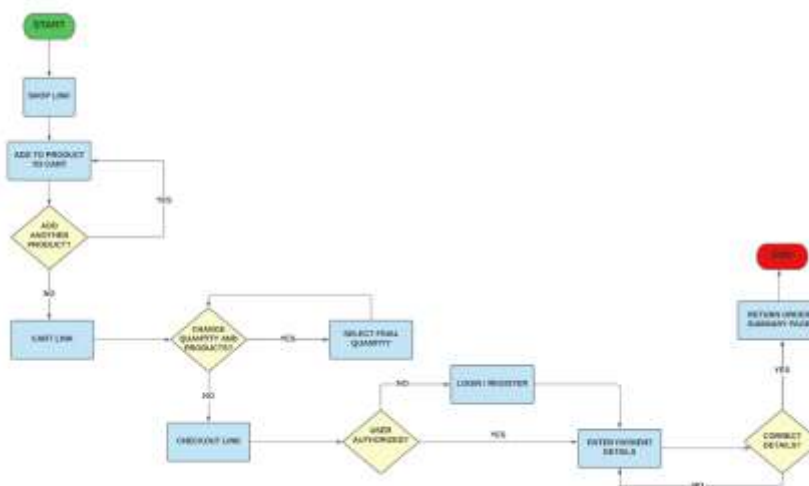


Figure 15

#### 4.1.6.2 User account journey

This process diagram represents the journey of the user for account management. The user will click the account link and will either be displayed on the account page with only user details or with subscription details if they have ordered. The user can then cancel the subscription or edit personal details. If the user cancels the subscription, they will be presented with an option to delete all account details from the system.

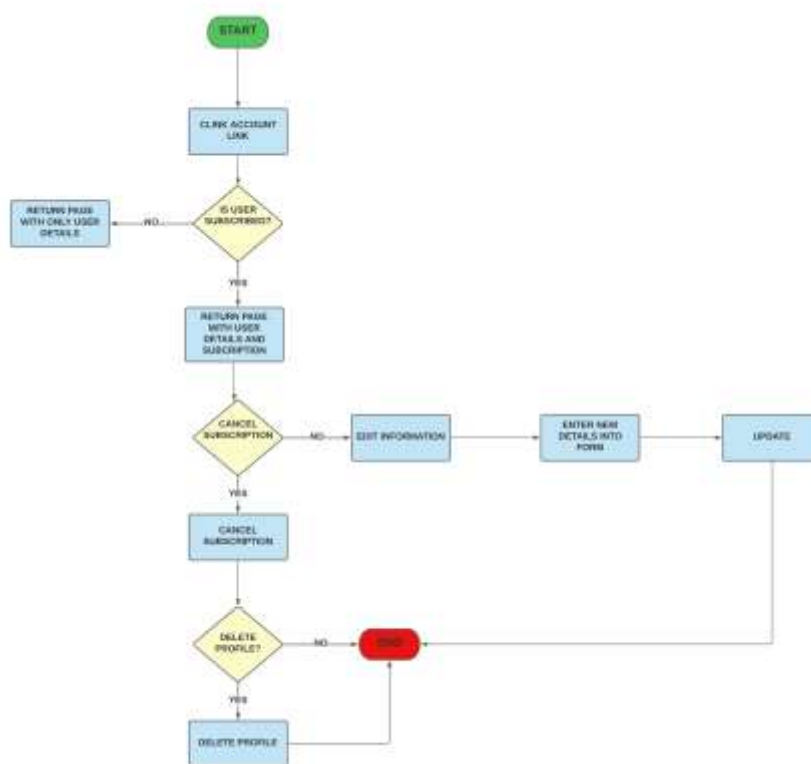


Figure 16

#### 4.1.7 Views

In this section, I will be discussing the interface designs for the intended views. Each view will build upon the base view which is the layout view found below. At the top of the layout, the navigation bar and account links are found. The account page and checkout will be represented with icons found on the top right. The colour scheme selected was discussed with the client and has been selected to present a more conservative and cool approach to the design.[45, p.489] The company name and appropriate logo have been included as per the requirements.



Figure 17

#### 4.1.7.1 Home View

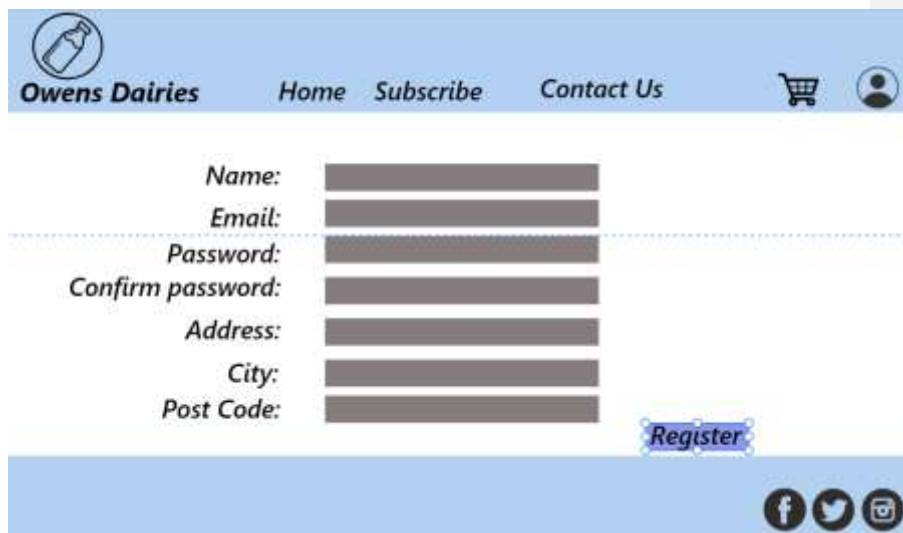
The central part of the page will be used for describing the process of subscribing. In the top right links to the account page and login are available. The design of the page utilises white space which can improve the user experience when not over utilised as discussed in research by Coursaris. [46] Additionally, Tidwell discusses the use of directing the user to the main content of the screen using centre-stage positioning making it easier for the user to understand what they need to do. [45, pg.146]



Figure 18

#### 4.1.7.2 Register view

Below is the registration view for the website. It has been designed with the left and right alignment layout discussed in Tidwell's book to ensure the user can easily read the form. [45, pg.174] The register button has been coloured blue to fit in with the layout of the page. This view will utilise the Laravel authorisation package.

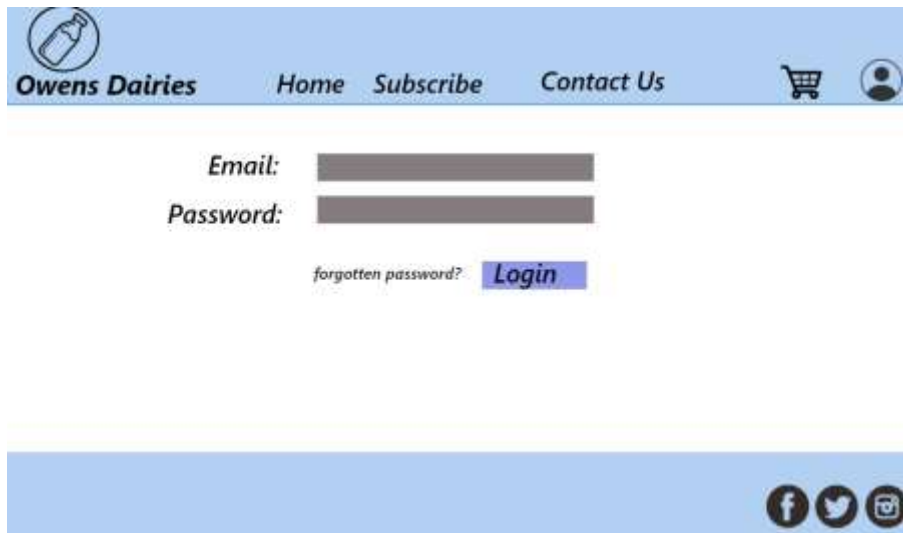


The registration form is displayed on a light blue background. At the top, there is a header bar with the 'Owens Dairies' logo (a milk bottle icon) and navigation links: 'Home', 'Subscribe', and 'Contact Us'. To the right of the header are icons for a shopping cart and a user profile. The form itself consists of several input fields with labels to their left: 'Name:', 'Email:', 'Password:', 'Confirm password:', 'Address:', 'City:', and 'Post Code:'. Each label is followed by a dark grey rectangular input box. A blue 'Register' button is positioned to the right of the 'Post Code' input field. At the bottom of the page, there is a blue footer bar containing social media icons for Facebook, Twitter, and Instagram.

