Design and Implementation of a F-Commerce Restaurant application.

THESIS REPORT

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Abstract

We are going to leverage a real life restaurant by making it fully functional and operational using the concept of F-commerce. We will use object-oriented design and implementation of F-commerce by providing an end-to-end product for the market. There will be a Facebook page and we will integrate a blog-site with this page where likes, check-ins of the restaurant or discount updates will be updated accordingly and vice-versa.

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Chapter 1: Introduction

The reasons that drive hundreds of millions of people to register to the social networks and are still driving the majority of them to access and interact with others on a daily basis is an important building block in understanding the social network consumer behavior. Recent research shows that using the internet for social purposes (such as the online social networks) reduces people's feeling of loneliness and depression, feeling that the modern world and specifically non-social internet usage amplifies as well as helping people's self-esteem and their perceived social support. [1] This sociology phenomenon can be partly explained by the fact that many traditional social networks disappeared over the last few decades as a result of the existence of the internet since people prefers to spend time online instead of interacting with their families and friends. [2] A social network is a very special platform for transferring viral messages and exchanging information with other users or companies. The uniqueness of this platform lies in its appearance as a public domain. Information that is shared or exchanged within the social network is visible to many people, not necessarily people that are supposed to be exposed to this information. The influence of the fact that there are other people that are "present" or exposed to the information sharing process has to be examined but in another research it was found that the presence of others influences the memory of people to social-related advertisement. This can be explained by the concern with regards to the impression others in the network can form. As an example, sharing information about visiting a restaurant that is positioned in a certain way (budget restaurant, for instance) might transfer the wrong message to people within an individual network that he might not be interested in this information. This phenomenon actually means that the messages that are transferred within a social network will not be virally distributed is the same way that a message will be distributed in another, more discreet, network. Most of the social Interactions within the social network happen between the net workers, but firms have the ability to influence this conversation by doing four main things: Observe, Moderate, Mediate and only sometimes Participate.

Chapter 2: Literature review

2.1 Related Work

The need for electronic Word of Mouth (eWOM) is increasing in today's world, mainly as a result of higher demand for information (that is led by the increasingly complexity of the products and services offered) and from the other end, higher supply of information (with all the different available forms of communication, such as emails, SMSs, mobile social networks and others).

Word of mouth and specifically positive word of mouth can really make a difference in the launch of a new product. Negative word of mouth or no word of mouth can either delay the diffusion of the product or even lead into a failure in its launch. [3] In that regard, the electronic world might have been accelerating the phenomenon but word of mouth and its drivers were always a key part of the communication between people. [4] The effect of word of mouth for companies that are in the services business is more substantial than for product companies [5], although word of mouth is critical in both types of companies. The WOM is even much more critical for services companies; compared to product companies which might be a result of the intangibility of services that is making the experience reporting very important.

The effectiveness of word of mouth differs according to the nature of the specific decision process, the positivity of the message that is transferred and the timing in which an individual entered into the word of mouth conversation. [6] As a result, it is very challenging for the company to influence the word of mouth in a certain way, while it has limited control over this information exchange process. Still, in the last few years, the usage of mathematical network models was used in order to scientifically optimize the usage of the network in order to achieve the best results out of the viral message distribution within the network. [7, 8, 9] These optimization models would minimize the amount of money that is invested in order to transfer a certain viral message to an individual. In order to explore the return on this investment, one needs to also estimate the value of the fact that the individual got the viral message. This analysis is obviously very complicated and should take into account the influence the message has on an average net worker and the value of this net worker for the company. The value of the net worker should be explored by calculating the value of a new customer that might become a lifetime customer. Taking into account the relationship marketing concept, the social networks should encourage a long time relationships between the company and the vendor, hence the calculation of the value of a lifetime customer. [10] Relationship marketing that was developed in the last 15-20 years is a concept that talks about building relationships between companies and their customers. The way the concept was understood and implemented is that companies need to keep long-term relationships with its customers. The most popular implementation of the concept is a "loyalty program". In order to keep relationships between the company and its customers stable, company should invest in improving the quality and strength of the relationships, as these were found to be correlated to the company's business results from the customer. The same research found also had the effectiveness of Relationship Marketing rises when the relationships are critical for the customer (in service offerings and business markets, for instance) and when an individual from the company is representing the company in front of the customer. Another method that is relevant for transferring commercial information in social networks is viral marketing. In Viral marketing, the company is creating an attractive content that is being published within the network from one member to another (like a virus). The positive effect of Viral marketing in social networks on the adoption of products (mainly new products) was proven in research that was done in the 90's but the exact "formula" of what kind of message should be transferred to which "entry point" within the network was still not found. [11] One aspect of a company communication that should be looked at very carefully is the company culture. Potential consumers will be more positive into messages of brands and companies that they are aligned with in terms of the culture they are representing. These findings are specifically challenging in global social networks such as Facebook, where members from all over the world, that have different cultural background, different set of values and different believes are connected to each another, as well as are connected to the companies group pages.

There was also a study that was undertaken as a systematic literature review based on the original guidelines as proposed by Kitchenham [16]. A Systematic Literature Review (SLR) presents a fair evaluation of a research topic by using a trustworthy, rigorous and auditable methodology. The objective is to retrieve, evaluate and interpret all the available research contributions that should be considered relevant with respect to the topic of investigation, and according to previously defined research questions. In order to reduce at minimum the risk of results biased by authors preferences a SLR should be carried on sticking to general and precisely defined guidelines. This work refers to the guidelines proposed by Kitchenham in 2007 which have been conceived with a particular emphasis on SLR conducted in the computer science domain. The considered approach is structured on three steps: Planning the SLR, Conducting the SLR and Reporting the SLR. To conduct the SLR, research questions were defined. They are related to the objectives of discovering why?, where? And how? Social Commerce is considered relevant and needed. Questions are also formulated to take real experiences into social commerce. The answers to these questions provide good foundation for researchers and practitioners who are interested in examine in depth the study of social commerce. [17]

Previous findings:

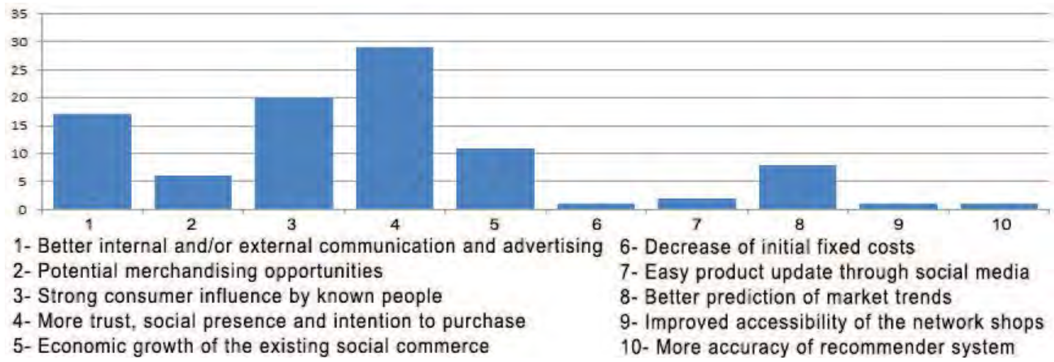

Figure 2.1.1: Reasons to implement social commerce on a histogram

Figure 1 demonstrates a histogram that gives us a better understanding of the reasons to implement social commerce in the real world. As seen in the figure, three of the most significant reasons are trust and relationship between a seller and their customers, influence amongst the known people to influence more consumers, internal and external communications between the seller and consumer and advertising. These factors thus help elevate the overall business income.

