



ASHESI UNIVERSITY

**A CONSUMER PRODUCT AND SERVICE REVIEW WEB
APPLICATION**

APPLIED PROJECT

B.Sc. Management Information Systems

**Akosua Afaribea Kissiedu
2020**

ASHESI UNIVERSITY

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APPLIED PROJECT

Applied Project submitted to the Department of Computer Science, Ashesi University in partial fulfillment of requirements for the award of the Bachelor of Science Degree in Management Information Systems.

Akosua Afaribea Kissiedu

2020

DECLARATION

I hereby declare that this Applied Project is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate Signature:

.....

Candidate Name:

.....

Date:

.....

I hereby declare that presentation and preparation of this Applied Project were supervised in accordance with the guidelines on supervision of Applied projects laid down by Ashesi University.

Supervisor Signature:

.....

Supervisor Name:

.....

Date:

.....

Acknowledgments

I would like to thank God, my supervisor, and my family, for their assistance and support.

Abstract

Reviews are essential in the growth of many businesses. Through reviews, firms can figure out how their customers feel about the value they provide. Information Technology has intricately become a part of the daily lives of human beings. In leveraging the ever-growing technology industry, this application seeks to provide a platform that allows consumers to share their views on goods and services they have experienced. Businesses, on the other hand, get to access valuable consumer information with which they can improve their offerings.

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Chapter 1: Introduction

1.1 Background

The issue of customer satisfaction in the business world is an important one. Businesses create a plethora of strategies, some of which include offering discounts and generating customer loyalty programs, to attract potential clients. If these clients do not find satisfaction in the offerings of these businesses, it may contribute to their decision to stop patronizing their goods and services.

Customer reviews can serve as a determinant of customer satisfaction, as review statements carry sentiments that relate to the client's ordeal. These reviews can be given by word of mouth, on digital platforms, or by any other means deemed fit by the company. Customer reviews not only serve as determinants of customer satisfaction, they also heavily influence customer purchasing decisions as found by [2] Bachleda and Berrada-Fathi in their study.

Customers who experience lousy service may take to social media platforms, some of which include Facebook, Twitter, Periscope, and Instagram, to air their grievances. As such, it can become difficult for businesses and customers to access this information when needed because the information is not centralized.

1.2 The Problem

There is no prominent centralized system for consumer reviews currently running in Ghana. When an individual experiences lousy service and they share these encounters on social media platforms, it can be hard for the business that provided the subpar service to find the review and fix the problem, if they have no social media presence. Further,

other consumers use reviews to determine whether to buy a given product, as found by [3] Elwalda and Lu in their paper. With social media reviews, it may be tiresome scrolling through multitudes of social media posts to find a single review.

The disorganized nature of social media customer reviews can contribute to the inability of a venture to view and address the issues customers raise. [3] Elwalda and Lü, in their study on online consumer reviews, concluded that indeed, reviews influence consumer purchasing decisions. It is, therefore, crucial for businesses to know what their customers are saying about them to help them pinpoint how customers feel about their services because it is from customer purchases that revenue is generated.

1.3 Motivating Factors

The motivating factors for this study are as follows:

To develop a software solution to collect client reviews, this information (client reviews) can aid businesses to serve their customers better.

Also, such a platform will provide consumers with information in the form of previous reviews. With this information, clients can read on products before purchasing to ensure value for money.

1.4 Related work

Elwalda and Lü [3] stated in their paper that, "the rapid growth of online communities has enabled individuals to post their evaluations, opinions, and recommendations regarding products on these platforms. This online information is arguably one of the main online product information sources that greatly affect consumer purchase intention". Consumer reviews heavily influence a buyer's purchasing decisions.

Yang et al. [4] established that the total number of reviews on a given product, and the general sentiment about the product (either positive or negative), play an essential role in customer purchasing decisions. When an offering has several bad reviews, it presents an underlying negative sentiment and causes increased risk perception among potential consumers. Further, this perceived risk hurts client purchasing decisions.

Yang et al. further found that the volume or number of reviews influenced subjective norm: the influence on a consumer to, or not to perform some action. Subjective norms also significantly affect consumers' purchasing decisions.

Consumer reviews are of importance to the consumer and the business. Positive reviews usually encourage consumers to purchase as found by Roy et al., [5] this can positively affect a business's revenue generation activities. Without revenue, it will be difficult for a company to stay afloat.

One of the prime motives of a business is to provide its customers with some value and reduce customer churn. Per Reichheld and Sasser [6], "a customer's relationship with a company lengthens profit rise and not just a little, companies can boost profits by almost 100% by just retaining 5% more of their customers". Hence businesses need to satisfy their clients; this will contribute immensely to customer retention and profit boost.

1.5 Existing Solutions

Yelp [7]

Established in 2004, Yelp is one of the most well-known customer review and business listing websites in the world. It currently runs in Australia, Belgium, Canada, Denmark, Singapore, Finland, France, Italy, Poland, Switzerland, The Netherlands, the United Kingdom, and the United States. Yelp runs in two phases; in the first phase, customers leave text reviews and star ratings for services experienced.

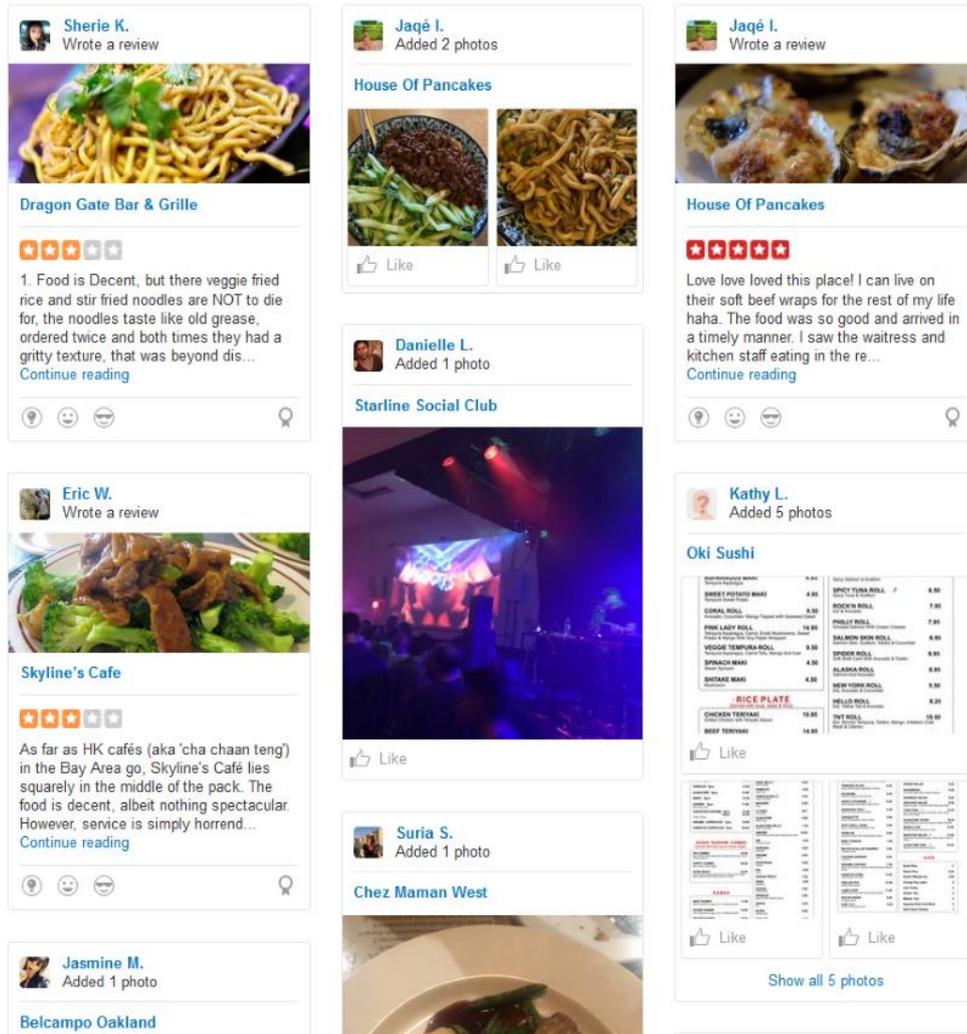


Figure 1.1: Yelp reviews

The second phase deals with business listings. Yelp, through its reputation, entices businesses to add their details to their online business listings. Customers can then pull up business information and ratings by entering the name of the company or by browsing through the varying business categories .



Figure 1.2: Yelp business finder interface

It is important to note that some businesses have listings that serve as advertisements, these are placed under a sponsored tab, with the ratings they have received. The rest of the unpaid-for listing's are ordered according to ratings. Yelp provides review and rating services to industries such as healthcare, hospitality, grooming (barbers, hairstylists, spa services.) and many others.

Angie's List [8]

Angie's List is a review and business listing website focused on the home improvement industry. This business helps homeowners find service providers for varying home improvement services. It does this by providing the prospective customer with a list of questions to answer, based on the answers provided, the client is matched with a potential service provider.

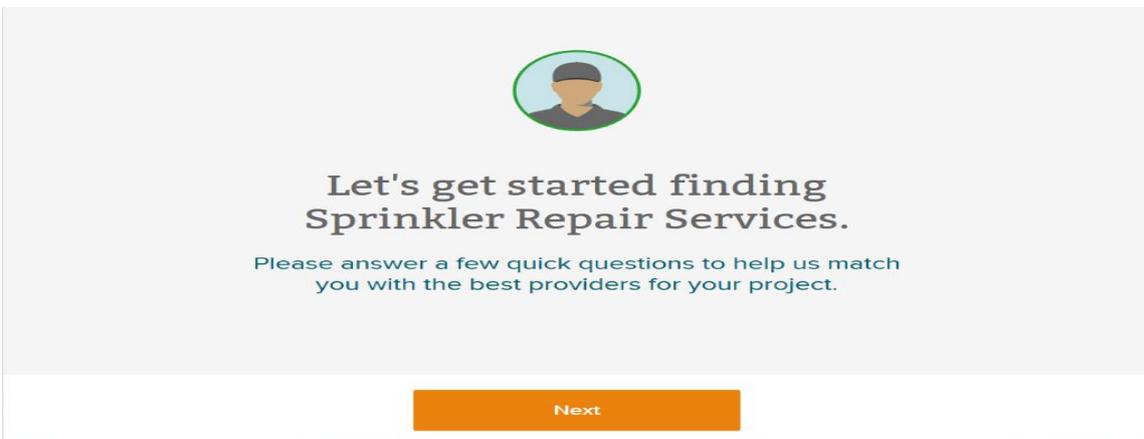


Figure 1.3: Angie's list question interface

Customers can view the reviews and ratings for a potential service provider. They also have the opportunity to see the profiles of other service providers from the directory provided. Angie's list makes sure that the reviews left are from clients who have patronized the selected service provider. They do this by allowing only members who have a paid subscription to leave reviews.

Citysearch [9]

Citysearch is a business listing website backed by a review model. It covers several industries with sections for restaurants, nightlife, spa and beauty, hotels, and others.



Figure 1.4: Citysearch homepage

Citysearch, based in the United States, lists businesses by state, under each state, the user can select a specific area and business industry.

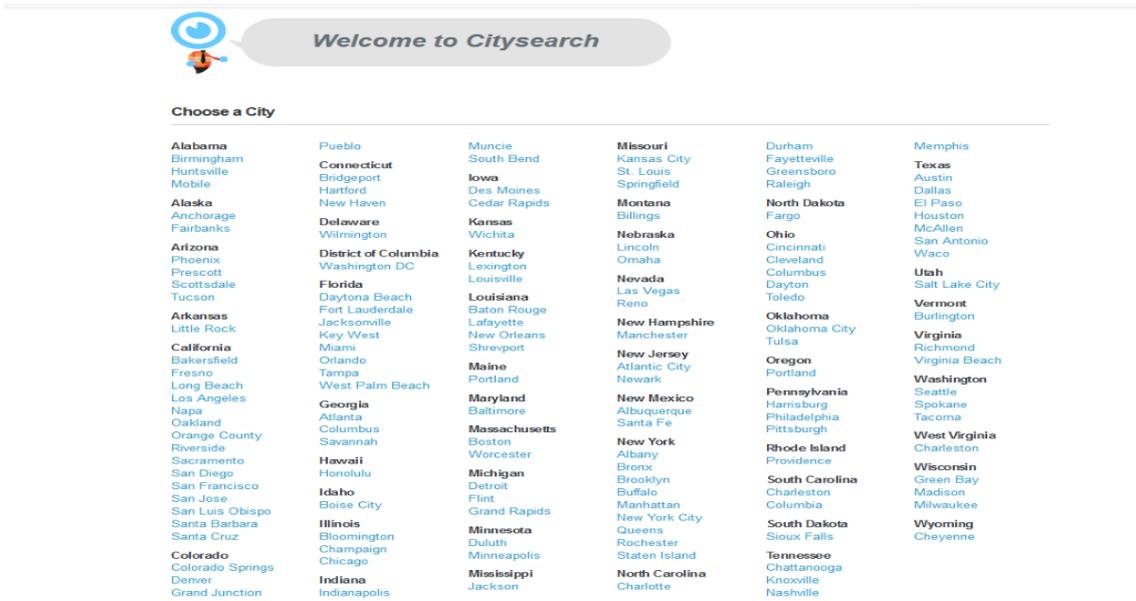


Figure 1.5: Citysearch city selector

After these selections, the user can now view the specific businesses and their reviews and ratings. Citysearch serves as a virtual tour guide as well; users can use it to find hotspots in a given area in many states in America.