Figure 19

#### 4.1.7.3 Login view

The login view is built on the authorisation package from Laravel. The form has been designed around the left and right alignment. The colour scheme is matched with the layout view.



The screenshot displays the login interface for Owens Dairies. At the top, a blue header bar contains the company logo on the left, navigation links for 'Home', 'Subscribe', and 'Contact Us' in the center, and a shopping cart icon and a user profile icon on the right. Below the header, the login form is centered on a white background. It features two input fields: 'Email:' and 'Password:'. Below the password field, there is a link for 'forgotten password?' and a blue 'Login' button. The footer consists of a blue bar with social media icons for Facebook, Twitter, and Instagram on the right side.

Figure 20

#### 4.1.7.4 Account View

The page will be responsible for allowing the user to view the current subscription and their account details such as address and email. Additionally, this page will allow the user to cancel the subscription and to also delete the account.

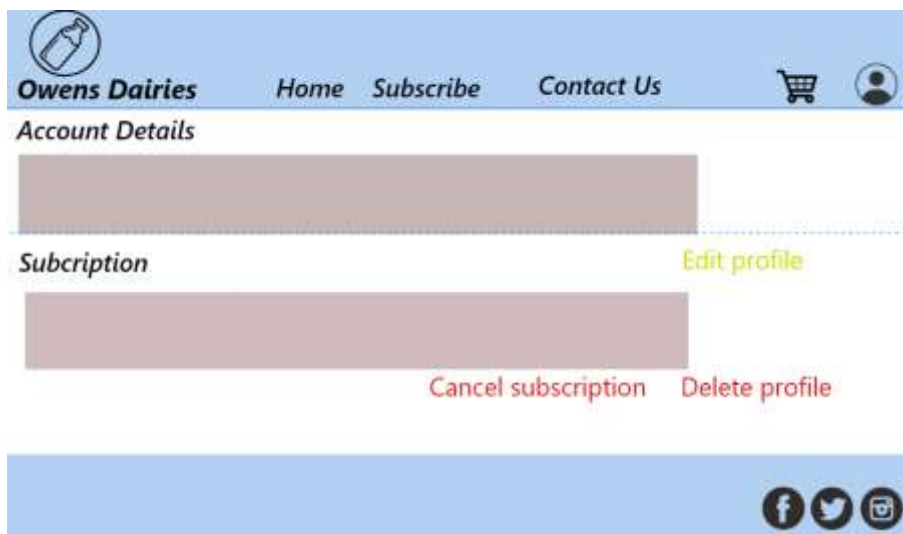


Figure 21

#### 4.1.7.5 Edit profile view

Old details of the user will be displayed on the left for a useful reminder of current details. On the right, the user will enter the new details into a form. This layout has been selected for the form as Tidwell recommends it for form-based layouts as it allows users to connect each control with the labels. [45, pg.174].

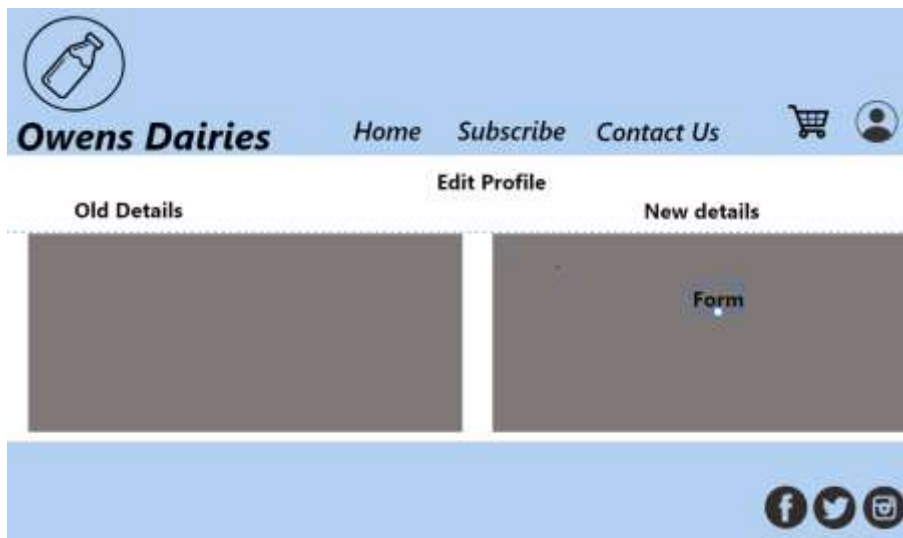


Figure 22

#### 4.1.7.6 Store view

For the store view, the user will be able to select the three products available. To ensure proper utilisation of white space the products will be displayed in the columnar way shown below. The add to cart buttons are sized large and coloured yellow to bring the attention of the user to the process needed. [45, pg.257]



Figure 23

#### 4.1.7.7 Cart view

The user will be able to review the order before purchase. The user will be able to decrement or increment the number of items. The user of the spinner buttons has been selected from the client. Tidwell mentions that the spinner option of input control is difficult for users to use as it requires dexterity. [45, pg.352] To counteract this effect the buttons have been made larger. Additionally, the use of colour and size of the buttons have been centred around the function. So, for the deletion of items, the button is red.



Figure 24

#### 4.1.7.8 Checkout view

The page is split into order details to show what the user is ordering and paying for. On the right is the payment details. This is based on the right and left alignment layout discussed by Tidwell in her book. The button displayed will be yellow again to signify a process to the user.

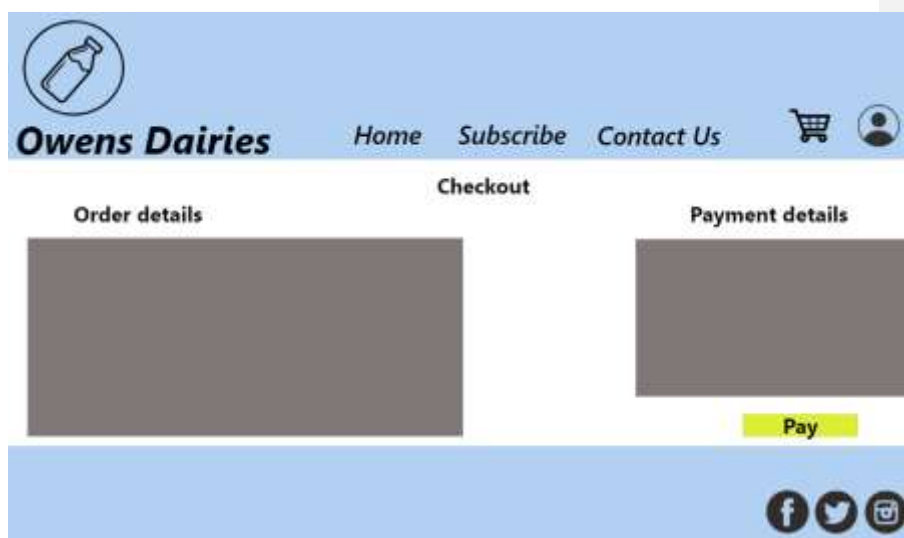


Figure 25

#### 4.1.7.9 Order summary

The user will be displayed the purchase and the delivery details in left and right alignment to clearly present the details to the user. The delivery details presented will be the same details the user provides in the registration process including address, name, and email.