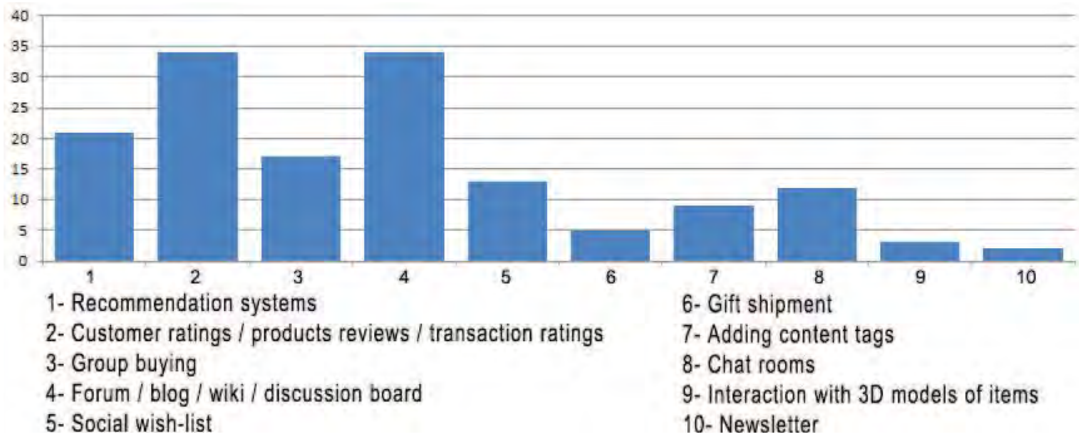

Figure 2.1.2: Technological features to support social commerce

Figure 2 shows the various features that are widely used to support social commerce. As seen in the figure above, websites, blogs, forums are commonly used features in the social commerce phenomenon along with customer ratings, Facebook groups and product reviews that are integrated within these social platforms which can add a different dynamic to a business making it more accessible and recognized throughout the internet, particularly the social media platforms.

2.2 Research on Facebook

As one of the predominant tools in social media, Facebook has received significant research attention from many disciplines, but only a few of the studies have focused on how Facebook can be used as an effective business-to-consumer (B2C) communication tool. For example, a study examined to what extent the national tourism organizations (NTOs) in Europe use Facebook as a marketing tool, concluding that few were doing so. [12] Using qualitative approaches, a focus group study was completed on college students' perceptions of corporate public relations efforts and corporate presence on Facebook. [13] The research findings suggest that Facebook users prefer to interact with small business owners through personal messages and can be motivated to "Like" a company's Facebook page if the company posts exclusive discounts and coupons on Facebook. Another study conducted a qualitative case study by observing the Facebook pages of six hotels in Taiwan that have a five-diamond ranking. The findings suggest that (a) using the Chinese language on Facebook creates a barrier for English-speaking consumers, and (b) based on the author's impression, it seems that Facebook users tend to like and post comments on the updates about a guest's exciting experience and satisfaction of his or her stay. [14] Recently, researchers adopted a quantitative approach to test the relationships among Facebook users' emotions that were exhibited on three Facebook pages about festivals, these users' acceptance level of the Facebook pages as a legitimate marketing tool, and their intentions to attend the festivals. The results confirmed that Facebook users' emotional connection to an event page could increase this page's perceived usefulness, ease of use, and enjoyment. Furthermore, Facebook users' perceived enjoyment could improve their attitude toward using the Facebook page, which would ultimately lead to their intention to attend the event. [15]W e still find a lack of in-depth analysis on the nature of hospitality companies' communications on Facebook.

CHAPTER 3: System Design

System designing in terms of software engineering has its own value and importance in the system development process as a whole. In a broader sense, it implies a systematic and rigorous approach to design such a system which fulfills all the practical aspects including flexibility, efficiency and security. Systems design is the process of defining the architecture, components, modules and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development.

3.1 System Requirements

The system requirements are description of features and functionalities of the target system. Requirements convey the expectations of users from the software product. The requirements can be obvious or hidden, known or unknown, expected or unexpected from client's point of view.

Requirement Engineering

The process to gather the software requirements from client, analyze and document them is known as requirement engineering.

The goal of requirement engineering is to develop and maintain sophisticated and descriptive 'System Requirements Specification' document.

Requirement Engineering Process

Our version of the project has a three step process, which includes –

- Feasibility Study
- Requirement Gathering
- Software Requirement Validation

Let us see the process briefly –

3.1.1 Feasibility study

When the client approaches the organization for getting the desired product developed, it comes up with rough idea about what all functions the software must perform and which all features are expected from the software. Referencing to this information, the analysts does a detailed study about whether the desired system and its functionality are feasible to develop. After this detailed study, the team comes up with a rough plan of software process. So after gathering the system requirements and determining the functional and non-functional requirements our team set up a meeting to study the feasibility of the whole process. We analyzed if this software system can be made to fulfill all requirements of the user and if there is any possibility of software being no more useful. We also determined whether the project is financially, practically and technologically feasible for the restaurant to take up. We concluded that there are many software development methodologies that we can use for our project in a feasible and non-costly manner and hence, continued the process.

3.1.2 Requirements Gathering

Requirements Gathering is a step where the user initiates the request for a desired software product. Initially, we contacted the restaurant owner and we delivered our proposal to develop his restaurant marketing system and growth utilizing an F-Commerce approach. Upon prolonged discussion both parties came upon a mutual agreement to develop several requirements which was proposed by the restaurant clients. The system requirements they have proposed are:

(1) Build a dynamic website for their restaurant.

(2) Integrate their Facebook page with the restaurant website.

(3) Automated “menu” section from Facebook page to website and vice versa.

(4) Login from the website using Facebook.

(5) Give and show reviews from the website to their Facebook page and vice versa.

(6) “Like” and “Comment” option to their website in their Facebook Page.

(7) Give ratings via website/Facebook Page and show it on website.

(8) “News” section in the website to show their published news in the newspapers.

(9) Throughout the process we can increase the marketing of their restaurant.

(10) Give offers to the customers who checks-in or gives review of their restaurant. The terms were mutually negotiated. We submitted our request to the service providing organization and started the development upon agreement.