Hello Peter [10]

HelloPeter is a customer review website that operates in South Africa. Unlike other sites of this nature, it offers consumers reviews solely. On the Hello Peter page, a user can search for a business and either read or leave reviews on their services.



Figure 1.6 HelloPeter start page

The website covers numerous sectors, including the banking sector, the insurance sector, the telecommunication sector, the fast-food industry, the automobile industry, and others.

HelloPeter also has a subsection for businesses; here, companies can access and manage the reviews left on their offerings. Companies who join the platform are offered varying statistics on customer engagement through the reviews they get on the HelloPeter website.

HelloPeter allows users to link the reviews they receive to other platforms such as websites and social media pages to help boost visibility and improve search engine optimization.

1.4 Overview of paper

The next chapter will discuss the requirements and requirement gathering process. The information obtained from the requirement gathering process will be used to form the system requirements. Chapter 3 will go on to explore the architecture by examining how the client-side and business side will work; this will be backed by use case diagrams and flowcharts. This chapter will also look at the technologies to be used in the development of the website. Chapter 4 will look at the implementation of the project and how it all comes together. Chapter 5 will provide information on the various tests carried out. Chapter 6 will be the conclusion, where lessons learned, limitations, and further work will be explored.

Chapter 2: Requirement Gathering

2.1 Project Scope

This project seeks to create a platform where consumers who purchase goods or services can share their experiences. It will also provide a business with the opportunity to explore the client reviews left for them and further view simple analytics like the number of people who have left them reviews and statistics of reviews. The platform also provides a medium that enables enterprises to learn about the grievances of their clients to provide better service.

2.2 Project Top Level Description

This solution is designed with entrepreneurs, businesses, and their customers in mind. The website would function like a social media platform. Business owners would have profiles for their companies. To register, business owners have to send an email to the system administrator with some pertinent information; these details will be used to create their account. Business owners will need to provide their legally registered business name, email address, contact number, location, and category. The legally registered business names will be verified with the registrar general's office. Consumers who want to leave reviews will have access to a leave review form with which they can share their opinions. Customers will be allowed to read reviews without having to sign in; however, to leave reviews, they would have to create an account, be verified, and sign in.

2.3 Requirement Gathering plan

Gathering and formulating requirements for this project was performed in two phases.

First, the stakeholders of the project were identified:

- Consumers
- Entrepreneurs and business executives

Next, the data to form functional requirements was collected via questionnaire. There were two questionnaires, one geared toward entrepreneurs and business executives (see appendix b) and the other towards consumers (see appendix a). The data obtained (see appendix c and d) was used to formulate functional and non-functional requirements. In addition to this, other web platforms for reviews were examined to generate additional requirements.

2.4 Procedure for requirement gathering

Requirements were gathered using questionnaires. There were two questionnaires created, one for the entrepreneurs and the other for consumers (see appendix b and a respectively).

A total of 89 people responded to the survey, 48 of them were consumers, and 41 were business owners. All the respondents were selected using random sampling methods. Social media was the primary tool in gathering respondents for the survey.

2.5 System Requirements

Functional Requirements

For Businesses

- Businesses should have profiles.

- Businesses should not be able to delete customer reviews.
- Businesses should have a panel where they can view statistics.

For Customers

- Customers should be able to create a profile.
- Customers should be able to leave reviews.
- Customers should be able to comment on reviews and reply to comments.
- Customers should be able to search using business names.
- Customers should be able to read reviews without logging on.

For the Administrator

- The administrator should be able to register businesses
- The administrator should be able to delete offensive posts
- The administrator should be able to award verified status

Use Case Diagram for businesses and customer review process

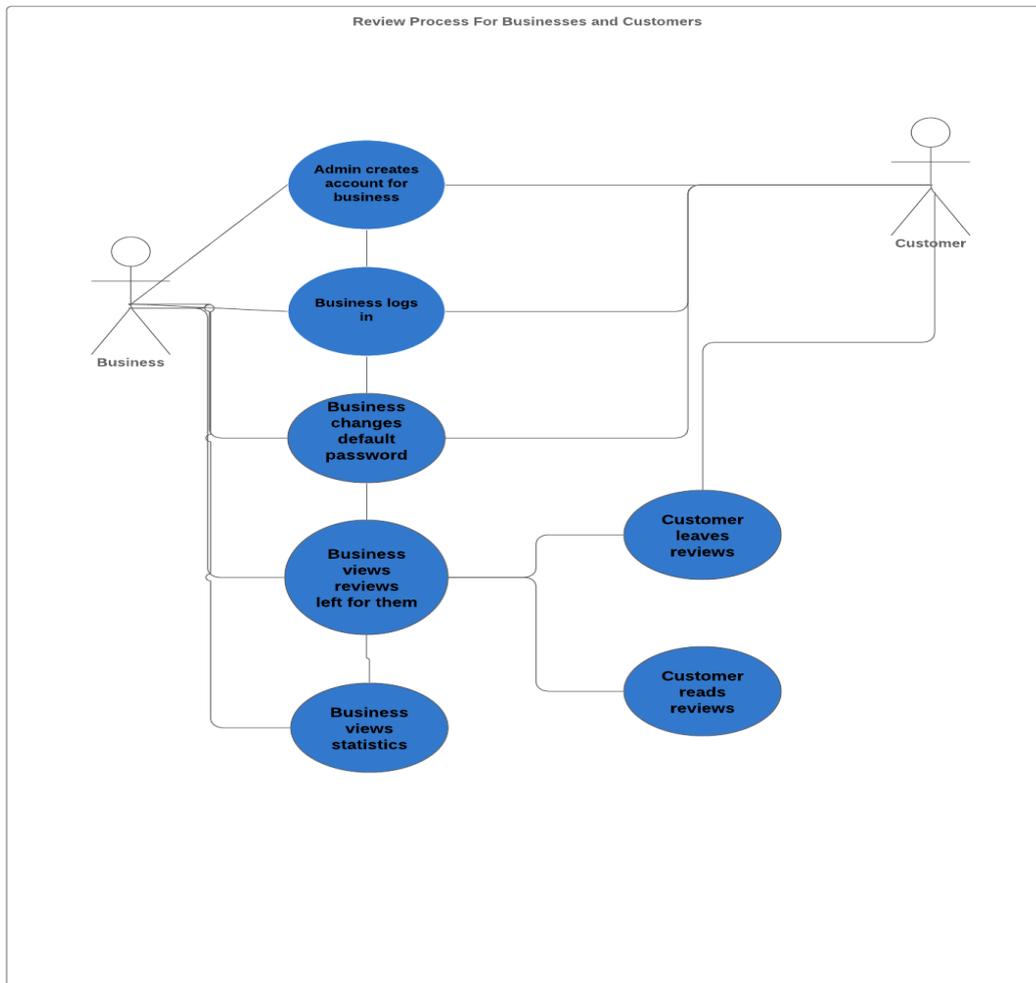


Figure 2.1 Use case diagram for business and customer review process

Non-functional requirements

- The design of the platform should be easy to understand and navigate
- Text analysis functionalities will be implemented to figure out the sentiment behind a review, to aid in the generation of a summary in the form of an emoticon. The emoticon can be observed in place of reading the whole review.
- Short text boxes with star rating options will be made available to the user. The evaluation will be summarized with an emoticon that shows the sentiment behind the review as determined by the text analysis plugin.

2.6 Use case scenario - consumer

Scenario: Leave Review

Actor: Consumer

The consumer leaves a review by first logging into the platform. If they do not have a profile, they need to register and be verified. The consumer then fills the leave review modal to generate their posts.

Alternate Scenario: Reading Reviews

Consumers can read reviews on businesses on the general timeline view, or by searching categories. They do not need to sign in to read reviews.

Alternate Scenario: Replying Reviews

Customers with profiles can reply to reviews by leaving comments. To do this, they first must log in to the platform, find the review they want to respond to, and click on the comment option on the post.

2.7 Use Case Scenario – Business

Scenario: Read reviews

Actor: Business Profile

The business profile reads reviews by logging into the platform and visiting their review page. From this page, they can read reviews left by customers for them.

2.8 Use Case Scenario – Sentiment Analysis

Scenario: Text API analyzing sentiment

Actor: Customer

The client writes a review, and the sentiment analysis API analyzes the text to find the related sentiment.

Chapter 3: System Architecture

This chapter examines the varying means of architecting the system and the tools and frameworks to be used in its implementation.

3.1 Model view controller architecture (MVC model)

The model view controller architecture highlights the various stages that data goes through either to reach a client or to be stored in a database. The platform will make use of this model. The user (either consumer or business owner) interacts with the view. The view collects information and instructions from the user. For example, a user who wants to log in will instruct the view by clicking the log in link and providing the needed details. The view would then pass the pertinent information to the controller. The controller processes the requests sent from the view and forwards them to the database for the appropriate response.

In our example, the controller will pass the username and the password to the database for authentication. The model represents the storage structure or database, where data and all relating processes are stored and run, respectively. In our example, the model will authenticate the data by running some commands that will check for the existence of the given username and password. The model will then return the response to the controller, and it will send a response to the view that will enable the user to log in. Below is a pictorial representation of the process.

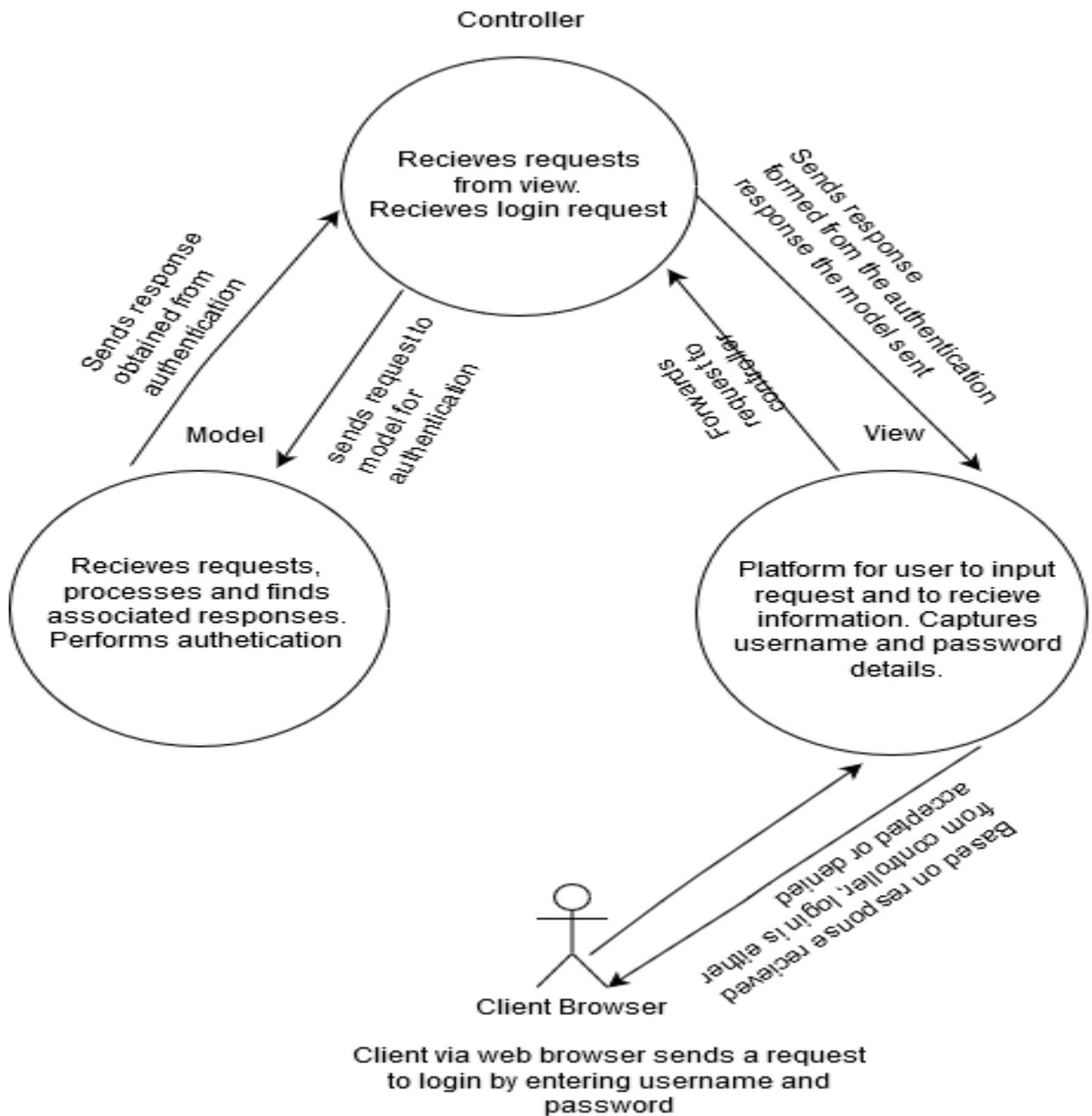


Figure 3.1 MVC architecture

3.2 Information Systems Architecture

The platform will follow the information systems architecture. It will use a transaction systems model where the user requests for information from the database, and the database responds with the details requested. The layers in this architecture as related to the platform are as follows:

- The user interface – The homepage presented by the browser.
- User communications- Represented by requests to log in or log out, and more.
- Information retrieval- The database, responding to requests with the appropriate information. For example, if the user submits a request to login, the database and related functions authenticate the details and respond with the relevant information.
- Systems database- The database will collect store and retrieve data as and when needed.