Figure 26

#### 4.1.7.10 Contact view

In this view, the user can find the contact details of the client as well as a form submission for contacting the client. The form will use the left and right alignment discussed previously and will use a green button to signify the action of the button.

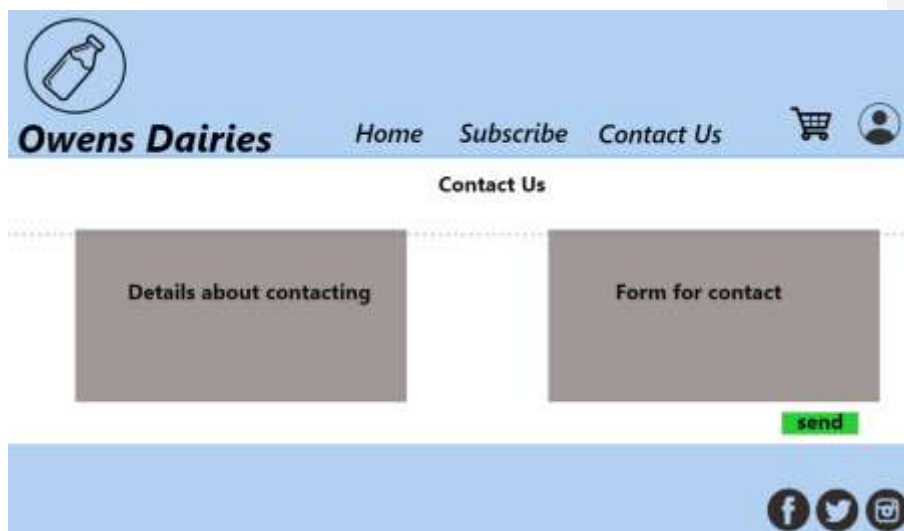


Figure 27

## 4.2 Implementation

### 4.2.1 Problems & Successes

#### 4.2.1.1 Error code 419

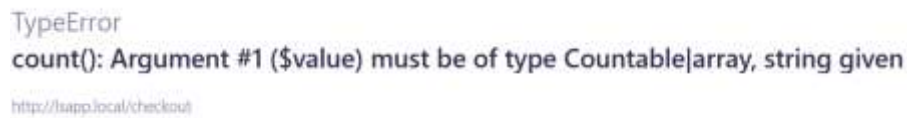
The first form created had an error. This error is related to cross-site request forgery (CSRF) which is an attack vector for hackers who hijack HTTP requests on authenticated users. [47] To resolve the issue a CSRF hidden input field was attached to the form which allows Laravel CSRF protection middleware to validate requests by checking the users CSRF token for that particular user's session. [48]



Figure 28

#### 4.2.1.2 Passing array via form

Another problem relating to forms occurred during the development of the cart page. The cart variable created during the add to cart press on the store page is stored in a session variable and contains multiple values such as quantity, price and stripe price ID. In the view, looping over the object and its arrays to display the values and to insert these values into the form. However, when the form is sent to the controller to initialise the create subscription and payment intent process an error is displayed as shown below.



```
TypeError
count(): Argument #1 ($value) must be of type Countable|array, string given
http://localhost/checkout
```

To resolve this issue I changed my form names to include arrays as shown below:

|        |                                                                                 |
|--------|---------------------------------------------------------------------------------|
| BEFORE | <pre>&lt;input type="hidden" name="name" value="{{ \$id['name'] }}"&gt;</pre>   |
| AFTER  | <pre>&lt;input type="hidden" name="name[]" value="{{ \$id['name'] }}"&gt;</pre> |

Figure 29

**Commented [AG25]:** Not the most secure solution – any issues with raw data being presented in the view?

Solution: Make a temp DB record to store this and retrieve with each subsequent page view.

This is one to question in viva!

#### 4.2.1.3 Cashier payment process

During the creation of the subscription function, an issue was discovered in the way in which Cashier handles creating the subscription. Originally, in my design I set out to use the following method:

```
User->newSubscription('default')->create($request->paymentMethodID);
```

As you can see in red it requires a 'paymentMethodID'. This is an issue as the process of subscribing for the user for this application requires the payment method last. To resolve this I used the stripe API to create the subscription manually using this code:

```
if (count($request->stripe) > 2){  
    $totalq = $request->quantity[0] + $request->quantity[1] + $request->quantity[2];  
    $user = Auth::user();  
    $stripeSubscription = Stripe\Subscription::create([  
        'customer' => $user->stripe_id,  
        'items' => [  
            [  
                'price' => $request->stripe[0],  
                'quantity' => $request->quantity[0],  
            ],  
            [  
                'price' => $request->stripe[1],  
                'quantity' => $request->quantity[1],  
            ],  
            [  
                'price' => $request->stripe[2],  
                'quantity' => $request->quantity[2],  
            ],  
        ],  
        'payment_behavior' => 'default_incomplete',  
        'expand' => ['latest_invoice.payment_intent'],  
    ]);  
}
```

Figure 30

#### 4.2.1.4 Updating status

In the diagram above the payment, behaviour is set to “default\_incomplete” when the user subscription is completed. Once the user pays this is set to “Active” automatically on Stripe. However, within the database, this is not synced with Stripe. To resolve this the following was added to change the database value upon payment syncing both Stripe and the client system correctly.

```
public function pay(Request $request)
{
    $user = Auth::user();
    $user->updateDefaultPaymentMethod($request->payment_method);
    Subscription::where('user_id', $user->id)->update(['stripe_status'=>'Active']);
    return view('/orderconfirm', ['subscriptions' => $user->subscription()], ['userdetails' => $user]);
}
```

Figure 31

#### 4.2.1.5 Delete account

Another problem involved deleting the user and their order from tables. The first method was to delete the user and the subscription hoping that the database would cascade delete. However, this had not been set up. To resolve the issue the following code was added to the delete account function in the account controller:

```
public function deleteAccount (Request $request){  
  
    if($request->cancel){  
        $user = Auth::user();  
  
        SubscriptionItem::where('subscription_id', $request->cancel)->delete();  
        Subscription::where('id', $user->id)->delete();  
        User::where('id', $user->id)->delete();  
        Auth::logout();  
        return view('/welcome');  
    }  
}
```

Figure 32

This request is used to delete the user's subscription items from the table. In the subscription table, the user ID is matched to delete the subscription. Additionally, the user ID is used to delete the user table record. After, the user is removed from the system they are logged out.

**Commented [AG26]:** Why would the orders be deleted? This would be inadvisable. Accounts, stock levels, etc.

**Commented [AG27]:** But then if the account is deleted in error, all previous transactions are lost. Perhaps archiving the account would be better? Data protection?

#### 4.2.1.6 Cart

The system had no feedback for the user to know if a product has been added to the shopping cart. To resolve the issue a counter was added using the code found below.