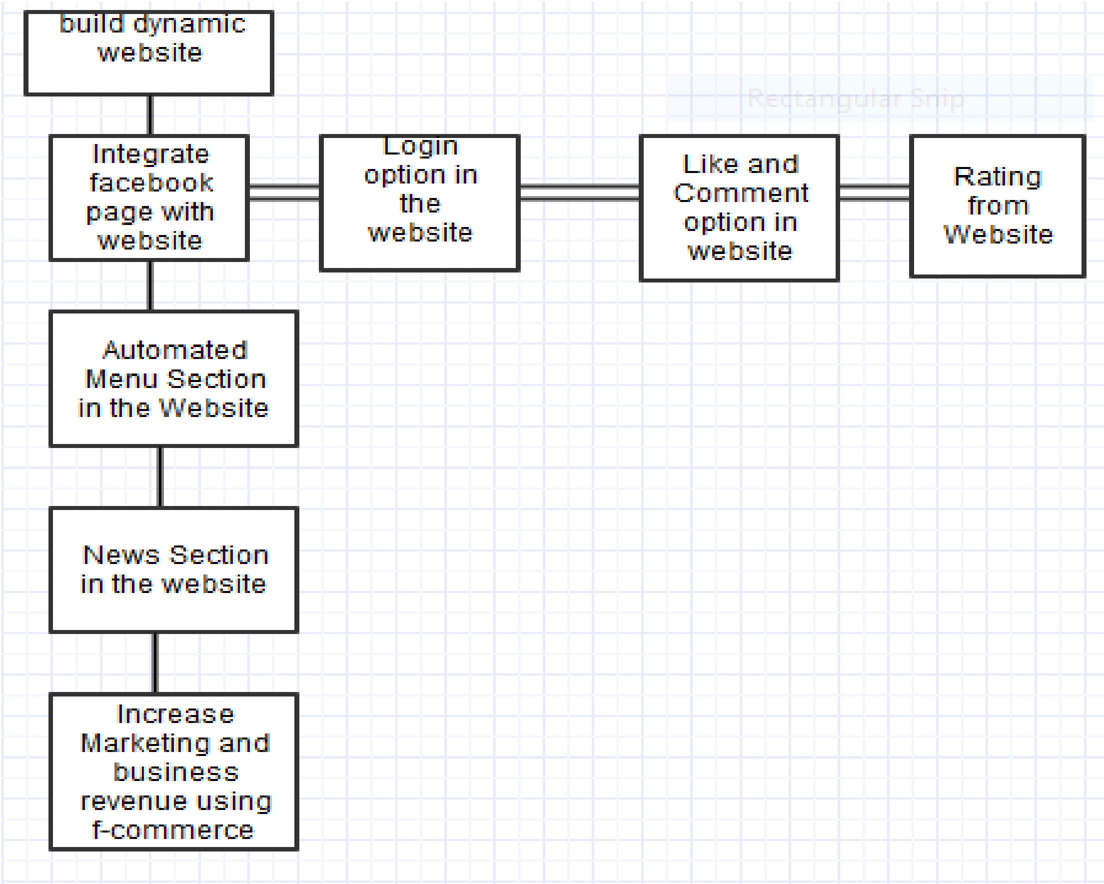

Figure 3.1.2.1: Blueprint of the components to be integrated within the restaurant website after gathering the functional/non-functional requirements.

This step onwards the software development team works to carry on the project. The requirements are contemplated and segregated into user requirements, system requirements and functional requirements. So, after reviewing their system requirements, we have divided those into Functional and Non-functional requirements.

3.1.3 Functional Requirements:

(1) Dynamic website that is fully functional and has multiple sections. For example- Home page, Menu Section, Contact, About sections.

(2) Integration of Facebook Page with the website so that anyone can login to their page through their Facebook Id and Password. There will be a "Login with Facebook Button".

(3) Like button, Comment options from the website after logged in. If anyone clicks the "Like" button, it will automatically give a like in the Facebook page. Same for the comment option.

(4) State the marketing strategies – how to increase "customer view" of the page, how to attract people to visit the page and the restaurant.

(5) Menu integration with website so that if one item is added or removed from the Facebook Page menu section, it is automatically updated in the website and vice versa.

(6) Showing price of each items in the menu. Therefore, customer can get an idea about the price range of the restaurant.

3.1.4 Non-functional Requirements:

(1) Give offers to the customers so they are encouraged to give check-ins, reviews, take pictures.

(2) "News section" in the website where news published about their restaurant will be shown.

(3) Providing security to the logged in customers.

3.1.5 Software Requirement Specification (SRS)

SRS is a document created by system analyst after the requirements are collected from various stakeholders, in this case the restaurant owner. In the specification document, we defined how the intended software will interact with different hardware, for example, with different PCs and on laptops, operation speed of the application, response time of the application and maintainability. The requirements received from client are written in natural language. It is the responsibility of the system analyst of our team to document the requirements in technical language so that they can be comprehended and useful by our team.

SRS should come up with following features:

- User Requirements are expressed in natural language.

- Technical requirements are expressed in structured language, which is used inside the organization.

- Design description should be expressed in terms of a website developing method like WordPress or Weebly.

- Format of the User Interface, such as, the catchy homepage of the website.

3.1.6 Requirement Elicitation Process

Requirements elicitation is the process to find out the requirements for an intended software system by communicating with clients.

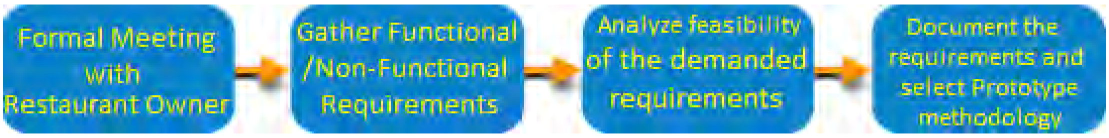

Figure 3.1.6.1: Elicitation of the requirement gathering process and the flow of procedure to select the Prototype Methodology

For our thesis project we have use three techniques to implement the ways to discover requirements.

- Non-structured (open) interviews, where information to gather is not decided in advance, more flexible and less biased.
- Group interviews which are held between groups of participants. They help to uncover any missing requirement as numerous people are involved.
- We also prototyping is building user interface without adding detail functionality for user to interpret the features of intended software product. It helps giving better idea of requirements. If there is no software installed at client's end for developer's reference and the client is not aware of its own requirements, the developer creates a prototype based on initially mentioned requirements. The prototype is shown to

the client and the feedback is noted. The client feedback serves as an input for requirement gathering.

During the requirements gathering process we discussed with the client to understand their expectations from the software.

We also had to organize requirements – Where our team prioritized and arranged the requirements in order of importance, urgency and convenience.

We then negotiated and discussed to check whether requirements are ambiguous or there are some conflicts in requirements of our client, if they are, it is then negotiated and discussed with our client. Requirements may then be prioritized and reasonably compromised. To remove the ambiguity and conflicts, they are discussed for clarity and correctness. Unrealistic requirements are compromised reasonably.

Finally, we documented all formal & informal, functional and non-functional requirements are documented and made available for next phase processing.

3.2 System Architecture

Software architecture refers to the fundamental structures of a software system, the discipline of creating such structures, and the documentation of these structures. Software architecture choices, also called architectural decisions, include specific structural options from possibilities in the design of software.

3.2.1 System Development Life Cycle

For our project, we proposed to enhance the marketing system and growth of a real-life restaurant in a systematic approach via F-Commerce which maintains different phases of the Systems Development Life Cycle as the architectural skeleton of our project. We built our whole project in a step-by-step manner following the System Development Cycle that is used widely in the field of System Engineering.