The information systems architecture differs from the model view architecture; it is more concerned with the exchange of information and the processes that data goes through within the system.

Below is a pictorial representation of this architecture

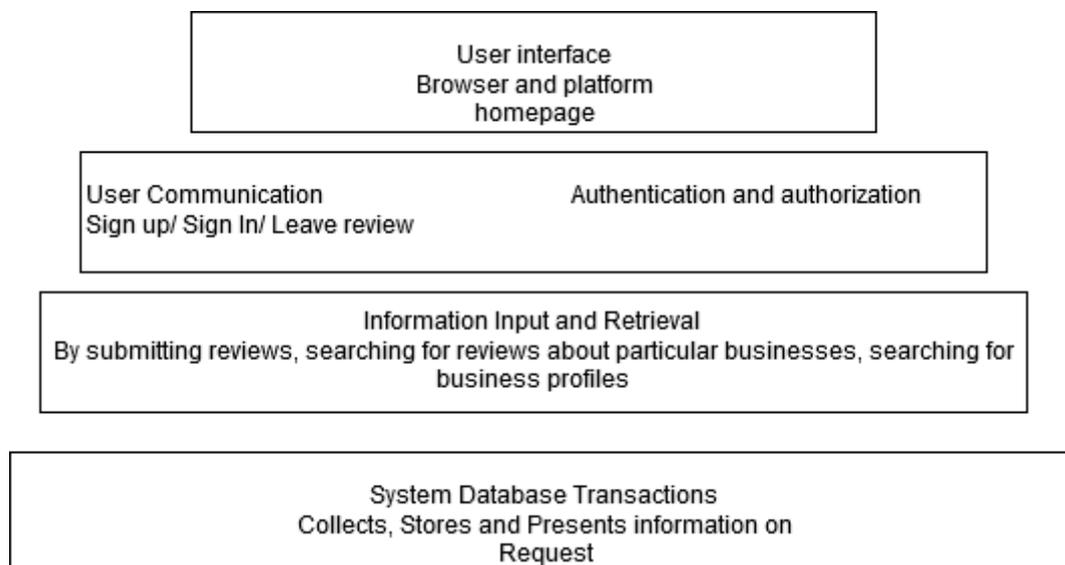


Figure 3.2 Information systems architecture

3.3 Client-Server Architecture.

The platform will utilize the client-server web architecture as it is hosted over the internet. The web browser acts as the client. It sends requests over the internet to the server on which the platform is hosted, and responses are passed back to the client via the internet. The browser displays the results it receives.

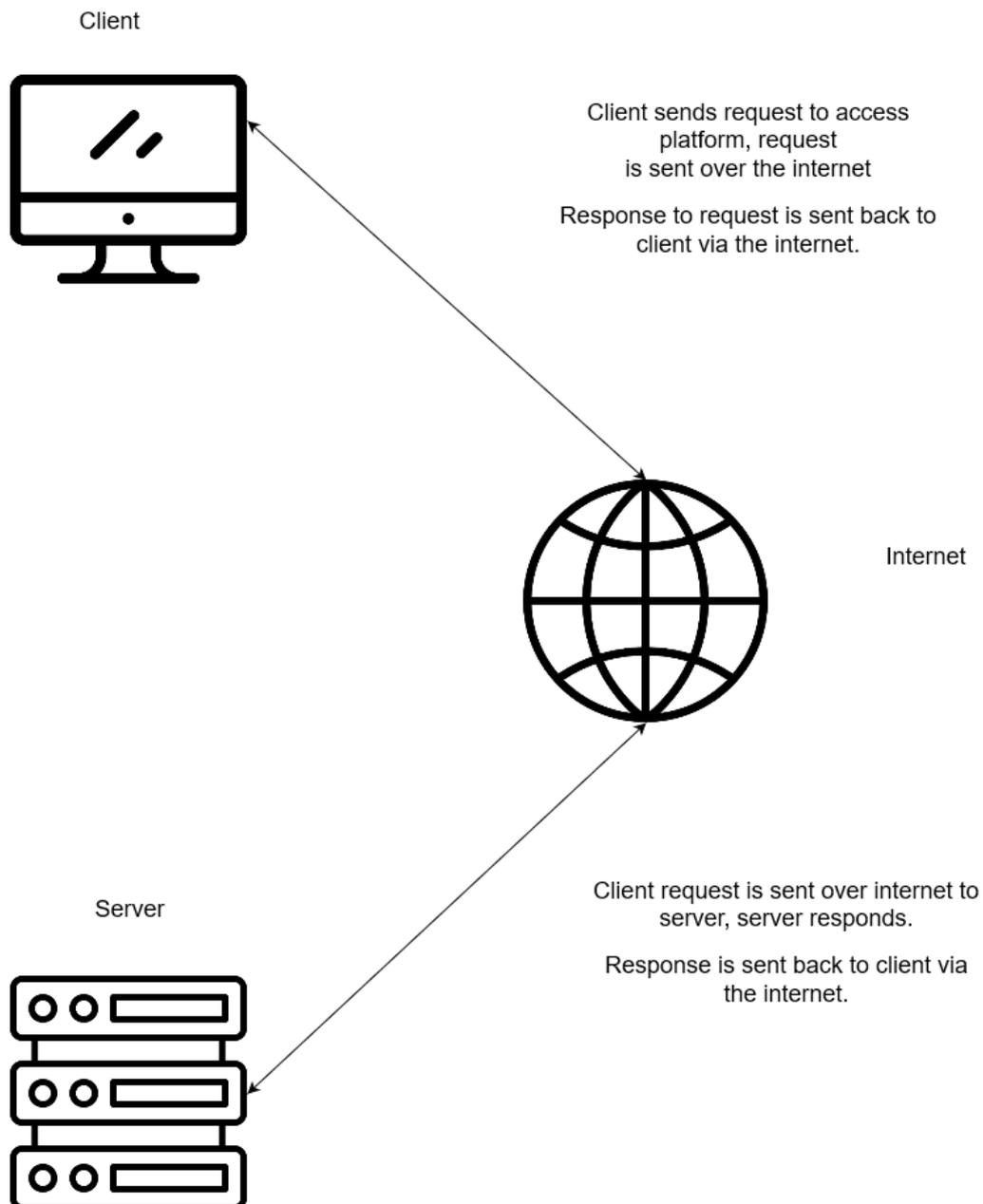


Figure 3.3 Client-Server architecture

3.4 Tools and frameworks

HTML

HTML technology will be used to create the webpages, focusing particularly on the structural outlook of the pages. HTML5 is the most up to date version of HTML, and it is compatible with several web browsers.

CSS

Cascading stylesheet will be used to style the HTML to give it an appealing appearance by adding colors, changing fonts, and more.

PHP- Laravel

PHP will be used to create the backend of the application. It will also be used in server-side validation of user-submitted information.

JavaScript and jQuery

These frameworks will be used to provide interactivity on the frontend in the form of popup notifications, autocomplete suggestion bar, and others. For example, when the user wants to delete something, there will be a pop up to alert them.

Sentiment analysis using the google cloud sentiment analysis API

Using the Google cloud natural language processing API, a controller will be generated to review the polarity of reviews. The API package will predict whether the review left is positive, negative, or neutral. The results collected from the API package will be passed back to the MySQL database and displayed on the frontend view to the user.

Bootstrap

The frontend with which the user will interact will be developed using Bootstrap elements together with HTML, CSS, JavaScript, and jQuery.

Laravel Dusk

Laravel will be used for unit testing to test the efficiency of functions created. The results obtained will be used to improve the functions created.

Laravel Charts and Chart js

These will be used to generate statistics for the business, based on user input.

Vanno template

Some pages of the web application will be modeled using the timeline page of this template.

(<https://bit.ly/2WsUbyc>)

MySQL database

The MySQL database will serve as a storage area for pertinent information, some of which include client login credentials, client registration information, reviews, and replies left.

Activity diagram showing steps for leaving a review

This diagram shows the actions and processes taken for a person to be able to leave a review.

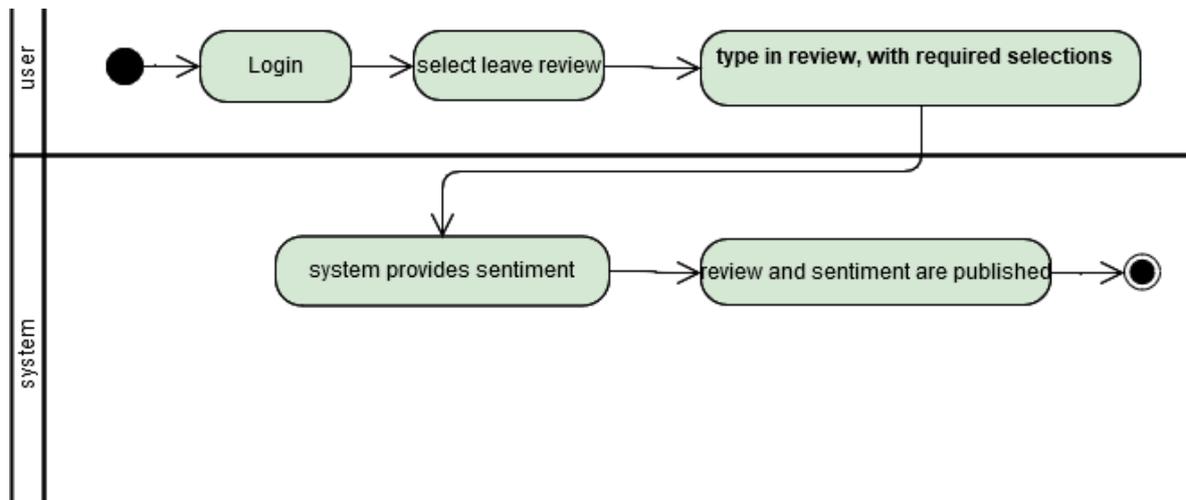


Figure 3.4: Activity diagram for leaving reviews

Chapter 4: Implementation

4.1 Overview

This chapter describes the technology, software, and techniques being used for the development of the web application. Laravel (PHP), JavaScript, Html, and CSS are the building blocks of the application. The backend functionalities, such as the ability to leave a review, are being developed with Laravel. JavaScript and jQuery are being used to ensure the dynamic flow of the web application via the automation of popups. Html and CSS are being used to develop the views with which the user interacts.

4.2 Implementation of User Section

The user section is the part of the application with which users communicate. Some features in this section include the ability to leave a review, to rate the service provided, to comment on reviews, and others, as mentioned in chapter two. From this area, users can register with an email and password, receive an email validation link, log in, and enter extra user information including, their names, preferred usernames, and profile pictures. On completion of these steps, the user can go ahead to leave reviews. Users who have not verified their email addresses or filled in the details form can only read reviews. Individuals who are not signed up onto the platform can only read reviews.

Register For Tellit

E-Mail Address

Password

Confirm Password

Figure 4.1: Registration page

Welcome to Tellit Leave Review

Complete User Profile

fullname

username

Figure 4.2: User details for profile



Figure 4.3: Completed user profile

```
public function store(Request $request)
{
    $fullname = $request['fullname'];
    $username = $request['username'];

    $this->validate($request, [
        'fullname' => 'required|max:225',
        'username' => 'required|unique:customers|max:225',
    ]);

    $id=Auth::user()->id;
    $customer = new Customer;

    $customer->user_id = $id;
    $customer->fullname = $request['fullname'];
    $customer->username = $request['username'];
    $customer->save();

    return redirect('useredit')->with('message', 'Profile updated successfully');
}
```

Figure 4.4: User information controller

The user information controller interfaces with the view which collects the user profile information. After a user fills the form, the content of the form is sent to the controller via a route. In the controller, all the necessary validation is completed to check whether the user has entered the right information. The validation process is enabled by the `$this->validate ()`

function. If the user information is correct, the id of the user is grabbed, and a new instance of a customer is created. The data is then matched to their respective columns within the database. If the information is wrong, the controller communicates this to the view, and an error message is shown.