Figure 32

#### 4.2.1.7 Foreach array

When creating the checkout view, I originally tried to calculate the total price of the order using the technique below.

```
<?php $total = $quantity1 + $quantity2 + $quantity3; ?>
```

This approach only accounts for users ordering three types of milk during checkout. To resolve this, I used a for each loop to go through the items array and to add the quantity to the total. This code allows for any number of items.

```
<?php $total = 0 ?>

@foreach($stripeitems as $plan)

<?php $total = $total + $plan->quantity ?>

@endforeach

<p style="padding-left: 350px;"><b>Total Price:</b>f{{{ $total }}}</p></td>
```

Figure 33

## 4.2.2 Software Testing

### 4.2.2.1 Functionality Testing

Functionality testing to ensure the key systems of the project work before the acceptance testing was done. Results can be viewed in **appendix A**.

### 4.2.2.2 User Acceptance Testing

For the testing of the application user acceptance testing (UAT) has been the selected method for the project. UAT is testing done by the user is focused on ensuring the system is functional for users. [foundations of software testing, 56] This method of testing is appropriate for this project as it simulates what the real users will be doing. UAT testing involves a scenario for the users. The scenario for this project is:

- Register for the service.
- Purchase a subscription.
- Handle subscription management

Commented [AG28]: Vague.

After the user will be asked the interview questions.

The sample appropriate for qualitative interviews is in the range of 8-16 according to research. [49] For the testing eight participants have been selected. The sample is made up of five males and three females. The age range of the participants is between 27-55 years of age and all participants are users of the system with three of them being employees.

Commented [AG29]: Justified well.

#### 4.2.2.2.1 Results of testing

The full transcripts of the interviews and the analysis can be viewed in **appendix B**.

## 5. Evaluation

### 5.1 Embracing digitisation

The first theme observed was the acceptance of the service becoming digitised. The first two questions of the interview asked the user's initial opinions on the service and the prototype.

All respondents of the interview expressed either interest or support for the service becoming digitised. However, this does not mean that the service is best suited to those individuals. Two participants' responses could suggest that the service is not suited to buyers who prefer to pay in person.

"I think it's a good idea but I wouldn't be that bothered if it didn't happen as I use cash anyway..." (P2)

Other customer respondents suggested that the service moving online will allow them to manage their subscription and orders with the business better as they experienced frustrations with the current service. Additionally, one expressed a preference for paying digitally.

"Moving the service online is a great idea. I love to pay online and to avoid change and cash. I think this service will allow me to manage my subscription much better if it is online." (P6)

The employees of the service also welcomed the move to the digital service. Reasons include better experience for the customer and the potential for new customers. Additionally, they perceived increases in efficiency in everyday work matters such as order list creation and payment collection with the move to digital.

Overall, the perceptions of the users concerning the digitisation of the service are mostly positive from the responses with most users expressing a want to pay and manage digitally.

## 5.2 Aesthetic Contrast

Another theme was the differing views relating to the aesthetics of the application.

Responses from the users showed a favourable view of the general design of the website landing page. However, issues relating to the way information was presented on the page was common among the participants. Specifically, the way the homepage subscription steps was presented was an issue for five of the users. Reasons included lack of vibrancy, dislike of the text and clarity. Recommendations from the users were offered including replacing the text list with an image or a diagram of the subscription steps.

“My first impressions of the website are mainly good it is very clear on how to subscribe online however it wasn't really nice to look at on the front page I thought they could've been a picture of something to show what was going on rather than a list.” (P4)

Aesthetic issues with the process were found when the users were asked if they had any negative experiences. Issues with pictures used in the store page because they did not represent the product accurately and displayed unprofessional tones in relation to the business.

“Keep the website professional by removing the cartoon pictures. Change them for more realistic ones....” (P2)

The aesthetic issues discussed show usability issues with the website and the heuristic of aesthetics. The user experience of the user is also affected by the issues discussed as shown from the generally negative responses of the participants. However, each user had no issues with the aesthetics of the application in other areas which could suggest that the application aesthetics is at least acceptable.

### 5.3 Process recognition and system visibility

This theme is concerned with the user experiences with the subscription process and the application feedback during that process. Multiple users experienced problems with the registration and subscription process within the application. Some said that the process of purchasing, and registration was confusing due to being forced to register first or not being able to complete it in one swift action.

“It is like other websites really and yeah only difference will be that I am used to entering my address and name in with the payment field. I'm not used to registering at the start” (P1)

Furthermore, multiple users experienced confusion with the process due to the lack of visibility of the stages needed to finish the process of subscribing. Annoyance was also experienced because of the lack of visibility forcing certain users to switch back to the homepage to see the next step.

“Obviously, on the homepage, you have that list of them steps to go through. However, going through it would've been better if it lets you see how far you are in finishing the steps..” (P4)

Three participants found the process of subscribing and accessing the application very simple. The navigation process has impeded the user experience to some extent. Recommendations from the users were observed regarding the subscription process which strengthens the negative feelings of the user experience.

Two participants found the account page difficult to access due to the link not being visible upon first inspection due to the drop-down menu design. This could be an issue with the design of the navigation menu as it relates back to the heuristic of visibility meaning the usability and the user experience of the users is affected. However, with only a small sample of the users experiencing this issue it could be down to individual preferences and knowledge. Another issue relating to the account page was not being able to modify the subscription after paying resulting in them having to cancel the subscription and go through the process again to change the order amounts. This is an

issue with the system design and requirements as the system was not specified to include this feature.

Users found that the number displayed for the basket icon was not clear due to the contrasts of the blue and red colours as well as the size of the number. Recommendations brought up regarding this matter suggested that a more visible alert would be better for those individuals as to show completion of an element of the process. The lack of responsiveness for these elements of the application is a design flaw within the system that needs to be improved as it relates to the usability heuristic of system visibility.

“Perhaps having something pop up when adding something as the number is not very clear when shopping.” (P4)

It is clear from the analysis that both the system visibility and the process relating to subscribing is needed to be improved for the user to gain a beneficial and enjoyable experience when using the service. However, user experiences between individuals did vary with some showing positive hedonic feelings with the process.

#### 5.4 **Flexibility and online payments**

Flexibility was a theme from the analysis of the responses. Customers showed an acceptance of the system due to the features it provided them offering more flexibility compared to the traditional way of ordering.

One feature discussed was the account management facilities located within the application. One participant believed that the feature would allow them to manage their life better as they can cancel their subscription before important life events such as holidays rather than calling in the set office hours. Another user stated that they would choose the online service because of the account management features “yeah I think managing the subscription online would improve my life offering me flexibility.” The flexibility of the account management feature is offering the users a better experience compared to the older system.

Some users including employees stated that paying online would improve their experience due to it being quicker and more efficient. This could suggest that the digitisation of the business process would improve the customer experience by allowing the users a more streamlined subscription process.

However, not all users believe that the online payment system is better. Some still preferred paying through cash and one employee believed that older customers would still prefer the old way of paying. All users in the testing found the payment system to be legitimate and trustworthy. Some experienced issues with the layout and payment options provided going on to recommend solutions. This could mean that the user experience is impacted negatively due to the usability layout of the payment system.

“I think the bits of the card could have been split up. Like separate the expiry and card number” (P6)

“Yes, however, it would be better for multiple payment options such as apple pay or PayPal.” (P3)

Employees of the business also stated that the system could be improved if the administration page were completed “For me, it would have been good to have an order page for us drivers. However, you have shown me on the stripe dashboard I can view orders online.” This shows that the system implementation could have been better to facilitate a complete system for the employees which would have improved their experiences in terms of enjoyability and practicality.