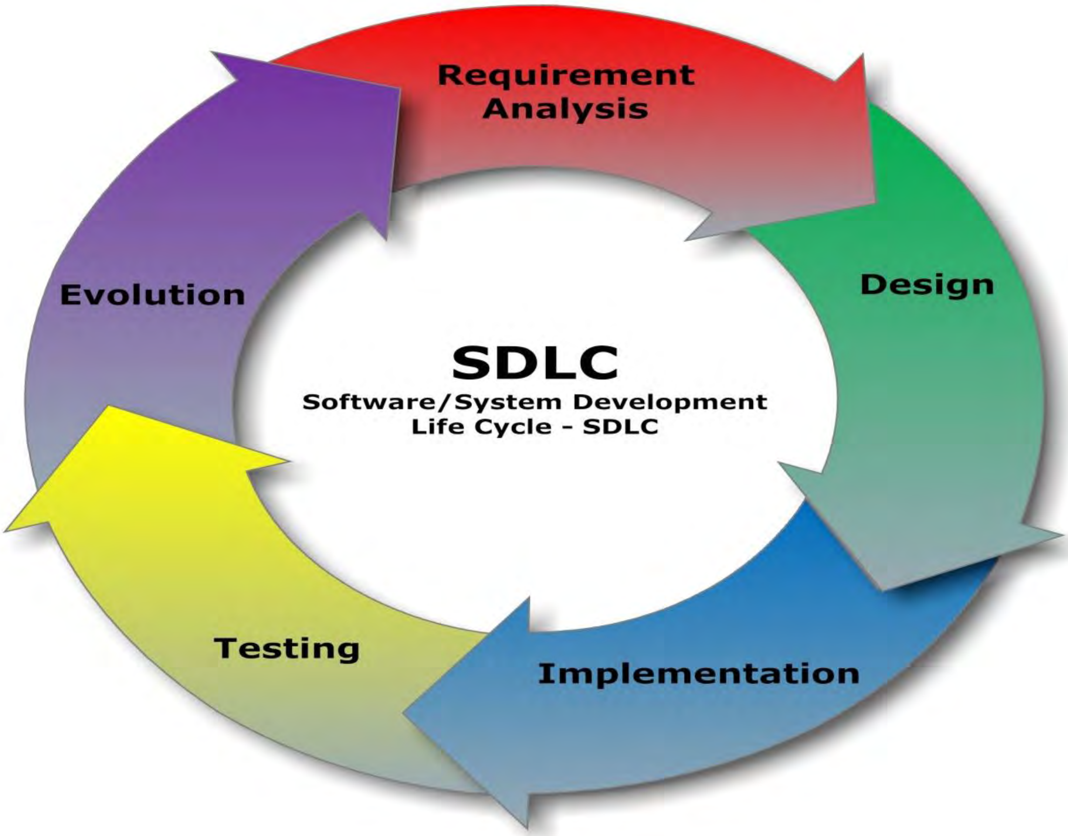

Figure 3.2.1.1: The generic model of the System Development Life Cycle our project team followed.

After the brief elicitation of the system requirements and studying, the feasibility to these requirements expected from our client relative to realistic willingness to compromise, we further developed our system as follows:

System Analysis

- At this step our team sat on informal meetings amongst ourselves to decide a roadmap of our plan and tried to bring up the best software model suitable for the project. System analysis includes understanding of software product limitations, learning system related problems or changes to be done in existing systems beforehand, identifying and addressing the impact of project on the restaurant. After analyzing these aspects of the system we decided to incorporate the prototype model which would be the most suitable for this project.

Firstly, the basic idea in the Prototype model is that instead of freezing the requirements before a design or coding can proceed. The Prototype model is developed based on the currently known requirements. By using this model, the client can get an "actual feel" of the system, since the interactions with prototype can enable the client to better understand the requirements of the desired system. The goal is to provide a system with overall functionality.

We have chosen the Prototype model for our project because:

- Users are actively involved in the development.
- Since in this methodology a working model of the system is provided, the users get a better understanding of the system being developed.
- Errors can be detected much earlier.
- Quicker user feedback is available leading to better solutions.
- Missing functionality can be identified easily.
- Confusing or difficult functions can be identified.
- Requirements validation, Quick implementation of, incomplete butfunctional, application.

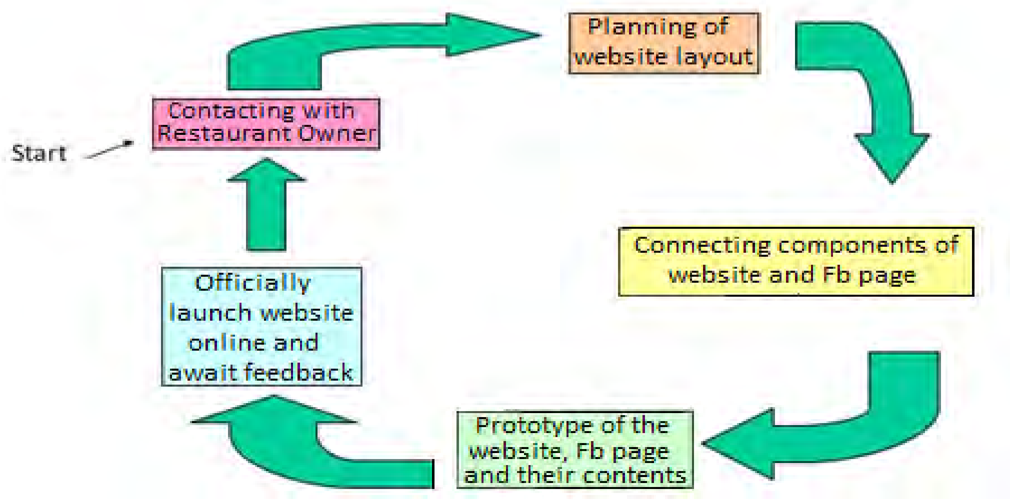

Figure 3.2.1.1: Roadmap of the implied Prototype model to deliver the product.

So while developing our model, the restaurant owners were able to have a transparent idea of the whole process. Since this model allowed our client to interact throughout the development process, he gained more interest in our working process. Thus, developed more trust with our team and was more satisfied because they were able to provide regular feedbacks for the prototype to result in a useable system.

Software Design

Next step is to bring down whole knowledge of requirements and analysis on the desk and design the software product. The inputs from users and information gathered in requirement gathering phase are the inputs of this step. The output of this step comes in the form of two designs; logical design and physical design. Our team set up a meeting to decide the logical design of our system. The layout and user view we would use for the website of the restaurant, the integration of the website to Facebook, the connection between the front-end and back-end of the website. For the software design, let us break down the whole process of how we created our website and inter-connected its front end and back end with the Facebook page of the restaurant. These parts fall under the logical design.

- Firstly, the tools we used to develop our website is using WordPress and Weebly systems. For ease of the structure of the website with minimal documentation, we focused on the interface and design to accommodate usability easiness for end users. We also maintained the overall structure of the website to give it an overall attractive outlook. This will pull in more customers to the website and the performance speed of the website is made competitive.
- Our use of WordPress allowed us to customize the functionality and design of the website. This gave us a better grip on the design part and enabled us to have a vision of what contents we are going to be able to add to the website.
- The use of plug-in button also helped us inter-connect the restaurant website with the restaurant page. This is the connection between the front end and back end of the system.

Testing

An estimate says that 50% of whole software development process should be tested. Errors may ruin the software from critical level to its own removal. After determining the logical and physical designs, for our system we tested the whole marketing concept and system by comparing with a restaurant that uses similar marketing strategies and concepts. Test cases with the restaurant's competitors are carried out to evaluate the position of the restaurant in the current circumstances. For that comparison study, we used analytics tools such as Facebook Business Manager. Hence, preserved the data and findings of our test to verify the succession of our project.

Implementation

To implement our project we created the website using WordPress and integrate the website with the restaurant's Facebook page. We have covered the system requirements of the client and tried to implement the whole System Development Cycle through F-commerce concept. We also have created some content on Facebook to increase their overall views, likes and popularity to elevate the restaurant's revenue and customer growth.

Operation and Maintenance

This phase confirms the software operation in terms of more efficiency and less errors. As new contents are added on website, the website will remain operational with contemporary functionality. We will also try to make the system secure in case of any penetration from external intrusions. We will also provide occasional updates and improve the application portability. For example, website that is compatible with mobile devices, a new mobile application and different contents around the website to enhance the marketing of the restaurant.

3.3 WORKFLOW

For our thesis project, we have followed a generic workflow model to develop our system application.