Sequence diagram for the registration process

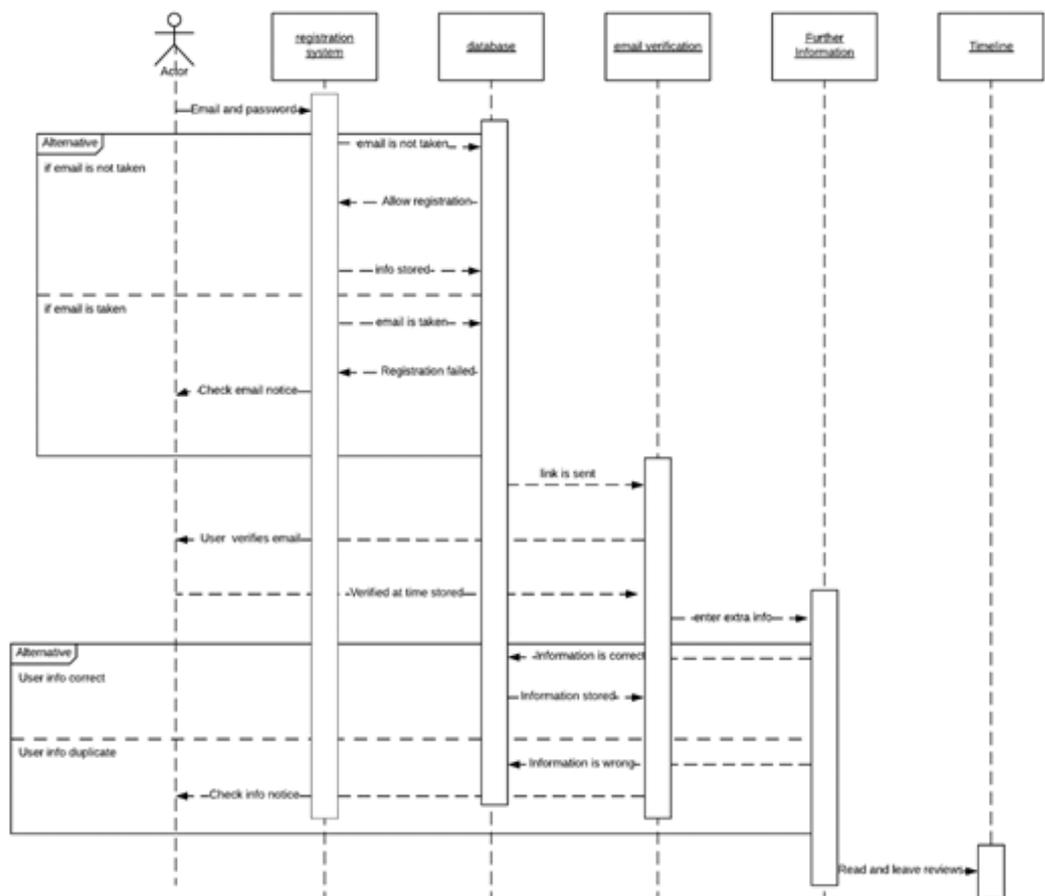


Figure 4.5: Sequence diagram for the registration process

The diagram above is a representation of the registration process for a user. For the preliminary registration process, the user must provide their email address and password. The information is then sent to the controller for validation purposes. If the email has already

been taken, the controller communicates with the view, and the user is shown an error message saying the email has already been taken. If the email address is unique, the controller creates and stores an instance of a user with the information provided. After this, an email verification link is sent to the email address of the user. The user needs to verify their email address by clicking on the link. When the email address is verified, and the user has completed their profile, he or she will be able to leave reviews and comment on reviews.

The frontend for this section is being developed using HTML, JavaScript, CSS, and Bootstrap classes. The backend is being generated using the Laravel framework following the model view and controller structure. The Laravel auth scaffolding is being used to develop user registration and sign in architecture. Furthermore, the database and related tables for the user section are being generated using the Laravel migration framework.

Using Mailtrap, a simple mail transfer protocol, email verification on registration has been implemented.

```
MAIL_DRIVER=smtp
MAIL_HOST=smtp.mailtrap.io
MAIL_PORT=2525
MAIL_USERNAME=db5d968b4e936b
MAIL_PASSWORD=aaf77400e73321
MAIL_ENCRYPTION=tls
MAIL_FROM_ADDRESS=Tellit@tellit.com
MAIL_FROM_NAME=Tellit
```

Figure 4.6: Connection between application and SMTP to enable sending of email links

After the user verifies their email, they can go ahead to fill in their user details. A user who has not validated their email and has only completed the preliminary registration process has

a status of inactive. On verification of their email, they become pending, and on the completion of their user profile, they become fully active.

4.3 Creating the timeline and post functionalities

To leave a review, a user must visit the leave a review page; here a user types in their review in a text box. They then go ahead to select the business name, and the number of star ratings they want to assign. The business name bar is powered by HTML datalist functionality. In the bar, when the user starts to type in the business name, suggestions are generated from which the user can select the desired name.

```
<div class="ml-auto p-2 bd-highlight d-flex align-items-baseline" >
  {{-- business name dropdown --}}
  <div class="dropdown">
    <label for="exampleFormControlSelect1">Business Name</label>
    <input type="text" list="businesses" class="form-control" name="business"/>
    <datalist id="businesses" >
      @foreach($businesses as $business)
        <option data-value="{{ $business['id'] }}" > {{ $business ['name'] }} </option>
      @endforeach
    </datalist>
  </div>
</div>
```

Figure 4.7: Datalist

The id of the given business name is pushed along with the review to be stored in the database. Ratings are assigned values from 1 to 5. When a score is assigned, its value is also sent with the text review to be stored in the database. Using the values assigned, the total average rating, and the total number of ratings received for each score group per business can be calculated.

With the Laravel blade syntax, the review, rating, and business name are pulled into the view, precisely the generaltimeline, and displayed for users. On the generaltimeline page, users can read and comment on reviews. Users can further flag posts that are deemed offensive; the administrator will review these posts.

Activity diagram for the process of leaving reviews.

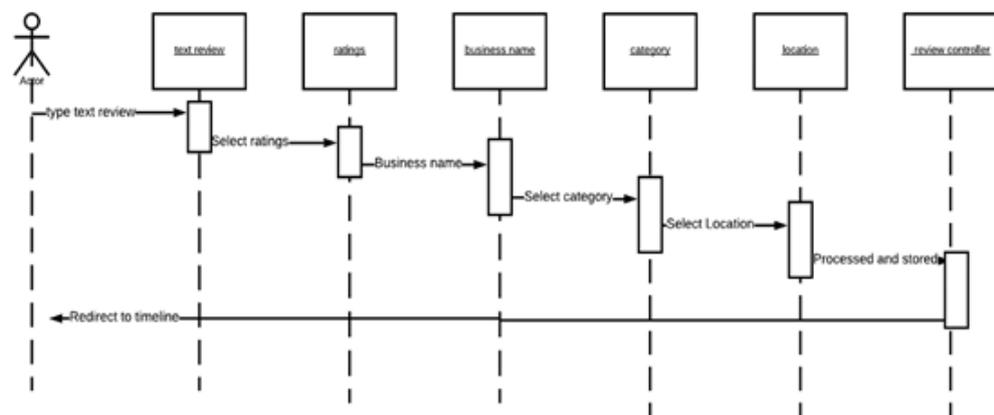


Figure 4.8: Activity diagram for leaving reviews

Figure 4.9: Leave review popup with rating, business name, and branch options.

4.4 Implementing Sentiment Analysis

Sentiment Analysis will be implemented using the google cloud natural language processing API. This package analyzes text in the English language and determines whether the tone of the language used is positive, neutral, or negative. After the user submits a review, the text portion of the evaluation will be forwarded to the sentiment analysis controller via a given route. In the controller using a set of rules, the text is broken down into constituent parts and analyzed. The results obtained will be stored in the database and displayed in the view with their respective reviews in the form of an emoji.

```
$cloud = new ServiceBuilder([
    'keyFilePath' => base_path('teliit.json'),
    'projectId' => 'teliit-sentiment-analysis'
]);

$language = $cloud->language();

// The text to analyse
$text = $request['review'];

// Detect the sentiment of the text
$annotation = $language->analyzeSentiment($text);
$sentiment = $annotation->sentiment();

if(($sentiment['score'] >= -1) && ($sentiment['score'] <= 0)){

    // echo "\u{1F620}";
    $review->emoji = "\u{1F620}";
    $review->save();

} elseif (($sentiment['score'] >= 0) && ($sentiment['score'] <= 0.5)) {

    // echo "\u{1F612}";
    $review->emoji = "\u{1F612}";
    $review->save();

} elseif (($sentiment['score'] >= 0.5) && ($sentiment['score'] <= 1)) {
```

Figure 4.10: Sentiment analysis

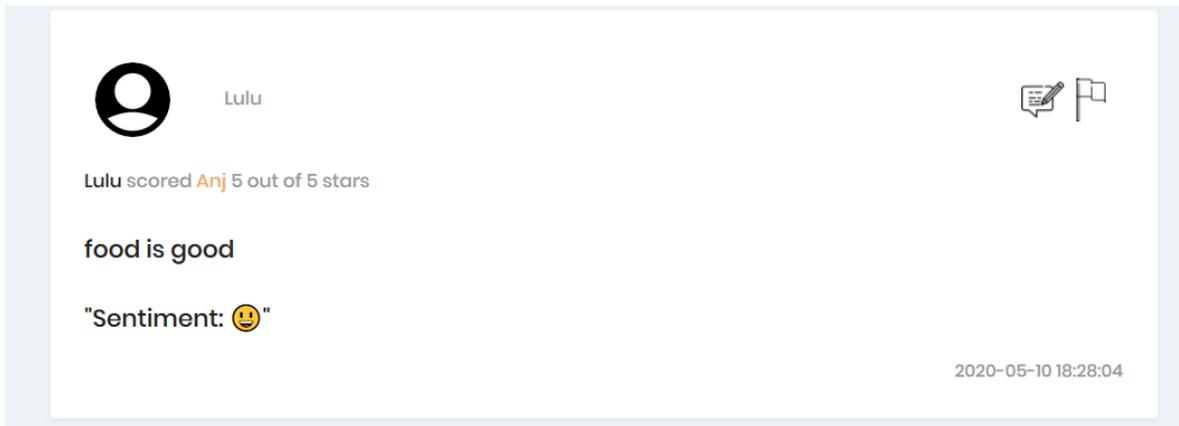


Figure 4.11: Review with text, sentiment emoji, and rating.

4.5 Business Section

This section allows a business to view reviews left for them and also review statistics generated on the reviews. Companies can access collated statistics on reviews left for them. To register, a business needs to send an email to the administrator of the platform, providing some registration details including; the name of the company, the phone number, the email address, the business registration information (number and name), the business category and the business location. Once the business registration is confirmed, the company will be sent an email with a default password with which they can log in onto their profile. The business has the option of changing the default password provided using the forgot password link. The sequence diagram below shows the steps for business registration.

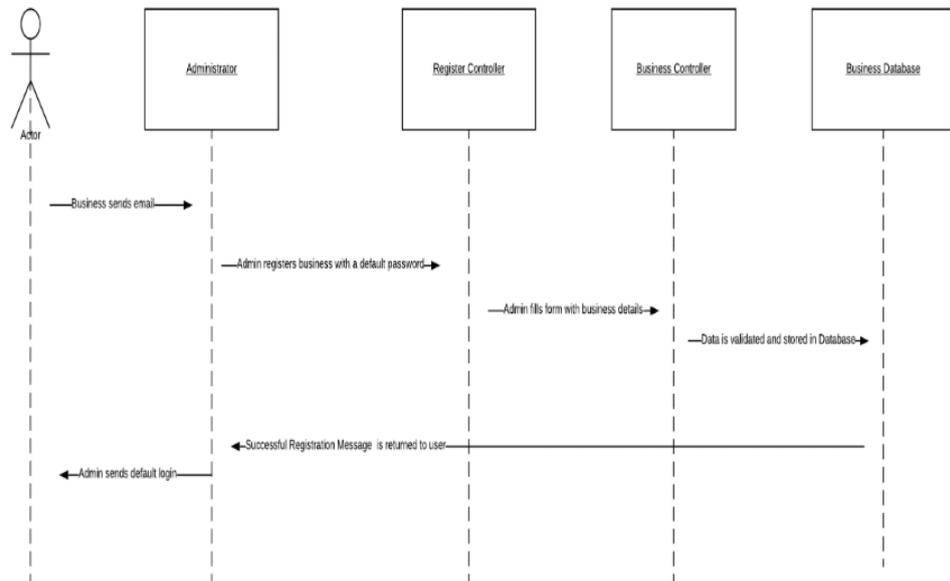


Figure 4.12: Sequence diagram for business registration

Businesses have access to a timeline where they can read all reviews left on the platform. They also have access to a timeline where they can read all reviews explicitly left for them.

The platform, using information collated from user reviews, will display statistics about the total number of reports received, the total number of positive and negative sentiments, and the total number of 1, 3, and 5 stars ratings. Businesses are only allowed to read and comment on reviews, as this is to discourage companies from getting involved in the review process, which may lead to possible bias. They are not allowed to leave reviews or flag reviews.

4.6 Administrator section

An administrator will login in with details provided to him or her. The administrators' responsibilities include registering new businesses, awarding verified status, and deleting

flagged or vulgar posts. The administrator will have access to the business login form where he or she can enter the business information received via email. After registering the business, the administrator sends the firm an email and a default password. With these details, the company can log in onto the platform.

To award verified status, the administrator will first have to take the business name as provided by the business and search for their registration status on the Registrar Generals' business registration search page (<https://bit.ly/2VDItAJ>). If a match is found, the administrator can go ahead and assign verified status. An icon serving as proof of verification will be displayed on the businesses' information page.

To delete flagged and obscene posts, the administrator will have access to a timeline; the timeline will contain all flagged posts. Here he or she can review the posts by community guidelines; if the posts indeed violate the set rules, the administrator can delete them. The administrator can also delete obscene posts from the generaltimeline.