From all the responses every respondent believes that the online system will improve their experience either from flexibility or from online payments. This could suggest that the application would improve the user experience when regarding these factors. However, considerations for the user recommendations for the payment layout and cash payments need to be taken into account as this suggests the application is not yet suited for all needs. Additionally, the admin page needs to be considered for a more enjoyable system for the employees.

**Commented [AG30]:** Admin roles? Were the admin pages viewable by everyone?

## 5.5 Comfortability and enjoyability

When testers were asked about the system in terms of their enjoyability and comfortability the majority of them found their experiences both enjoyable and comfortable “Overall yeah the website was enjoyable to use I enjoyed ordering on it and seeing it working for us.” This could mean that the design of the application was suitable for the majority of users and the time they spent using it.

However, with the general positive hedonic experiences of the users and employees, they still had suggestions for improving the system that relates to the system visibility and feedback issues discussed previously “No issues but it would be nice to have more feedback when something is complete.” This suggests that the software is satisfactory but needs improvement in its design to derive a more fulfilling and meaningful experience for the user.

## 5.6 Evaluation conclusion

The user experience of both the employees and users with the system suggests that the software has improved their experience compared to the older service. It is clear from the comfortability and enjoyability theme there is an overall acceptance of the system with most users experiencing positive feelings. Additionally, the system provided the users with greater flexibility due to the features on the account page enabling greater control and efficiency in managing the subscription. All the users believed that the system would improve their experience due to the flexibility and the online payments.

However, even though the acceptance of the system was positive the users still experienced negative emotions with particular features or were left with unfulfilled desires such as the admin page for the employees and the system visibility issues in the subscription process. These issues were not expected as the intention with the design was to make it as easy as possible to subscribe. They do show that the design objective of making a suitable system for the client is partially failed as the admin page would improve efficiency for the employees.

Users also expressed negative experiences with the aesthetics of the page which suggests improvements needed to be changed in the usability of the design. To improve the application further considerations into other usability principles such as visibility and feedback are also needed as users demonstrated difficulty recognising if actions and steps in the process of subscribing had been fulfilled.

If the research were to be done again increasing the sample size of the users would be beneficial to gather more experiences. The current sample size is satisfactory for an interview study. However, deeper insights could be gained with more users. The usability of the system would be greater if the design of the system was more focused on the frontend compared to the API and backend systems as was evident from the negative responses. Exploration of more positive emotions relating to the system would be beneficial as during the testing trying to bring out more information from users was difficult. This phenomenon could be due to the lack of semi-structured interview practice on my part.

**Commented [AG31]:** They never are!

**Commented [AG32]:** Requires extra security.

**Commented [AG33]:** Perhaps... people are always more ready to moan.

## 6. Conclusion and recommendations

The research set out to find whether software can improve the process of ordering milk for users of the service. Research conducted in the literature review facilitated this main aim by providing an understanding of the technologies and the business needed to construct the design of the system. While there are limitations observed in the evaluation relating to the design and implementation including the admin page and system visibility issues, the objective of creating a design suitable for the client was reached as the requirements specified have been met.

For the design, the system used the cashier library to handle the stripe requests which resulted in being unable to handle subscriptions without payment methods. This was rectified using the stripe API manually. During the evaluation issues were experienced with getting participants to give more insightful answers, this could be due to my inexperience performing interviews as well as the structuring of the interviews. Additionally, the evaluation exposed areas in the design such as visibility, aesthetics and features. However, evaluation and analysis did find the user experiences of both the employees and users which resulted in the system improving their experiences.

### Suggestions for further work

From the evaluation, the admin page would have been a great feature to implement for the employees. Future work could involve implementing the admin page with the order information of each customer for the week's rounds splitting them into three separate lists, one for each driver. Future work could be done exploring the system in a mobile format to see if the user experience is more beneficial via mobile.

Implementation of more payment methods would be an area of further work as well as implementing a cash payment option. Implementing the system with PayPal over Stripe and redoing the study to compare user experiences with the different payment systems.

Another area of study could be done on the payment process comparing registration first to all-in-one order and registration as some users experienced concerns. Finally, a study exploring the system used in a trial week in the business to see if the system

**Commented [AG34]:** Geographically? If so... phew, lots of work there. If arbitrary... not so efficient.

**Commented [AG35]:** As well as?

could improve the efficiency or profit for the business to prove the system is beneficial financially.

## 7. Reflection

During my time developing this subscription system and exploring the perceptions of the users I have learned a lot. At the beginning of the project, I felt underprepared at first to carry out what was necessary for the technical aspects of the project such as the implementation. Additionally, I felt overwhelmed to be carrying out my first interview research study analysing the experiences of customers of a business. However, as soon as I started the initial investigation into the literature and technologies, I found the process to become easier as my knowledge developed further. I gained confidence further after setting up the database and strategy for the research as that set the fundamentals for completing the implementation and evaluation.

I did experience some issues in the implementation however managed to overcome them by using alternate techniques to what was in the design. In the future, I will analyse design details in more detail to avoid issues like this. I also experienced issues with the interviewing as the answers from the users were insufficient in some areas. This was probably due to me being inexperienced in performing interviews and next time I will spend more time testing my interviews. The design went well in the beginning but from the evaluation of the user responses, I think areas such as aesthetics and the system layout could have been better designed in hindsight. To rectify this in the future I will consider the issues experienced in future designs.

However, despite all of these issues, the project aim was achieved as I was able to determine the user experience of the users. I learnt that my development skills have definitely improved compared to other projects I have done in my past and my knowledge in web development practices has grown. However, I do need to focus my efforts more on front-end design as the user experiences have shown that is where most issues lay.

**Commented [AG36]:** Did not trial interviews!!!

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## **Appendix A**

### Shopping page

| <b><u>Test Number</u></b> | <b><u>Test Case</u></b> | <b><u>Expected result</u></b>                    | <b><u>Actual Result</u></b>             | <b><u>Outcomes &amp; Actions</u></b> |
|---------------------------|-------------------------|--------------------------------------------------|-----------------------------------------|--------------------------------------|
| 1                         | Add to cart buttons     | Item added to cart and number added to cart icon | Item added to cart number not displayed | Included code for cart number        |

### Cart page

| <b><u>Test Number</u></b> | <b><u>Test Case</u></b>                 | <b><u>Expected result</u></b>                                     | <b><u>Actual Result</u></b>                    | <b><u>Outcomes &amp; Actions</u></b> |
|---------------------------|-----------------------------------------|-------------------------------------------------------------------|------------------------------------------------|--------------------------------------|
| 1                         | Increment button                        | Quantity increases and the number in the cart icon increases by 1 | Quantity increased and cart number is correct. | N/A                                  |
| 2                         | Decrement button                        | Quantity decreases and the number in the cart icon decreases by 1 | Quantity correct.                              | N/A                                  |
| 3                         | Remove button                           | Deletes item from cart                                            | Item deleted                                   | N/A                                  |
| 4                         | Checkout button with user not logged in | Redirect user to login page                                       | Redirect correct                               | N/A                                  |
| 5                         | Checkout with the user logged in        | Redirect to the checkout page                                     | Redirects                                      | N/A                                  |
| 6                         | Continue shopping button                | Redirect to shopping page                                         | Redirects                                      | N/A                                  |
|                           |                                         |                                                                   |                                                |                                      |