Firstly, we initiated the request for a desired software product. Initially, we communicated with the restaurant owner and we delivered our proposal to develop his restaurant marketing system and growth utilizing an F-Commerce approach. Through prolonged discussion between both parties, we came upon a mutual agreement to develop several requirements which was proposed by the restaurant clients. The next step our team took was to work on the accumulation of requirements for project. The requirements are contemplated and segregated into user requirements, system requirements and functional requirements. So, after reviewing their system requirements, we have divided those into Functional and Non-functional requirements. The next flow of work we performed our team decided a roadmap of their plan and try to bring up the best software model suitable for the project. System analysis includes understanding of software product limitations, learning system related problems or changes to be done in existing systems beforehand, identifying and addressing the impact of project on the restaurant. After analyzing these aspects of the system we decided to incorporate the prototype model which would be the most suitable for this project. The Prototype model is developed based on the currently known requirements. By using this model, the client can get an "actual feel" of the system, since the interactions with prototype can enable the client to better understand the requirements of the desired system. The goal is to provide a system with overall functionality. Next step is to bring down whole knowledge of requirements and analysis on the desk and design the software product. The inputs from users and information gathered in requirement gathering phase are the inputs of this step. The output of this step comes in the form of two designs; logical design and physical design. Our team set up a meeting to decide the logical design of our system. The layout and user view we would use for the website of the restaurant, the integration of the website to Facebook, the connection between the front-end and back-end of the website. These parts fall under the logical design. Whereas, the contents of a website and the website itself are part of the physical design of our system. Errors may ruin the software from critical level to its own removal. After determining the logical and physical designs, for our system we tested the whole marketing concept and system by comparing with a restaurant that uses similar marketing strategies and concepts. For that comparison study, we used analytics tools such as Facebook Business Manager. Hence, we preserved the data and findings of our test to verify the succession of our project. To implement our project we created the website using WordPress and integrate the website with the restaurant's Facebook page. We have covered the system requirements of the client and tried to implement the whole System Development Cycle through F-commerce concept. We also have created some content on Facebook to increase their overall views, likes and popularity to elevate the restaurant's revenue and customer growth.

The complete development workflow is represented on an activity diagram below:

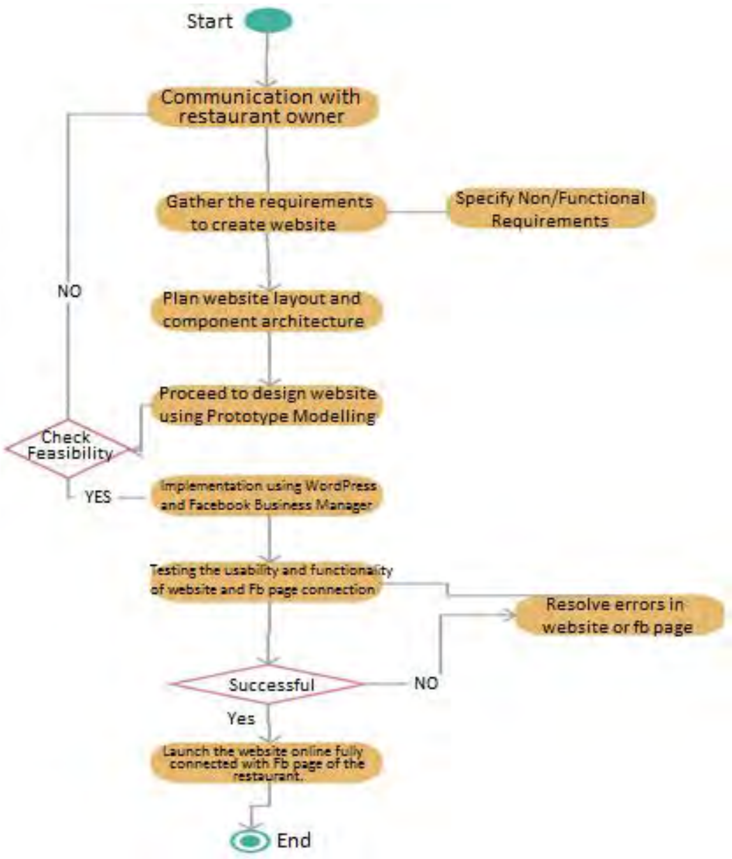

Figure 3.3.1: Workflow diagram of the whole development process from creating and inter-connecting the website and Facebook page of the restaurant to the launch of the website online.

3.4 Testing

The most important part of our project relied in Software Testing where we evaluated the application against requirements gathered from our client. Testing is conducted at the phase level in software development life cycle.

The targets of the test cases we carried out were:

Detect Errors – This is where we gave several inputs to check and see if our integration of source codes for the website layout met the desired output, otherwise it would be considered as an error. When error exists fault occurs. A fault, also known as a bug, is a result of an error which can cause system to fail.

Nullify Failure - failure is said to be the inability of the system to perform the desired task. Failure occurs when fault exists in the system.

To achieve these targets we tested different components separately and on different levels just to make sure that there are no hidden bugs or issues left in the application. We tested on various levels –

3.4.1 Regression Testing

Our team conducted regression testing whenever we updated the website with new source code to change the layout and user interface of our site, or added new features or functionality like plug-in buttons or videos into the restaurant’s website. We tested thoroughly to detect if there is any negative impact of the update.

3.4.2 Usability Testing

We also performed usability testing to evaluate how easy our website is to use. The tests took place amongst our team where one of us casually browsed through the website to measure how ‘usable’ or ‘intuitive’ a website is and how easy it is for users to reach their goals. We also checked on our contents that we tried to incorporate on the website. Since the contents should be logical and easy to understand. We checked for spelling errors. Also, use of dark colors may annoy most users and should not be used in site theme. Thus, we followed some standards that are used for web page and content building. These are common accepted standards like bright colors and medium fonts and catchy images, etc. Content should also be meaningful. So we checked if the anchor text links were working properly. Images were also placed properly with proper sizes.

3.4.3 Functionality Testing

We performed this to test for all the links in web pages, plugin buttons, Database connections, forms used in the web pages for submitting or getting information from user. We basically checked all the links, for example, the outgoing links from all the pages from specific domain. We then tested all internal links like jumping on the same pages. Tested links used to send the email to admin or other users from web pages. Finally, we tested to check for broken links in all above-mentioned links.

3.4.4 Performance Testing

Lastly, a crucial type of testing was carried out. This is where we checked how our Web application sustained under heavy load. This was performed by giving the links of our website to our trusted group of networks amongst our team and we all tried to enter and use the website all at once. Also when many users are accessing or requesting the same page, the website might encounter crashes. We deliberately stressed the input fields and login areas. We also tested the website functionality on different operating systems and on systems using different hardware. Our goal was to check whether the website performs smoothly without faults under severe load and stress. We also tested the website performance on different internet connection speeds. The site was tested against many simultaneous user requests, large input data from users and heavy load on specific pages, etc.

After the testing phase where our team checked for system errors and for the system to perform appropriately, we decided to launch the website unofficially to the restaurant owner with respect to his demands. This step is equally important because our development methodology relies on taking feedback from end users about the usability, functions and smooth accessibility of the website and Facebook page of the restaurant to-and-fro.