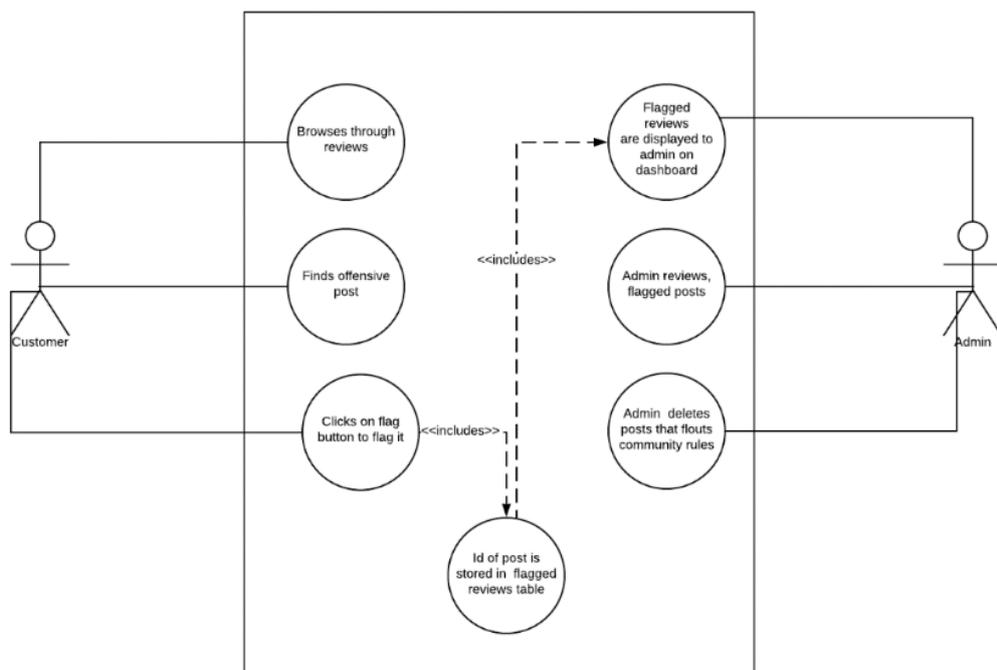


Figure 4.13: Use case diagram for flagging posts

When a user flags a post, the id of the review is passed to a controller. The controller gives the id to the database. These flagged reviews are displayed on a separate timeline on the administrator dashboard. The administrator goes over these posts and deletes the offensive ones. Power to delete is limited to the administrator to ensure no user or business can maliciously remove reviews left for other users of the system.

Chapter 5: Testing

5.1 Overview

This chapter serves to elaborate on the testing process of the system, to make sure that it works up to standard. The fundamental building blocks of the system were the focus of these tests. These building blocks encompass the customer section, the business section, and the administrator section. The tests performed included unit testing, component testing, system testing, and compatibility testing.

5.2 The unit section

This section took into consideration the control flow for options about registration and login. Individuals who do not have an account should be able to read reviews without having to create an account. These individuals do not have the option of leaving reviews. Individuals who have accounts but have not completed their profiles or validated their email addresses only have the option of reading reviews. Only individuals who have confirmed their email addresses and completed their profiles can leave reviews. Unit testing was performed using the Laravel Dusk API. Laravel Dusk works with the chrome browser to make the unit testing process more efficient.

5.2.1 Unregistered Users Test

Unregistered users are only allowed to read reviews; to assess this, a test function was written in Laravel Dusk. Unregistered users are redirected to the *publictimeline*.

```
1 <?php
2
3 namespace Tests\Browser;
4
5 use Illuminate\Foundation\Testing\DatabaseMigrations;
6 use Laravel\Dusk\Browser;
7 use Tests\DuskTestCase;
8
9 class UnregisteredTest extends DuskTestCase
10 {
11     /**
12      * A Dusk test example.
13      *
14      * @return void
15      */
16     public function testUnregisteredUsersCanReadReviewsOnly()
17     {
18         $this->browse(function (Browser $browser) {
19             $browser->visit('landandselect')
20                 ->clickLink( 'READ SOME REVIEWS' )
21                 ->assertPathIs('/publictl');
22         });
23     }
24 }
25
```

Figure 5.1: Unregistered user function

The function first visited the landing page at the *landandselect* route and triggered the read some reviews link on the photo slider. The function checked whether the route activated was the *publictimeline* route. (The route unregistered users are redirected to).

```
afari@Akosuas-yoga MINGW64 ~/Desktop/TellitV2 (dev-akosua)
$ php artisan dusk tests/Browser/UnregisteredTest.php
Warning: TTY mode is not supported on Windows platform.
PHPUnit 8.5.2 by Sebastian Bergmann and contributors.

DevTools listening on ws://127.0.0.1:58895/devtools/browser/55a38eff-e377-431e-9916-8105862b7
.
1 / 1 (100%)

Time: 10.23 seconds, Memory: 18.00 MB

OK (1 test, 1 assertion)
```

Figure 5.2: Unregistered user test results

The test returned the time it took to run and the amount of space in memory it took.

5.2.2 Incomplete User Registration Test

Upon the completion of registration, for a user's account to be fully verified, the user needs to verify their email address and complete their user profile. The user's status changes to active when they finish these processes; if the user's status is not active, they are redirected to the timeline view when they log in. This view does not offer the option to leave reviews.

```
use Tests\DuskTestCase;

class IncompleteRegistrationTest extends DuskTestCase
{
    /**
     * A Dusk test example.
     *
     * @return void
     */
    public function testUsersWhoHaveNotCompletedRegistrationCannotLeaveReviews()
    {
        $this->browse(function (Browser $browser) {
            $browser->visit('/login')
                ->type('email', 'babavoss@gmail.com')
                ->type('password', 'password')
                ->press('Login')
                ->assertPathIs('/timeline');
        });
    }
}
```

Figure 5.3: Incomplete registration

This test method first visited the login route and tried to log in a user that had just been created and had not fulfilled any of the requirements needed for complete registration. To find out if the user was indeed pointed to the correct route, the test checked whether the redirect route was indeed the timeline route.

```
afar1@Akosuas-yoga MINGW64 ~/Desktop/tellitv2 (dev-akosua)
$ php artisan dusk tests/Browser/IncompleteRegistrationTest.php
Warning: TTY mode is not supported on Windows platform.
PHPUnit 8.5.2 by Sebastian Bergmann and contributors.

DevTools listening on ws://127.0.0.1:55984/devtools/browser/6ef59313-637b-4ed1-9245-9d
1d46e8520f
.
Time: 23.74 seconds, Memory: 18.00 MB

OK (1 test, 1 assertion)
```

Figure 5.4: Incomplete Registration result

The time it took to run, and the memory used were returned after the test was run. In testing this scenario, the authentication controllers (Register and Login) and their ability to store, fetch, and crosscheck information from a given table in the database was analyzed.

5.2.3 Fully Registered Users can leave a review

The system only allows users who are assigned the active status to leave reviews and comment on posts. These users are redirected to the generaltimeline view after login.

```
class RegisteredUsersCanLeaveReviewsTest extends DuskTestCase
{
    /**
     * A Dusk test example.
     *
     * @return void
     */
    public function testRegisteredUsersCanLeaveReviews()
    {
        $this->browse(function (Browser $browser) {
            $browser->visit('/login')
                ->type('email', 'lulu@gmail.com')
                ->type('password', 'password')
                ->press('Login')
                ->assertPathIs('/generaltimeline')
                ->clickLink('Leave a review')
                ->pause('1000')
                ->assertPathIs('/leavereview');
        });
    }
}
```

Figure 5.5: Fully registered users can leave reviews

This test intended to check if the fully registered user could reach the leave a review modal. The trial began by logging in a user; here, the authentication controllers were working as they should in fetching and crosschecking the user's login information. Further, the test case also examined the controller responsible for checking the user's status and redirecting them to the appropriate page. On reaching the *generaltimeline* view, the leave a review link was called, the test then paused for 1 second to allow the leave a review modal powered by JavaScript to pop up.

```
afari@Akosuas-yoga MINGW64 ~/Desktop/TellitV2 (dev-akosua)
$ php artisan dusk tests/Browser/RegisteredUsersCanLeaveReviewsTest.php
Warning: TTY mode is not supported on Windows platform.
PHPUnit 8.5.2 by Sebastian Bergmann and contributors.

DevTools listening on ws://127.0.0.1:61538/devtools/browser/3b9c5d5a-c566-4f84-a324-65beb45d3647
.
Time: 35.77 seconds, Memory: 18.00 MB

OK (1 test, 2 assertions)
1 / 1 (100%)
```

Figure 5.6: Fully registered users can leave reviews

This test case passed, showing all the controllers and models associated with these processes are working as they should

5.3 Component Testing

In this section, the tests were carried out on the fundamental building components. The tests carried out were as follows:

- The ability of a customer to register and signup.
- The ability of a customer to leave a review, a comment, and reply to comments.
- The ability of a customer to read reviews and comments.

- The ability of the administrator to add businesses to the platform.

5.3.1 The ability of a customer to register and signup

The test customer first entered their details into the form on the registration page.

Register For Tellit

E-Mail Address

Password

Confirm Password

Figure 5.7: User registration

This information was passed to the user controller and stored in the user table in the database.

			5	danny@gmail.com	NULL	\$2y\$10\$HwGHpInGmerJ5FYjRkLlon5DE6iAHINTCj0i8bv1..	customer inactive	NULL	2020-04-16 15:34:49	2020-04-16 15:34:49
--	--	--	---	-----------------	------	--	-------------------	------	---------------------	---------------------

Figure 5.8: User info stored

Upon registering, the test user completed their user profile and validated their email address. This allowed them to access the options to leave reviews, and comment on reviews left. The information entered for the generation of the user profile was stored in the customer table in the database.

Figure 5.9: User info stored in the customer table

5.3.2 The ability of a customer to leave reviews and comments

The test user could only leave reviews after their status had changed to active. (After they had verified their email address and completed their profile). To leave reviews, the test user filled in the leave review form. The information was then stored in the database.

The screenshot shows a web form titled "Leave review". It contains three input fields: "Business Name" (value: Kinbu), "Ratings" (value: 5 Stars), and "Branch Name" (value: Atomic). Below these is a large text area with the text "They have nice chairs". A tooltip "Type in review" is positioned over the text area. At the bottom left is a close button (x) and at the bottom right is a "Submit" button.

Figure 5.10: User leaves a comment

With the information entered, the sentiment of the review was generated, and displayed with the other details on the general timeline.

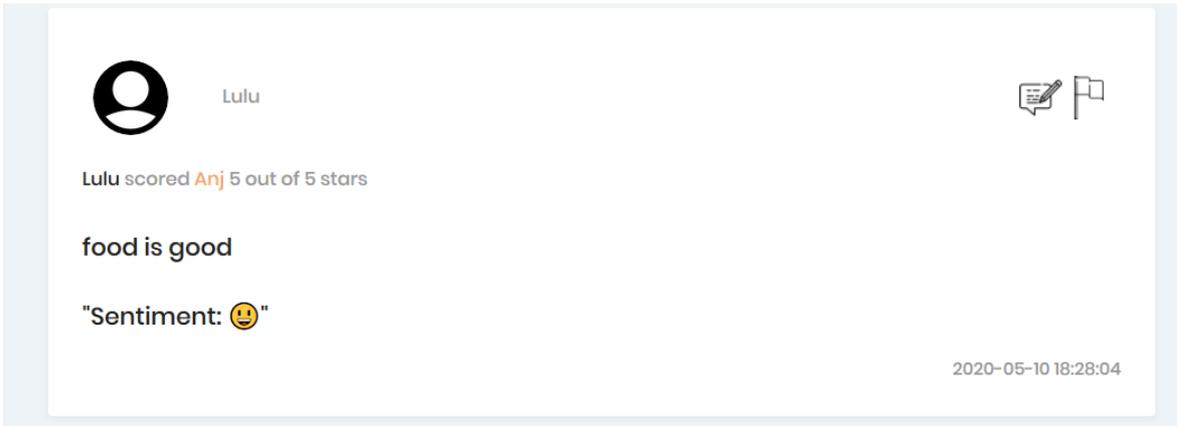


Figure 5.11: Users review is displayed

Other users had the opportunity to leave comments on reviews left, and further reply comments left. To access the comment section, the user clicked on the comment icon.

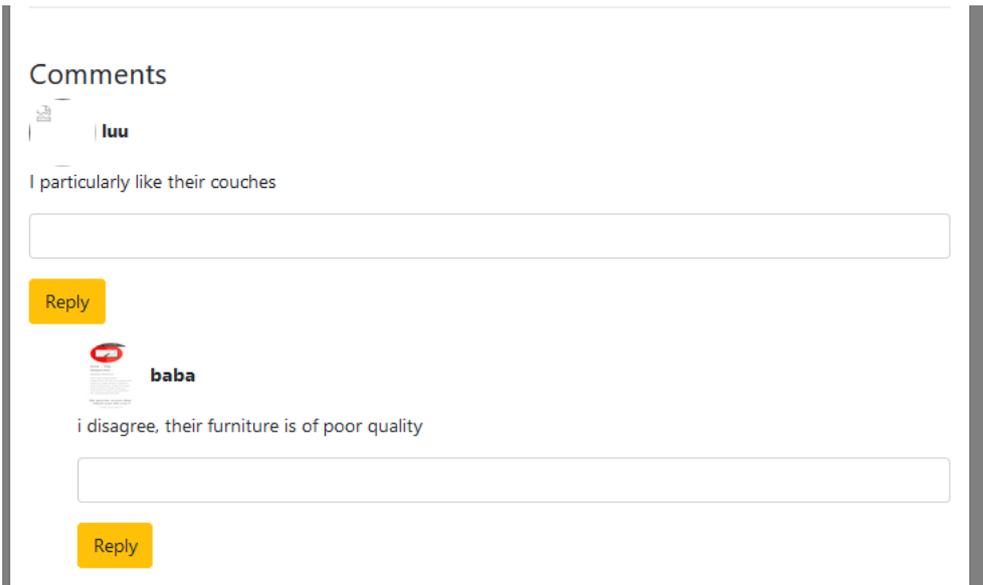


Figure 5.12: Comments left on review

5.3.3 The ability of a customer to access reviews

The test user could find reviews via the category options, or by using the search bar. Via the category option, the user selected the category of business they wanted to view; they were then redirected to a page with all companies in that category. They could further click on the company to display all reviews about the business.