#### Checkout page

| <u>Test Number</u> | <u>Test Case</u>        | <u>Expected result</u>                                                             | <u>Actual Result</u>              | <u>Outcomes &amp; Actions</u> |
|--------------------|-------------------------|------------------------------------------------------------------------------------|-----------------------------------|-------------------------------|
| 1                  | Order                   | Order displaying in the column on left.                                            | Order displays correctly          | N/A                           |
| 2                  | Correct payment details | Accepts test card data: 4242424242424242                                           | Accepts card data                 | N/A                           |
| 3                  | Payment button          | Redirect to order summary page                                                     | Redirects                         | N/A                           |
| 4                  | Incorrect payment       | Does not accept incorrect details:<br><br>Letters, symbols and incomplete details. | Does not accept incorrect details | N/A                           |

#### Account page

| <u>Test Number</u> | <u>Test Case</u>    | <u>Expected result</u>                                   | <u>Actual Result</u>            | <u>Outcomes &amp; Actions</u> |
|--------------------|---------------------|----------------------------------------------------------|---------------------------------|-------------------------------|
| 1                  | Edit profile        | Edit profile form and buttons work                       | All buttons work with form data | N/A                           |
| 2                  | Cancel subscription | User status changes to cancelled                         | User subscription cancelled     | N/A                           |
| 3                  | Delete account      | Delete button deletes account and redirects to home page | Deletes account and redirects   | N/A                           |

## Appendix B

### 1. What were your first impressions of the website?

Yeah, I like the overall aspect of the website however I did find the homepage to be a bit bland. You could have more interesting pictures or diagrams for the first page and a more artistic way to represent things but yeah generally overall I have an average first impression.

Happy that this has to decide to go online it looks like a service that I would want to use.

I liked the colour scheme and the layout was very easy to read I like the simplistic design of it.

My first impressions of the website are mainly good it is very clear on how to subscribe online however it wasn't really nice to look at on the front page I thought they could've been a picture of something to show what was going on rather than a list.

I found the website was really well laid out showed all the products that we offer and obviously, it records the details of the customer and their subscription and I think that's great. However, I do think the front page could've been improved it could've been a bit more popping and for it to stand out more for the people coming to our website. Yeah, I think overall it is quite good to see that our business represented in that way.

My first impressions were very good the front page displayed all our products and how to subscribe. Compared to our old website definitely better. It could be improved by changing the list to something more exciting it looks very dull.

When I first saw the website I was impressed. The blue colour was really nice. The description of the business was really good. The list on the right needs to be changed to something more vibrant.

I liked the site and the description of the business. I didn't like the text but I did like the colour on the screen. Overall, very good.

Blue – Generally favourable view of design - 3

Red – Issues with homepage - 3

Yellow – Delivery drivers view positive - 2

Green – issue with the homepage – text and images. - 2

2. What are your thoughts on the digitisation of the milk delivery service?

I think it's a good idea but I wouldn't be that bothered if it didn't happen as I can use pay you cash anyway but I think it's good to be able to manage your subscription online and it offers a bit more control over handling my life.

Happy that it is now all done on the computer I found it quite frustrating sometimes when trying to order on the phone as you can only order at certain times of day.

I think it's very helpful to be able to order wherever I am. Especially over the Internet because you can do it at any time of the day compared to the phone deliveries as you have to ring within the opening hours to order.

I think it is good as I like to use online payments to allow me to manage my money. However, I do like the old way of paying with the cash as well as I can get rid of my spare change so I'm a bit of a 50-50 to be honest with you.

So I think it is good for us to go digital as it will gain us more customers. Hopefully, it will allow us to build order lists and gather more people in the future.

Moving the service online is a great idea. I love to pay online and to avoid change and cash. I think this service will allow me to manage my subscription much better if it is online.

Yeah, it would offer a better customer experience for the customers. It is better for us if we are spending less time waiting for customers to find money or answering calls for orders every day.

Grey – Digitisation is welcome - 3

Green – Delivery drivers believe it will be better.

Yellow – Management of orders is important.

Pink – Cash is important to some

3. How did you find navigating the website?

It is like other websites really and yeah only difference will be that I am used to entering my address and name in with the payment field I'm not used to registering at the start so there that was a weird change for me as a person.

Easy to navigate yeah I do find the buttons covering all aspects so it was clear on how to operate the system and access your details

I found the navigating website very easy with the colour scheme means all the text is very easy to read. It is very easy to make an account and to select what product you want and put in the details to get the order together.

It was easy to navigate and pretty good almost like a normal website however it wasn't really clear on how to subscribe unless you're on the homepage so it got annoying when you go to do the steps you didn't know if you were on the right page or step in the process.

Yeah, I found it quite easy to follow per the instructions on the front page. I did find going from the store to the cart a bit hard it would have been good to have something pop up to tell you to review your order. I also think the account page is a bit hidden away. It would have been better to have a more obvious way to get there. I did find it easy to go through the rest though.

I found it easy to use. I did have to go back to the homepage to view the steps once or twice. It might be good to have the steps on each page or something if they are a new user.

Navigation was easy much like other stores. The steps to buy things are much different though. Registering first is strange.

Um yeah, it was ok. It was clear on what was needed to order some milk. I had no issues really.

Blue – Issues with navigation and visibility during operation – Cart not responsive, process unclear.

Pink – Process easy and account easy to view.

Red – Registration confusing

Yellow – Account unclear.

4. Was it clear during use how to operate the system and access your account details?

Yes, however, if I didn't read the starting page it could've been a bit confusing. As I said earlier that you just move typically from the store to the basket and then you enter all the details at once but this website is different.

Yes, it was very clear on how to use it and access the account.

Very simple to see my account and what my subscription entailed after ordering.

Obviously, on the homepage you have that list of them steps to go through. However, going through it would've been better if it lets you see how far you are in finishing the steps. In terms of accessing the account details yeah that was pretty clear and then it's good you could change the details on delivery. However, it would be nice if there was something to edit the subscription without cancelling and re-going through.

Yeah as I said earlier it was quite hard to access the account and that could be improved. But once on the page, it was easy to use and change details and is well designed for our customers. I do think it would be better if you could modify your order on that page though.

Yeah using the website was easy enough. The account page took a few seconds to find but it wasn't too hard to find. Maybe a larger link for the account.

On the homepage, it was a pretty good description of what was needed. However, if I didn't see that page it could be confusing to ask someone to register first. Accessing account details was easy.

It was clear for me and I think It would be for customers as well. The account page is easy to find as most sites keep it in the top corners most of the time I think.

Yellow – Yes but initially the process wasn't clear

Blue – Clear

Pink – Issue with steps – hard to remember on other pages.

Green – Process confusing as registration is first – Unfamiliarity compared to other sites.

5. How did you find the structure and the visuals of the application?

I think it was good for the most part it was the same throughout but it was a bit bland on the homepage as I said and perhaps the checkout could've been a bit more spaced out as it is quite narrow when you click on it. I think is quite clear when you're going through what you're buying but I feel like yeah is it a different way of checking out I'm not used to.

I thought that whilst it was easy to read it's quite simplistic it doesn't necessarily look like an established businesses website. It would be good to improve it visually.

As I've already said the presentation of the website is good and I thought that the pictures used were good.

I think the visuals could be improved as I don't think it is good looking really. The structure was okay but that could be because I am used to ordering on similar websites.

I think the structure could have been better for the text and the colours were too similar throughout making it a bit boring. I also think that the images of

the milk could be improved by showing our real products. I do like the basket though.

I like the structure it is like a normal site. The store looks good and is well laid out. I would prefer to see the actual milk though. The colour scheme of the site is nice I like the blue.