3.5 Data Analysis

This is a crucial segment in our thesis project where we collect data and readings from the techniques and methodologies. We recorded these data, analyzed it and vastly interpreted it in terms of marketing using the F-commerce concept. We would go through the details of this section in the later chapters of our report but here, we would like to briefly explain about the steps taken to extract the data. The data extraction process began with content creation that was applied within the Facebook page and developed website. The contents were created using a software tool called Facebook Business Manager. This tool helped us imply the contents onto the Facebook page of the restaurant. By the application of these contents, the Facebook page garnered a severe increase in popularity within the Facebook community. Advertisements of different offers and items respective to the restaurant were generated using this tool and the day by day increase in revenue could be extracted and analyzed. Due to the boom in popularity with the help of posting ads on Facebook about the restaurant, there was also an increase in overall product sales. These increase in restaurant productivity could also be analyzed and recorded for further marketing developments. If the business of the restaurant is proceeding slowly, we would use this content creation tools to generate new contents and apply it on the website page to catch customer attentions with ads, offers, discounts, check-ins and several techniques so that the overall business of the restaurant receive a noticeable rise for extraction, documentation and analysis.

Figure 3.5.1: An instance of content creation and applying it on the Facebook page of the restaurant

CHAPTER 4 SYSTEM IMPLEMENTATION

4.1 Webpage Design & Facebook Integration:

At first, to meet up the system requirements, we have created a responsive website of the restaurant. We have built our website using Weebly which is a web host and online service that gives users the ability to create a website using a drag-and-drop interface. Weebly's free online website creator uses a simple widget-based site builder that operates in the web browser. All the site elements are drag-and-drop and it automatically generates a mobile version of each website. Storage is unlimited, but the service restricts individual file sizes. Consumers are given the option to have any URL ending in .weebly.com, .com, .net, .org, .co, .info, or .us. (example.weebly.com). The domain name of the website is www.kingscornerbd.weebly.com.

Firstly, we have created four different sections in our webpage. Home, Menu, About Us and Location sections are included in the webpage.

4.1.1 Home Section:

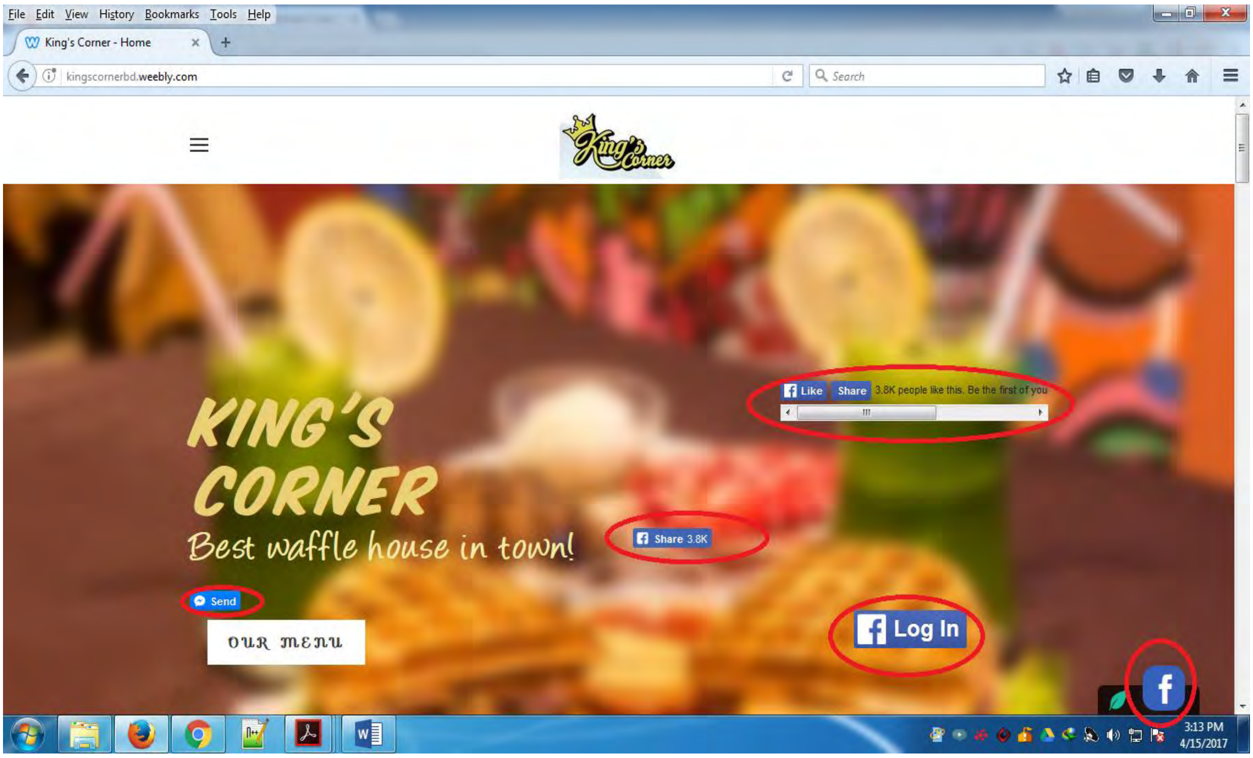

Figure 4.1.1.1: Home page of the website

In the home page, we have decorated our webpage with a catchy picture of few of their special menus. As the owner of the restaurant demanded Facebook login, like, share button to the webpage we give that in the home page. Any webpage visitor can login to their perspective Facebook account from our website. Moreover, by logging the person can also like the Facebook page of the restaurant from the webpage and also can share our Facebook page from his/her Facebook account. We have also created a send button by using this any logged in user can invited their Facebook friends to visit the restaurant's webpage. On the corner of each section we have created a Facebook icon. By clicking this anyone can get a overview of the restaurant's Facebook page. We have also created an 'our menu' box in the home page. By clicking this people will be able to access to the menu section directly.

4.1.2 Menu:

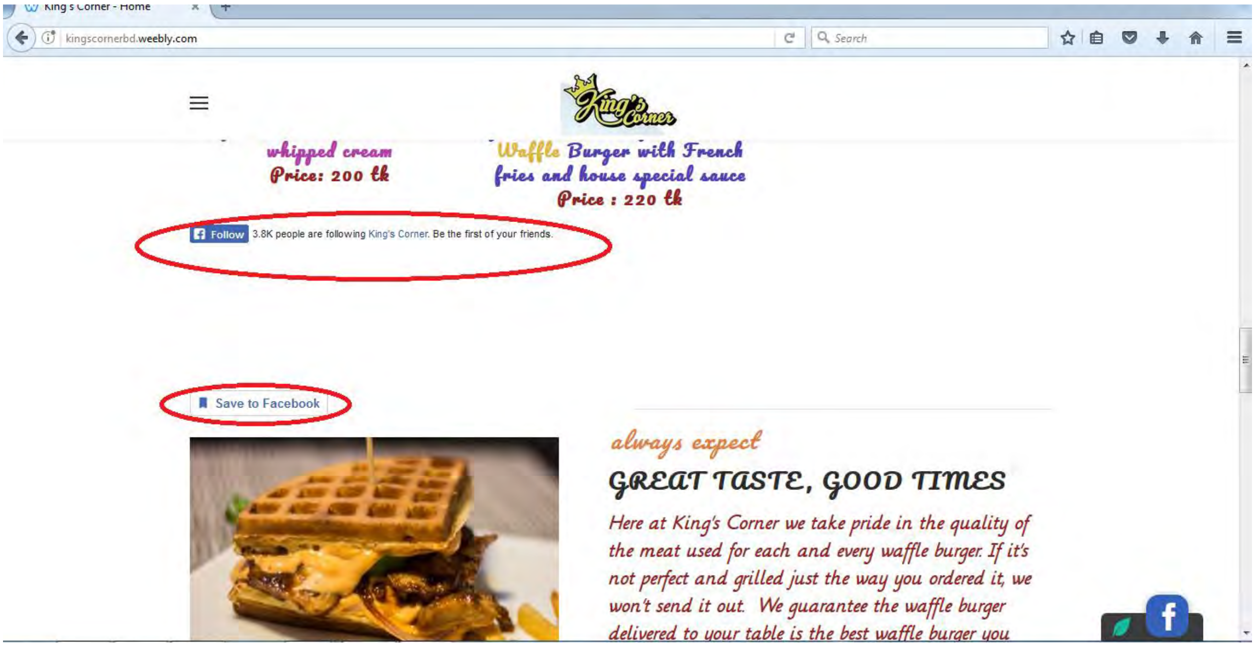

Figure 4.1.2.1: Menu Section of the webpage

There is a menu section in our webpage where we have built an auto generated menu of the restaurant. We have provided the list of all the items with the picture and the price. In the menu section, there is follow button from where a logged in user can follow the restaurant's Facebook page. In addition, we have created a "save" button which will be useful to save any content from the webpage. Thus, we have decorated our menu section with attractive pictures of their food items.