For a more detailed search, the test user had the option of typing the business name into a search bar provided, and all the reviews left for the business would be displayed.

5.3.4 The ability of the administrator to add a business

To add a business, just like the test user, the administrator first registered a company. Their registration information would be stored in the user table, and they would be assigned the role of business. The administrator then went ahead to fill in business details; these were stored in the business profile table. For a firm to log in, after they received an email from the administrator concerning their successful registration, they could log in with the default password provided. Before logging in, they had the opportunity to change their password.

5.4 Compatibility testing

As a web application, the system should be able to display and work efficiently on different browsers. With this in mind, the system was tested on the Chrome, Mozilla Firefox, and Internet Explorer browsers.

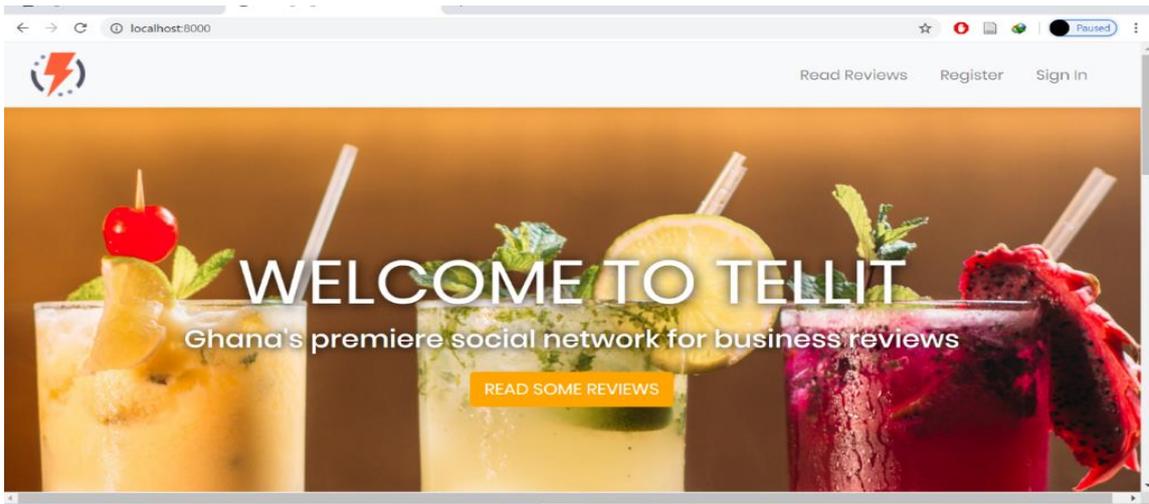


Figure 5.13: Tellit on chrome

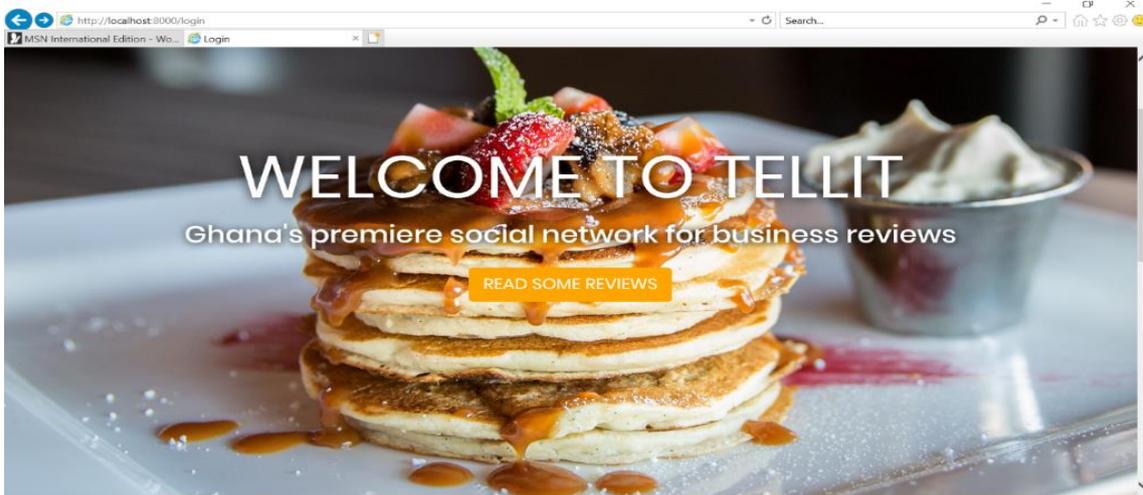


Figure 5.14: Tellit on Internet Explorer

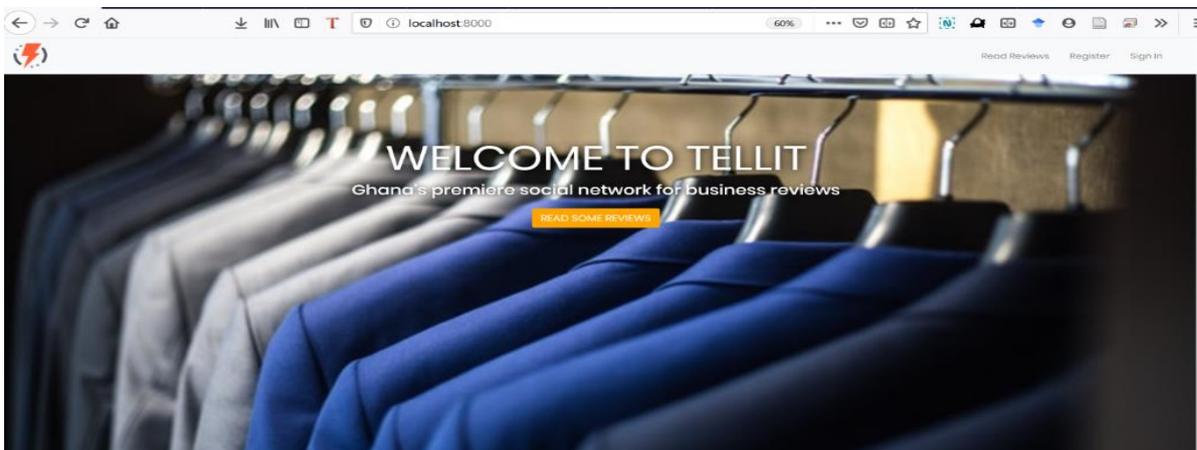


Figure 5.15: Tellit on Firefox

5.5 System testing

This section collated all the processes tested in the component section. All the components were brought together and tested as a cohesive unit. The test user created an account, verified their email address, and filled in their user details. They then left reviews and commented on reviews, searched via category, and the search bar. The administrator also added businesses to the system so that the user could review them. System testing discovered that some parts of the application took longer to load. For example, redirection to the generaltimeline after the user left a review took some time. To optimize this, using Laravel eloquent, relationships can be created between the models in the application. This will make it easier to fetch and store data with fewer queries and reduce runtime. To reduce the lag, the controllers here will be optimized.

Chapter 6: Conclusion

6.1 Overview

This section examines the challenges faced in the development of the application, the future work, and the conclusion.

6.2 Challenges faced

There were some challenges faced during the development of this application; the major struggle involved learning Laravel, the primary language on which the application is developed, while at the same time building the application.

6.3 Future work

To further improve the application, the following can be considered:

- Addition of a business directory: Currently, the application only takes reviews; in the future, to expand its capacity, the application can be altered to include a directory service. This will provide users with the opportunity to access a list of businesses with the locations of their branches.
- Anonymous posting for customers: For now, user details are displayed when users post a review. In the future, a way to allow users to post without their details being public would significantly improve the capacity of the system. However, this option must still enable the system to keep track of users on the backend.
- Provision of a mobile version: At the moment, the application is only available as a web application. By turning it into a mobile application, it would become much more convenient for users to access.

- More effective methods to moderate content: One of the administrators' tasks is to remove offensive reviews from the platform. As the platform grows, this may become overwhelming, developing an algorithm to remove objectionable content will make this process more bearable.

6.4 Conclusion

Tellit is a web application that allows customers to leave reviews on goods and services they have used or experienced. It further allows businesses to view these reviews and use the information to determine if they are in a favorable position with clients, and if their offerings have been well received by the market. This platform seeks to benefit both customers and businesses.

References

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- [4] Jing Yang, Rathindra Sarathy, and Stephen M. Walsh. 2016. Do review valence and review volume impact consumers' purchase decisions as assumed? *Nankai Business Review Int* 7, 2 (June 2016), 231–257. DOI:<https://doi.org/10.1108/NBRI-11-2015-0028>
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- [6] Frederick F. Reichheld and Jr W. Earl Sasser. 1990. Zero Defections: Quality Comes to Services. *Harvard Business Review*. Retrieved October 13, 2019 from <https://hbr.org/1990/09/zero-defections-quality-comes-to-services>
- [7] Yelp. Yelp. Retrieved October 13, 2019 from <https://www.yelp.com/>
- [8] City Directory | Citysearch. Retrieved October 14, 2019 from <http://www.citysearch.com/world>

Appendix A

The questionnaire used in data collection from customers

- Has a company ever asked you to rate their services?
- By which means did you provide your review?
- Have you ever experienced bad customer service?
- Did you share this experience with anyone?
- If you answered yes to the previous question, by which means did you share your experience?
- Which social media web platform do you use the most to find reviews
- From 1 to 5 with 1 being the lowest and 5 being the highest, rank how much or how little you prefer using word of mouth to share reviews
- From 1 to 5 with 1 being the lowest and 5 being the highest, rank how much or how little you prefer using written methods to share reviews
- From 1 to 5 with 1 being the lowest and 5 being the highest, rank how much or how little you prefer using digital methods to share reviews
- From which sources do you find the most reviews
- From 1 to 5 with 1 being the easiest and 5 being the most difficult, rank how difficult or how easy It is to get reviews from family and friends.
- From 1 to 5 with 1 being the easiest and 5 being the most difficult, rank how difficult or how easy It is to get reviews from social media.
- From 1 to 5 with 1 being the easiest and 5 being the most difficult, rank how difficult or how easy It is to get reviews from other online sources.

Appendix B

The questionnaire used in gathering information from businesses

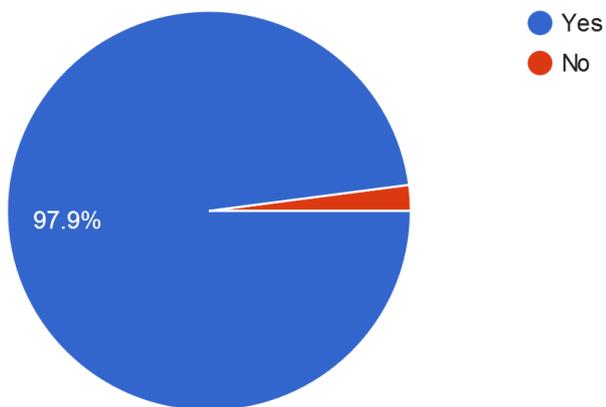
- Are you a business owner or a business executive?
- Which industry does your business belong to?
- Do you think customer feedback is important for your business?
- Have you taken any steps to collect customer feedback?
- Can you think of any other method for collecting customer feedback you have not tried yet?
- On a scale of 1 to 5 with 1 being the lowest and 5 being the highest, rate how effective you believe it would be to use online methods to collect customer feedback/reviews.
- Would you use an online resource for collecting and viewing customer reviews if one existed?

Appendix C

Responses from customer Questionnaire

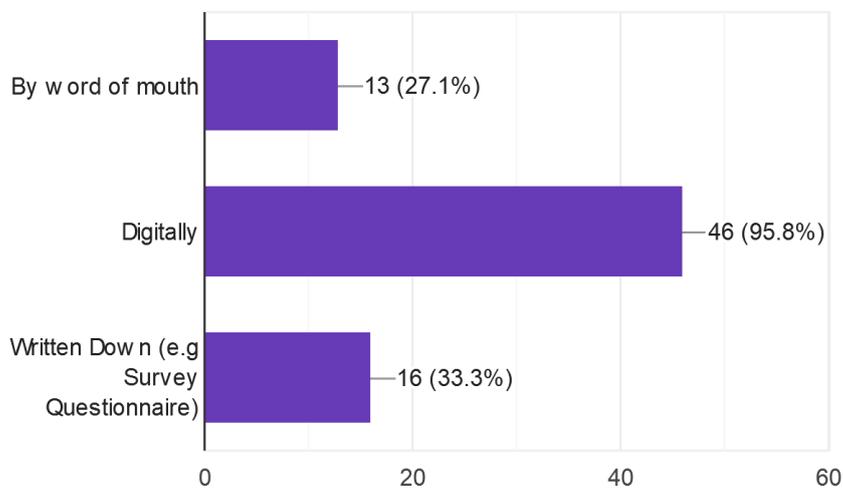
Has a company ever asked you to rate their services?

48 responses



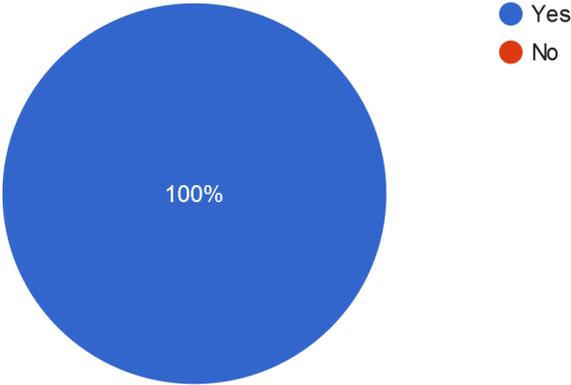
By which means did you provide your review?