I think the organisation of the pages is well done. It is like a normal website structure so not confusing at all. I like the art style and the simplicity.

Visuals could be changed to be better. I think the pages all look to similar so maybe something unique on each page would be better. The structure of the pages was good I like how the order was on the left and the buttons on the right.

Yellow – Structure is good.

Pink – Content of the page such as the store images was an issue.

Blue – No issue with the aesthetics.

6. Would you change any of the features or add any new features to improve the service?

I don't know perhaps offering a way to register as you pay as long as you can do it all in one if you're not registered already. Maybe make like a new page for doing that do the both at the same time. Perhaps you could add the other products that are available that I normally get with my original delivery so she's like the cheese and the butter and the cream.

Keep the website professional by removing the cartoon pictures. Change them for more realistic ones yeah even actually pictures of the product itself what to expect on your doorstep.

I would add the change subscription feature mentioned earlier. Change the subscription on checkout during payment.

For me, it would have been good to have an order page for us drivers. However, you have shown me on the stripe dashboard I can view orders online. Perhaps

having something pop up when adding something as the number is not very clear when shopping. Something, like on amazon when you can go straight from shopping to checkout. Also, being able to change the number of bottles in the account section.

I would change the number on the basket to a bigger one for clarity. I think in the account page the user probably doesn't need to change their email or name often but might need to change just the address.

Maybe give the user the stages on each step of the registration steps. Add something on the contact page for confirmation of the message being sent.

The admin page would be good to add in the future. I would change the text and add more unique things on each page.

Grey – No feedback or visibility in the process or help during.

Green – System not flexible after ordering user wants to be able to modify subscription after order.

Yellow – Registration should be in one page, not a fan of the process.

Blue – Drivers wanted the admin page.

Pink – Dislike of the aesthetics of the site.

7. Did you feel confident and comfortable using the system?

Yeah, I feel okay using it no qualms really it is like using a standard website really.

Yes, it was very easy and felt completely comfortable using the system.

Yes very simple to use and I think anyone could use it.

Yes, I felt comfortable using it. But going through the process it would have been good to be told how long I had left in the process without going back to the first page.

Yeah, I have no issues using the system personally it's a pretty normal standard structure for our website and for our customers.

Yeah, I felt ok. It was easy enough to use didn't have any worries.

I felt confident and comfortable with no issues in using it.

Easy to use the website so yeah I felt comfortable with it no issues.

Blue – No issues using the system to achieve the task in terms of comfortability.

Yellow - Average

8. Was the system enjoyable to use?

System was okay to use. I wouldn't say that it was negative or positive.

Yes, I think so.

It was alright nothing fantastic.

Simple to use. It would have been good if when you clicked on add to cart buttons on the store if something popped up as the number on the basket is not very clear.

It was okay it was just a normal website for myself. I wouldn't say it was terrible or fantastic. Room for improvement.

Yeah it was enjoyable to use I think. Much better than the old one.

No issues but it would be nice to have more feedback when something is complete.

Overall yeah the website was enjoyable to use I enjoyed ordering on it and seeing it working for us.

Yellow – Didn't mind the system but didn't hate it either. Neutral response.

Green – Liked the system. Reasons including better than old website.

9. During the operation of the website did you have any frustrations which negatively impacted your experience?

Just the homepage really just the way it looks probably negatively impacted my experience straight away. The account management page is a bit strange to use but you can just cancel the subscription they can't edit it. Oh yeah and there is no affiliate pages such as Facebook on the website.

When I went to try and change my subscription there wasn't the option to change the subscription only an option to delete my subscription and I had to go through the whole process again when wanting to change my subscription details again which was a bit of a headache.

No, it all went very smoothly.

The process of going through the steps was annoying as you had to flick back, the cart has an unclear number and the homepage could be better designed as it is plain.

When you go into the payment area the total were off in alignment. The number on the cart could be changed to a new colour. Also, the admin page for viewing orders would be good.

No way to check how far through the process you are which forced me to go back to the home page to look at the steps again. The photos could be better in the store also.

Not really. No real negative impacts. Just the feedback suggestion and confirmation details.

The total value on one page was slightly askew not really a frustration just a small detail. Also, the pages could be more exciting for us and the customers.

Yellow – Lack of visibility during the process ruined the experience for them

Green – System would be better with an edit order after purchasing.

Red – No issues.

Blue – Page display issues

Grey – Number on cart was hard to see when using the system.

10. Do you trust the website enough to use real information and card details? (Probe on why)

Yeah, I was a bit confused that you only enter the card details without the name to go with it. Kind of strange for me personally but yeah I think I felt secure enough using it.

Yeah, I think I would use my own details it looked legitimate.

Yes, however, it would be better for multiple payment options such as apple pay or PayPal.

Yes I trust it with my information. It, is a different way of paying as you normally enter all details such as address with the card details. However, I think it looks good and it told me my type of card.

Yeah, I think I would use it personally. I think it is quite simple to pay which is great.

I think the payment is easy to fill out. I think the bits of the card could have been split up. Like separate the expiry and card number into different boxes.

Yeah I would enter my card details into it no issues. I think it looks safe enough for me as it looks like other payment blocks.

Yeah I would enter my details and I think most customers would be alright with entering their own details. The payment side of things was nicely done.

Yellow – Would use the system but were confused in the layout of the payment as it differed to other e-commerce sites.

Blue – Liked the system and think the layout was easy to use.

Green – Not enough payment options for this user.

11. Do you think that the online service would improve your overall experience as a customer?

Yeah, I think it would improve part of my experience I guess I don't really mind paying with cash I think it would be good to have the option to pay with cash though still but yeah I think managing the subscription online would improve my life offering me flexibility.

Yeah, It would improve my experience. I think that it's a really helpful way to make it more accessible to use to anyone really and it can be done any time of day it's a lot simpler and you have an instant receipt that your order is confirmed.

Yeah, I like how it's all online it makes the process a lot faster and quicker and can be done any time of day.

Yes. I am to be able to manage the subscription remotely I don't have to call in to cancel my subscription. I can go online before the holiday and cancel whenever that way I can safely say that would be useful to me as a customer.

I think it would improve the customer experience and my own. I could make my own spreadsheets and order lists with this new system which could improve my life. In terms of the customer, I think it would also improve their experience, especially the younger people as I think they prefer paying digitally.

I think it would improve the customer experience for those who want to order online as it makes it easier to manage the details and the amount of pints. As a delivery driver it would have been better for us if the admin page was created but the stripe dashboard does show the details needed.

Yeah, it would be for payments and subscription cancellation. I don't think it would be much better though than the old way for the rest of the service.

In terms of the customer some of them would definitely benefit from this online service as it allows them to use card payment. It also gives them some other features such cancellation which I think they will appreciate having. For me as a worker of the business. I would use it as the records of the orders being made

will be great for managing the warehouse day to days and getting ready for new deliveries.

Blue – Improvement in experience due to the flexibility, remote management, faster process

Red – Improvement only due to the management of handling the subscription. Not bothered paying in cash or online.

Yellow – Delivery drivers would use it if admin page was incorporated. Improve admin management with online.

Grey – Delivery drivers believe that the customer experience would improve with the site as they could modify orders and use online payments.

12. Would you use this service over the traditional method of milk delivery? Can you also explain the reasoning for your answer?

I'll definitely use it over that I do like to be able to manage my account online and that's probably the main reason for me the flexibility. If I was on holiday I can cancel online with no stress.

Yeah, I would use it over the current service as I struggle to find cash some weeks and feel bad for slowing down the drivers fumbling about for my change. I would definitely prefer to pay by card.