4.1.3 About Us:

We have embellish the about us section slight differently. We have added some feedbacks and Facebook posts of the valuable customers from the restaurant's Facebook page. For that we have collected a few Facebook posts from the customers who have visited the restaurant and enjoyed their time with some delicious foods. The posts of this section can be changed manually by the webpage handler.

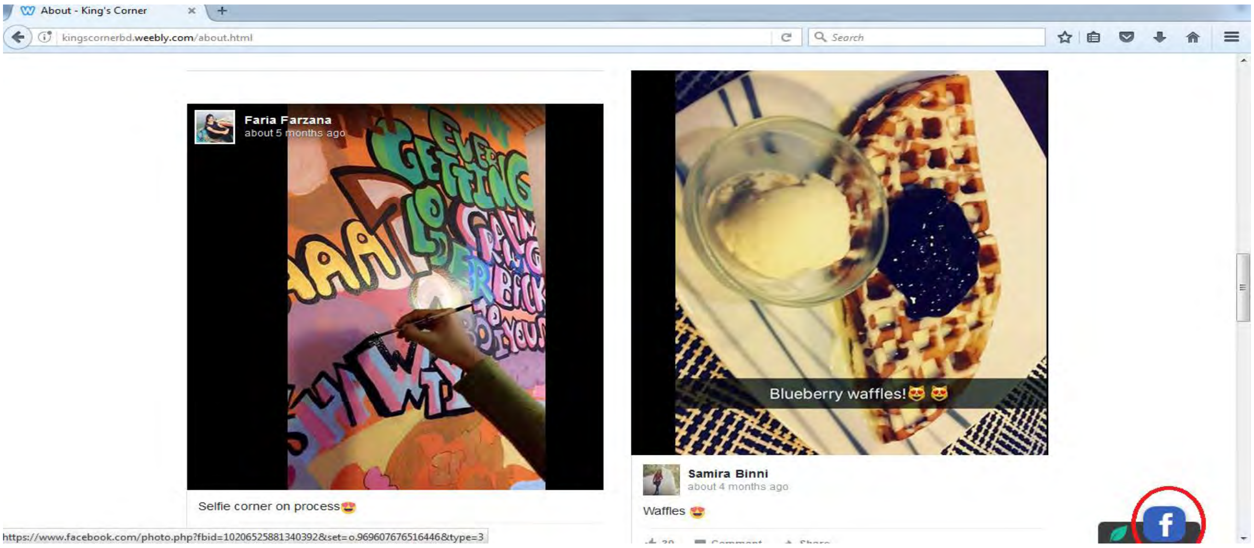

Figure 4.1.3.1: Posts of the Customers in about us section

Besides, we have put a comment section in the bottom of the about us page. By using this anyone can put their valuable comment in our web page which will automatically share in his Facebook account. Furthermore, we have fabricated an option of survey in our about us page, by filling up the form anyone can put their valuable recommendation or feedbacks about the webpage, Facebook page, as well as about the restaurant. According to the owner's request we have put the comment section in a way that anyone can give any type of comment which will enhance to increase the overall operational process of the restaurant.

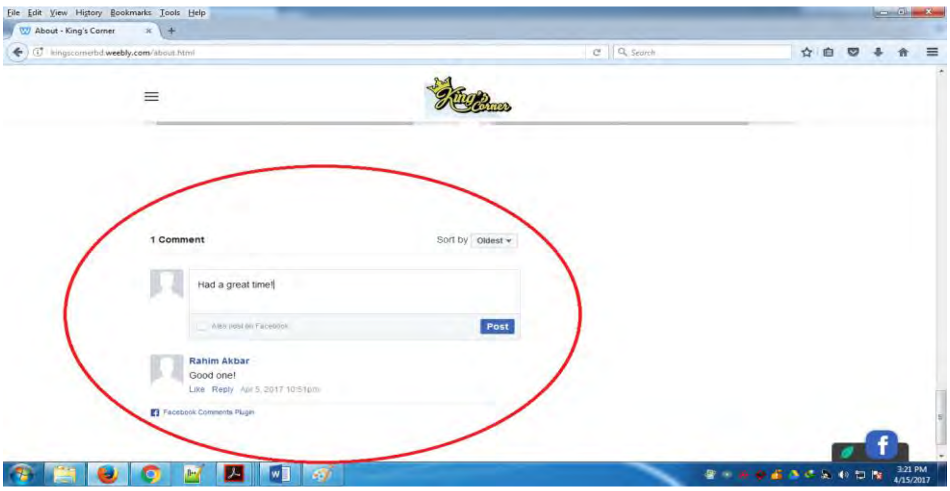

Figure 4.1.3.2: Comment option in 'About' section.

4.1.4 Location:

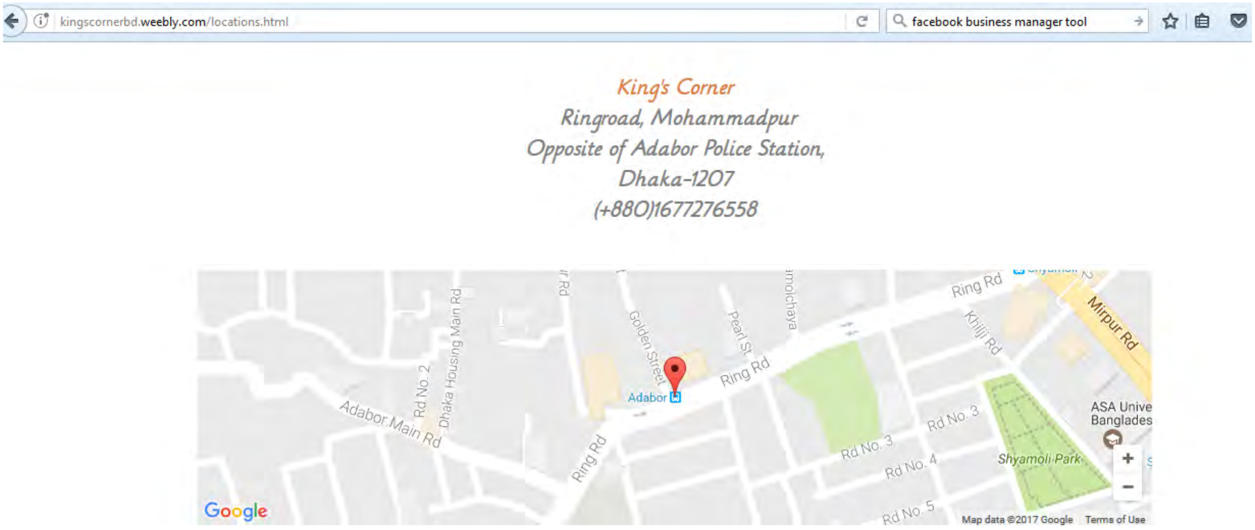

Figure 4.1.4.1: Location of the restaurant in the 'Location' Section

To end up with,we have tried to help the customers by providing the exact location of the restaurant in the location section. To extract the location we have used the google maps and integrated it with our webpage. Additionally, in every page we have created the instagram, Facebook and mail icon at the last of every page. From those icons if anyone click the Facebook icon the user will automatically view the Facebook page of the restaurant. Respectively, by clicking instagram icon user will get the view of the instragram account and anyone can give a mail to the restaurant's mail address by clicking the mail icon.