48 responses



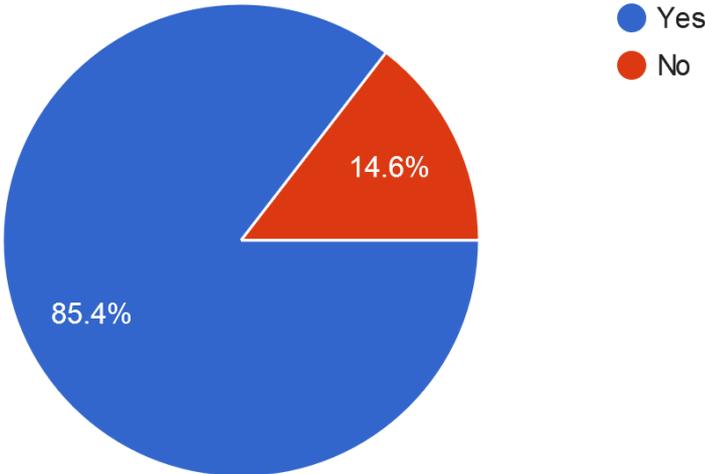
Have you ever experienced bad customer service?

48 responses



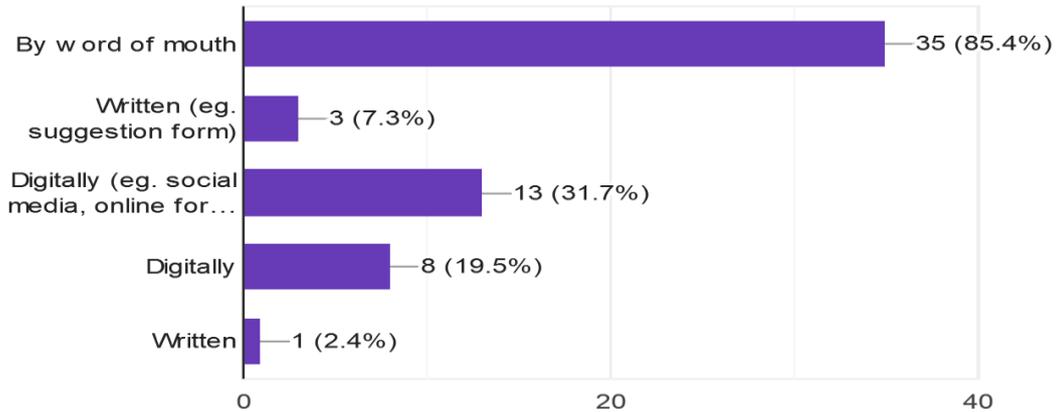
Did you share this experience with anyone?

48 responses



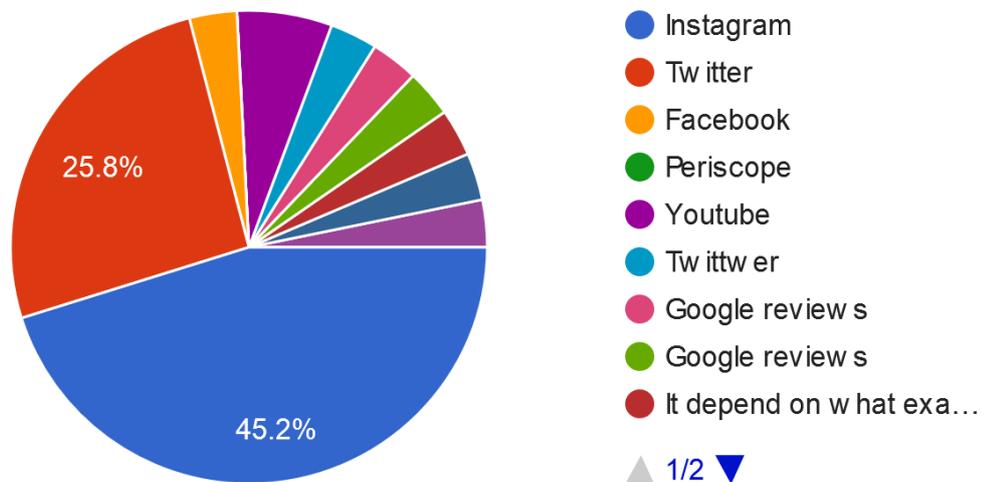
If you answered yes to the previous question, by which means did you share your experience?

41 responses

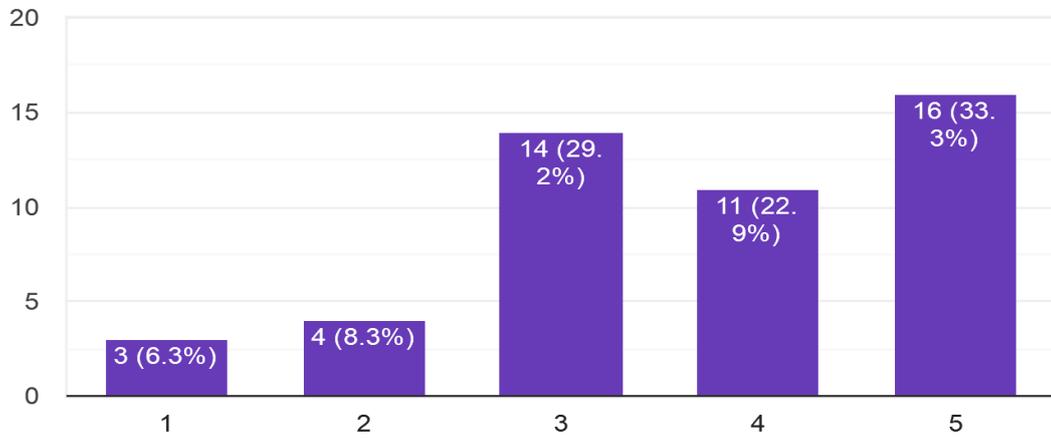


Which social media web platform do you use the most to find reviews

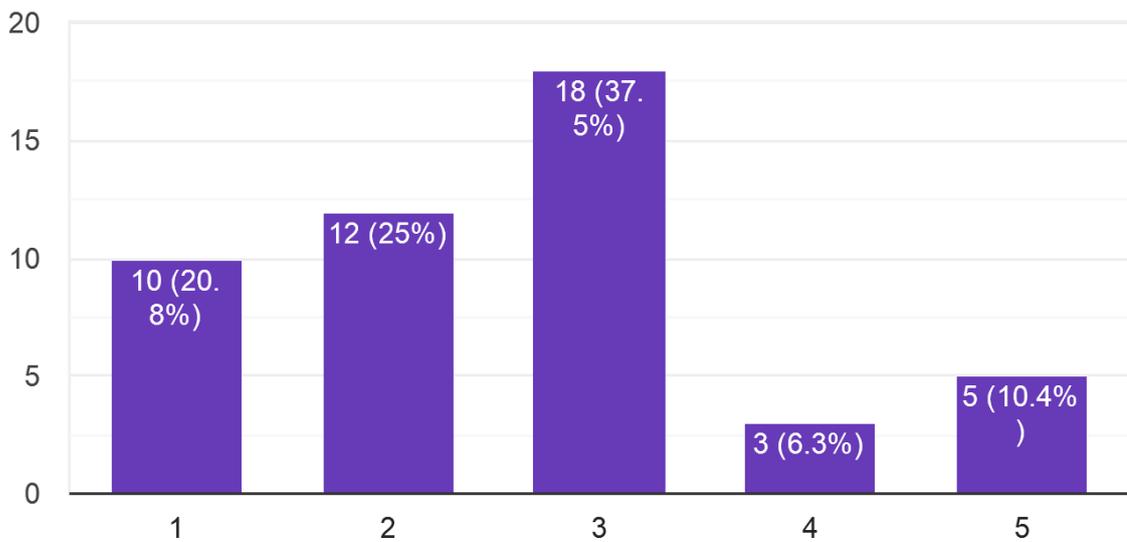
31 responses



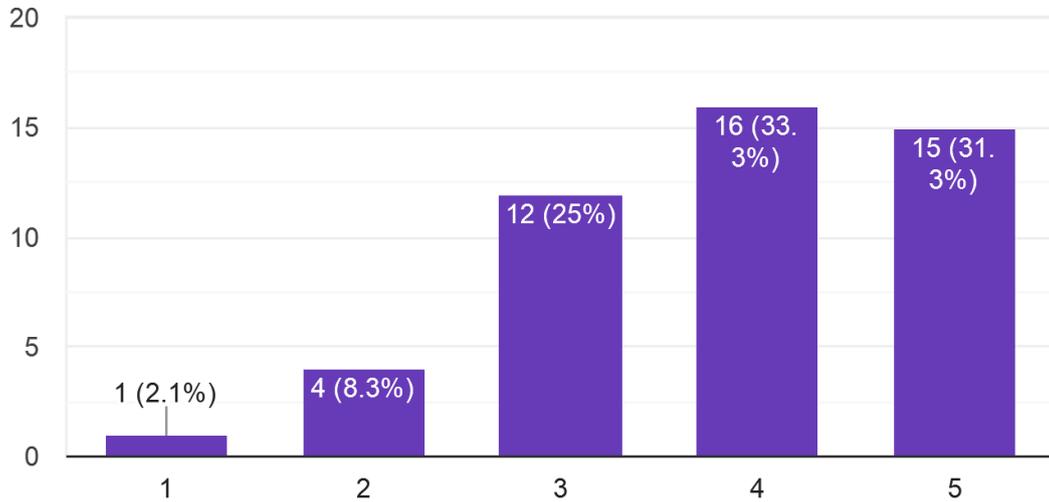
From 1 to 5 with 1 being the lowest and 5 being the highest, rank how much or how...rd of mouth to share reviews
48 responses



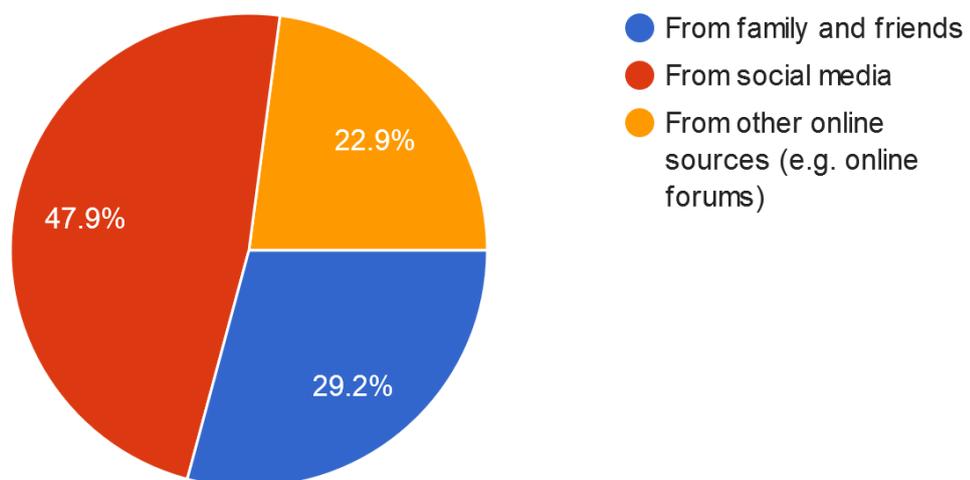
From 1 to 5 with 1 being the lowest and 5 being the highest, rank how much or ho...ten methods to share reviews
48 responses



From 1 to 5 with 1 being the lowest and 5 being the highest, rank how much or how...tal methods to share reviews
48 responses

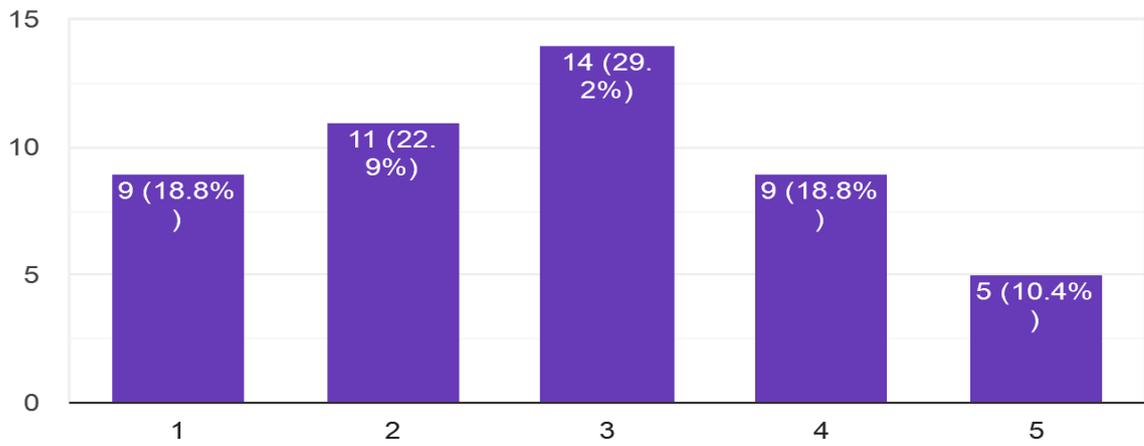


From which sources do you find the most reviews
48 responses



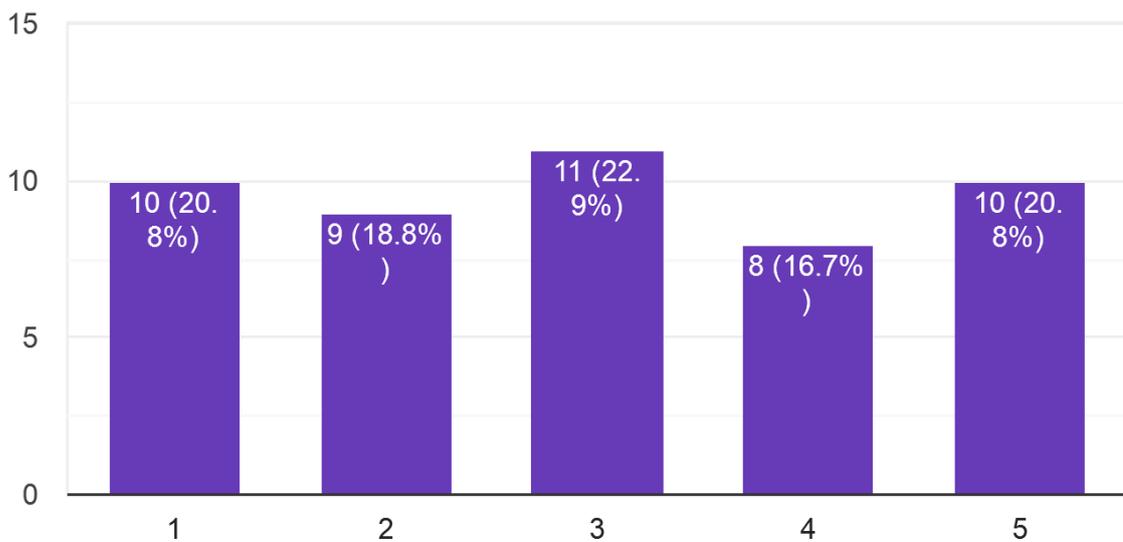
From 1 to 5 with 1 being the easiest and 5 being the most difficult, rank how difficult or...reviews from family and friends.