I prefer to use the online version for example previously when I've sent an email regarding an order it's unclear as to whether an email has been received until I get a reply the next day so with the online version I'll be able to get answers straight away.

I probably would use it over the traditional methods just for the flexibility of it. I do think it needs to be improved to a good system for ordering. Yeah I would use it over the traditional one because I can modify stuff and cancel my subscription.

I think the older customers prefer paying via cash. I think newer generations skew the other way. Personally, I would prefer to pay by the website if I was a customer.

I would use the system if it stored the orders in the admin page. It would be super easy for me if that was working as I could track the deliveries on route. However, you did say we could make a report through the database which solves that issue.

Yeah I would like to move from the old service if this way an option. Easier to manage payments online these days. It also looks much easier to cancel than ringing up.

I probably would use it over the old way. Having the orders coming in digitally will be much easier both on the road and in the warehouse. Less admin for myself.

Pink – Milkmen prefer it due to having digital access

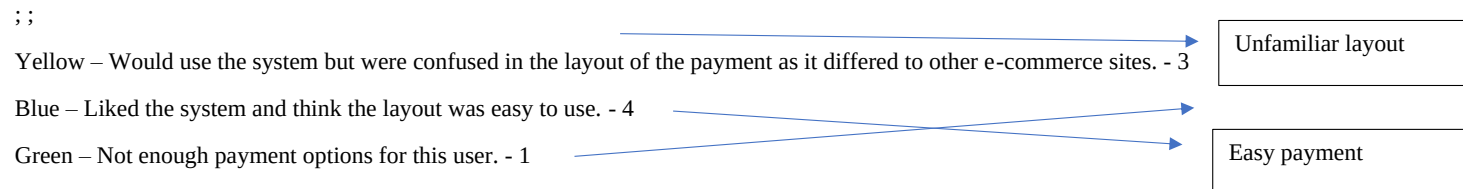
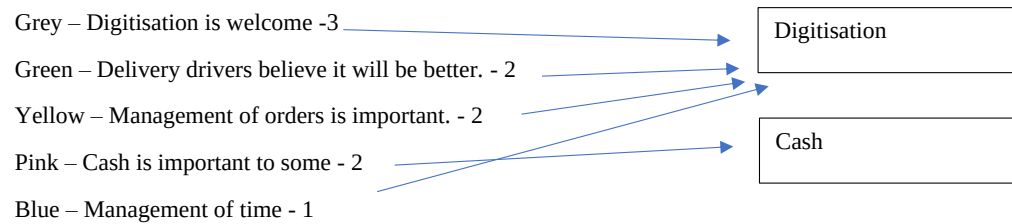
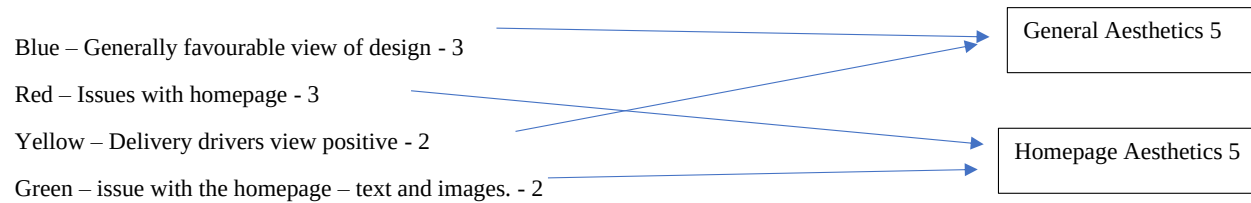
Green – Online payment is better than the old way

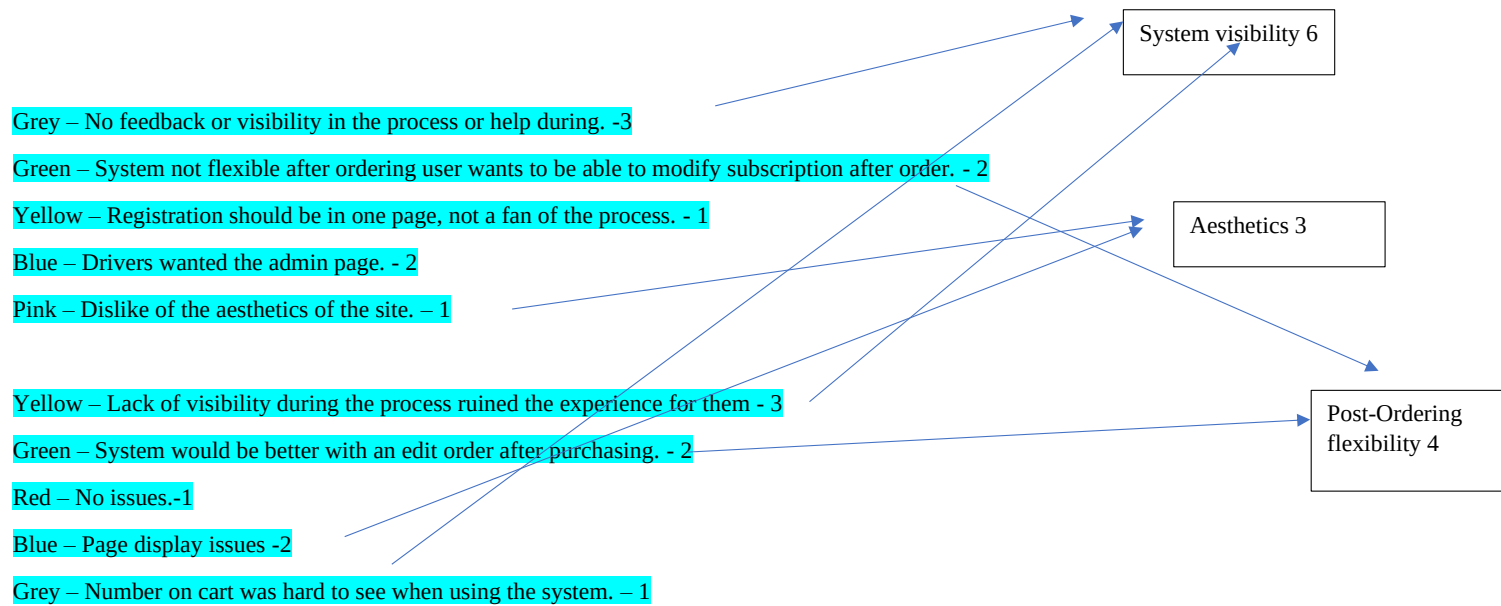
Grey – Would use it if the system had an admin page

Red – Older customers and new customers have different needs.

Yellow – Software provides more flexibility than the old way – Cancellation at any time and changing details.

Blue – Instant feedback using online no need to wait for replies on simple operations.





**Do you think it improves the customer experience**

Blue – Improvement in experience due to the flexibility, remote management, faster process - 3

Red – Improvement only due to the management of handling the subscription. Not bothered paying in cash or online. - 1

Yellow – Delivery drivers would use it if admin page was incorporated. Improve admin management with online. - 3

Grey – Delivery drivers believe that the customer experience would improve with the site as they could modify orders and use online payments. - 3

**Would you use it over the older system?**

Pink – Milkmen preferring it due to having digital access - 1

Green – Online payment is better than old way - 2

Grey – Would use it if the system had an admin page - 1

Red – Older customers and new customers different needs. - 1

Yellow – Software provides more flexibility than the old way – Cancellation at anytime and changing details. - 2

Blue – Instant feedback using online no need to wait for replies on simple operations. - 1