48 responses



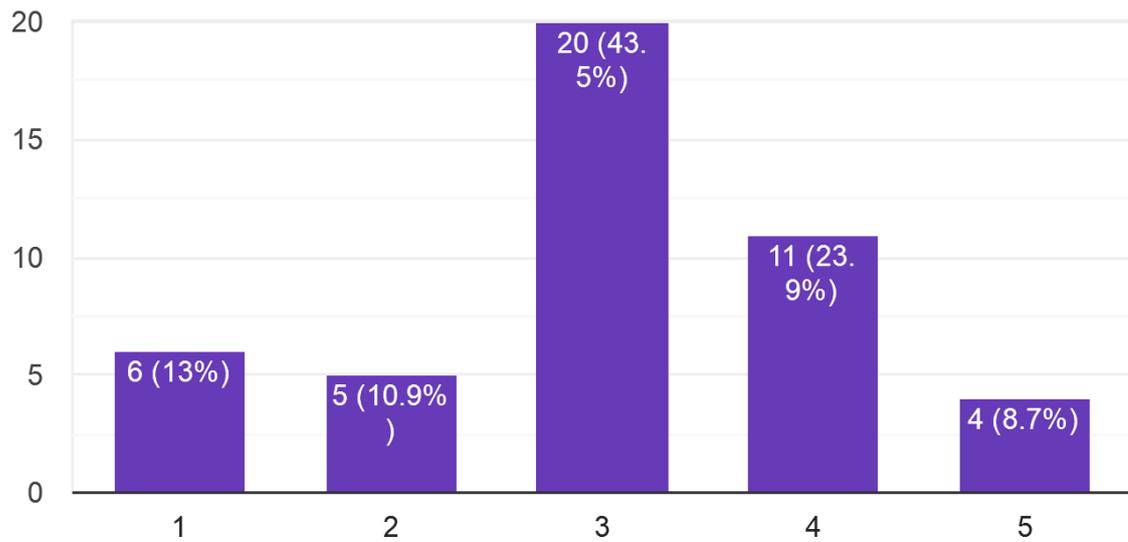
From 1 to 5 with 1 being the easiest and 5 being the most difficult, rank how difficult or... get reviews from social media.

48 responses



From 1 to 5 with 1 being the easiest and 5 being the most difficult, rank how difficult or...iews from other online sources.

46 responses

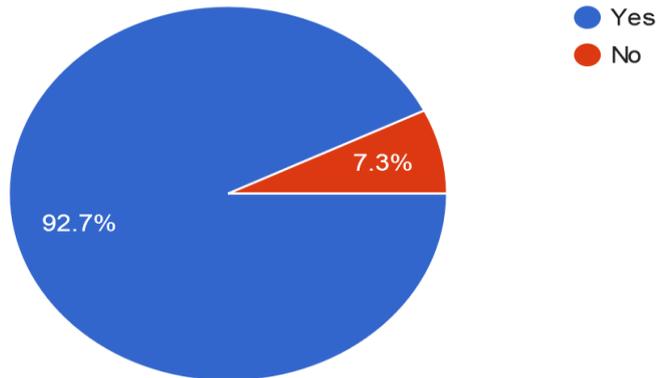


Appendix D

Responses for the business questionnaire

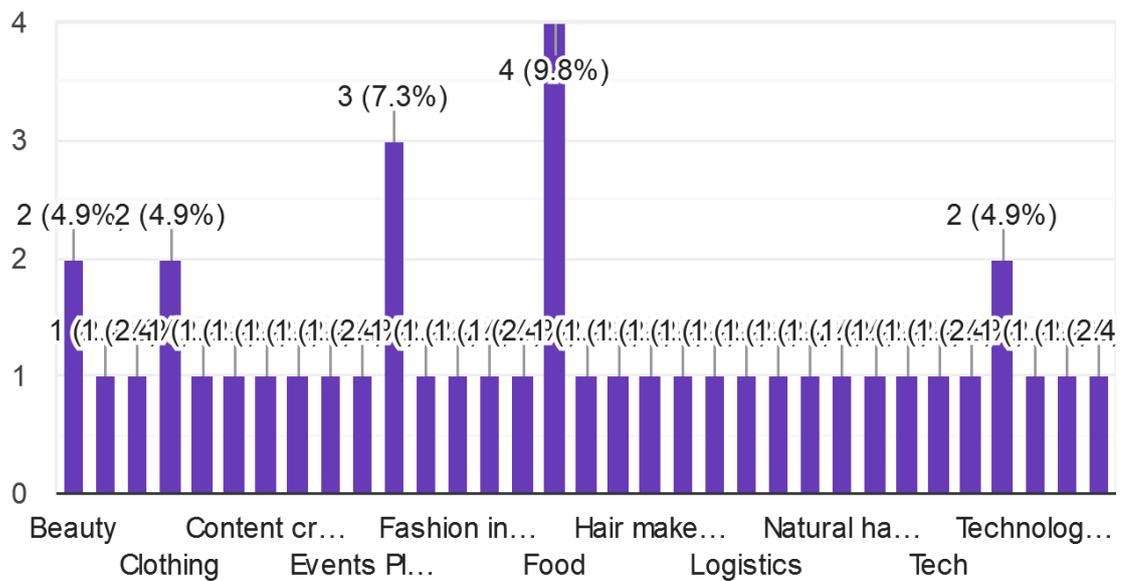
Are you a business owner or a business executive?

41 responses



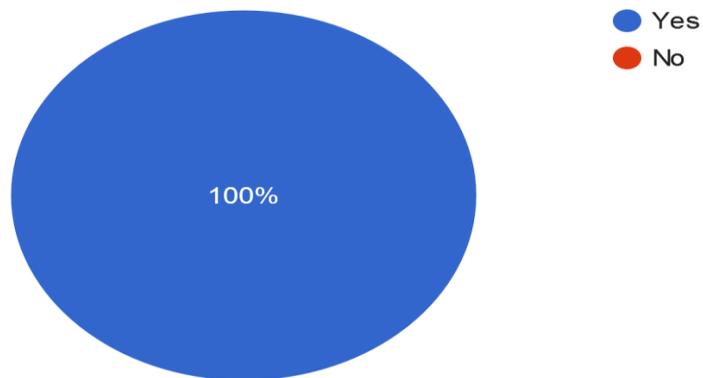
Which industry does your business belong to?

41 responses



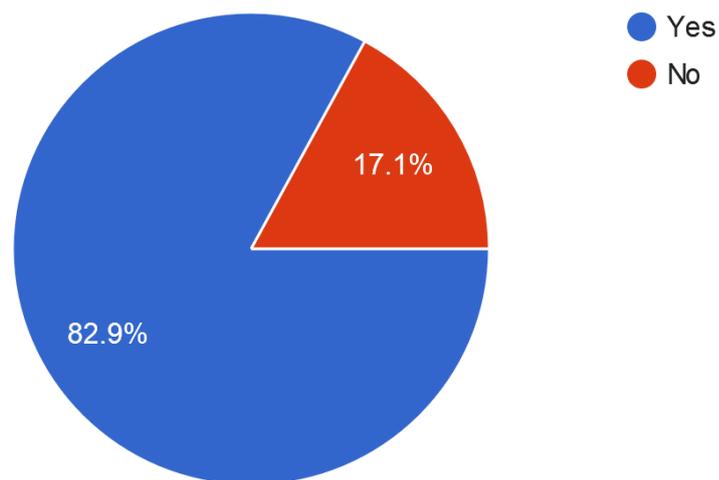
Do you think customer feedback is important for your business?

41 responses



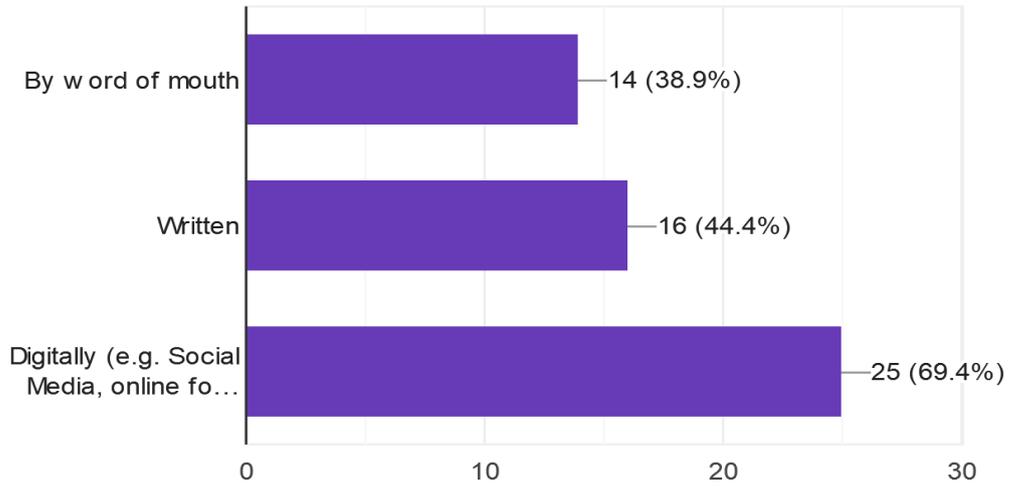
Have you taken any steps to collect customer feedback?

41 responses



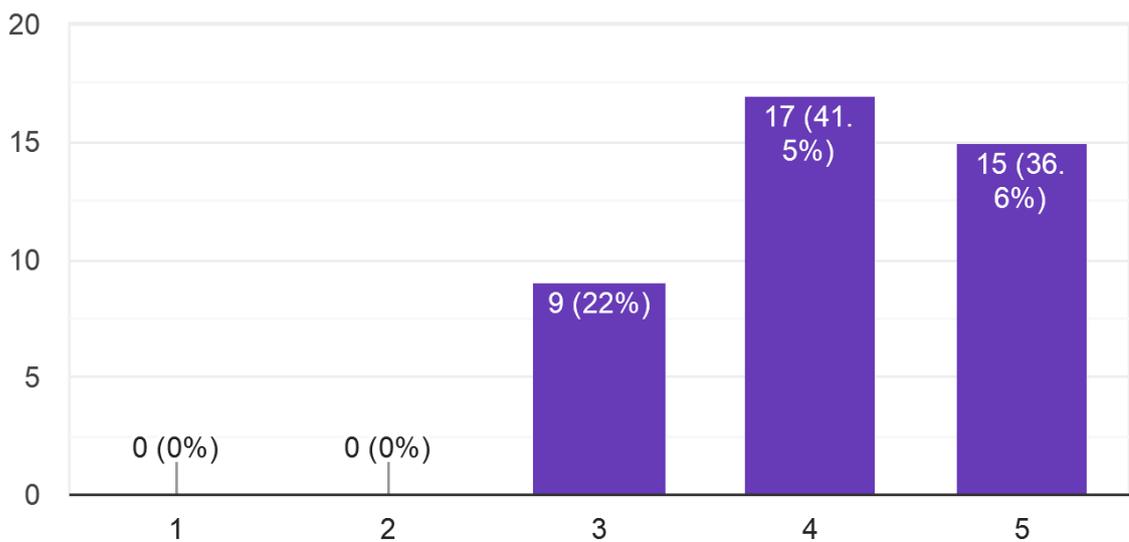
Can you think of any other method for collecting customer feedback you have not tried yet?

36 responses



On a scale of 1 to 5 with 1 being the lowest and 5 being the highest, rate how effective y...ect customer feedback/reviews

41 responses



Would you use an online resource for collecting and viewing customer reviews if one existed?

41 responses