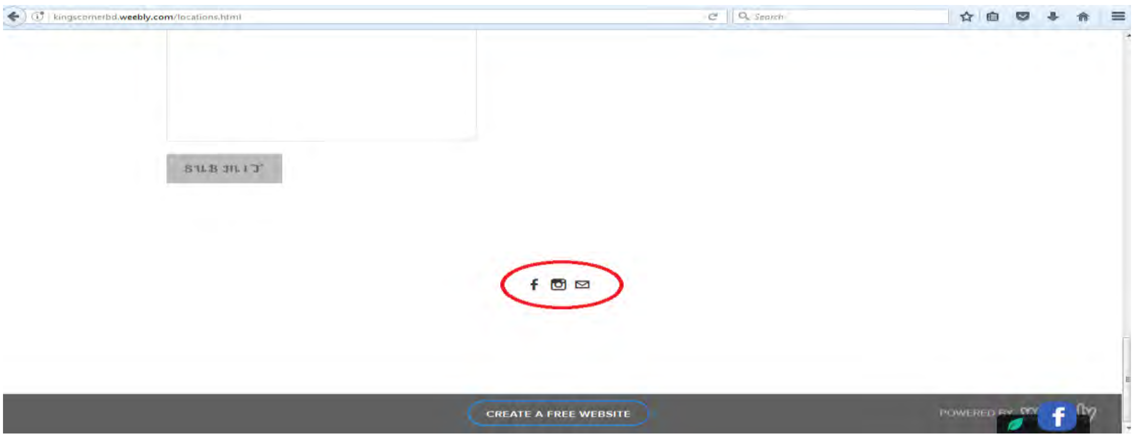

Figure 4.1.4.2: Icons of Facebook, Instagram, Mail

4.2 Facebook Business Manager:

Business Manager is a tool for managing access to Pages and ad accounts, geared towards companies who need to give different permissions to lots of people. Business Manager lets:

- **Manage access to Pages and ad accounts:** Clearly see who has access to a Pages and ad accounts and remove or change their permissions.
- **Keep one's work separate:** Get access to Pages and ad accounts without being friends with the coworkers on Facebook.

Figure 4.2.1: Workflow of using Facebook Business Manager

Facebook Business Manager is a more structured and fancier way to manage and publish content. Therefore, we will use this tool to create our ad and post it on Facebook. The process of utilizing Facebook Business Manager is as follows:

4.2.1 Create an account on Facebook Business Manager:

For creating an account, one has to go to www.business.Facebook.com and press "create account". After that, he has to give his Facebook id, password and an email address which has to have a domain name against it. For example. If King's Corner has a domain name www.kingscornerbd.com then the email address has to be xyz@kingscornerbd.com for creating an account in Facebook Business Manager.

4.2.2 Creating posts and boosting for advertisements

For creating posts, one has to go "Adds Manager" section which is under "+Create & Manage" section.

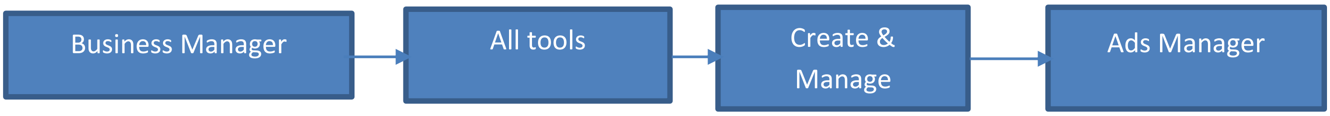

Figure 4.2.2.1: Flowchart for creating a post

4.2.3 Defining audience, budget & schedule of the post

4.2.3.1 Targeting audience by location

One of the key advantages of using Facebook Business manager is, it can categorize and sort audience by their location. For this reason, when creating an advertisement we can target the group of people whom we want to see our adds.

For our advertisement and boosting of our restaurant, we chose locations and areas adjacent to the restaurant which are Mohammadpur, Dhanmondi, Mirpur-1 and Shyamoli. Facebook business manager also gives the option of radius (surrounding of that particular area) +1 to +10 miles for targeting that specific audience.

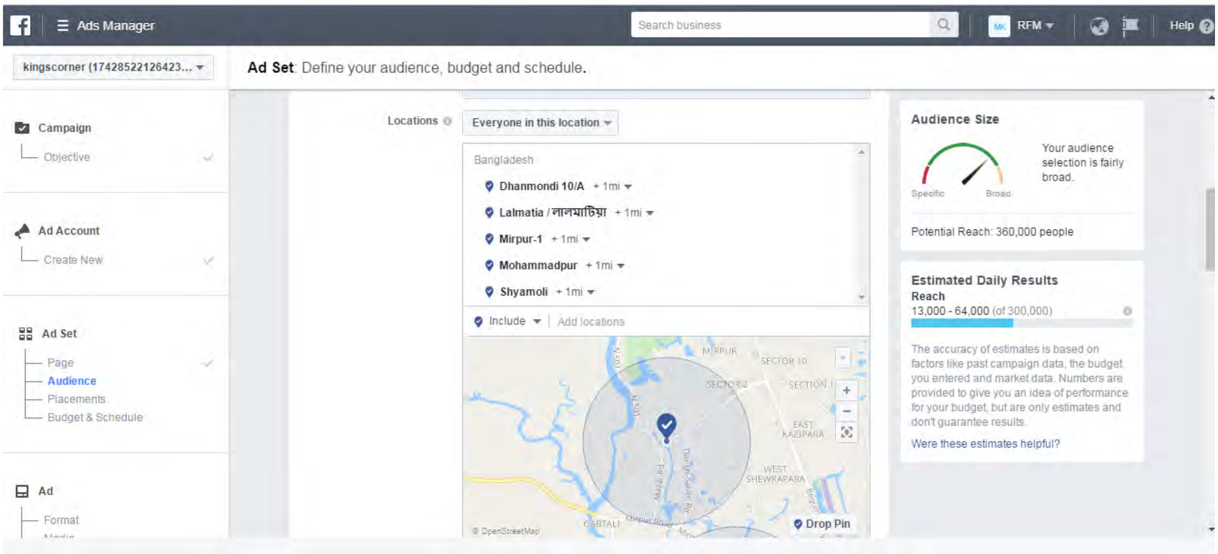

Figure 4.2.3.1.1 Targeting audience by location using Facebook Business Manager

Also, we can see the audience size on the right top corner of our Facebook Business Manager page, which describes the amount of people of those location that have been targeted. The terms specific means low and broad refers to high number of people. Furthermore, Business Manager estimates the number of people that can be reached after targeting the locations which is indicated as Potential Reach. In our case, the potential reach is 360,000 after giving locations.

Also there is a section just at the bottom of "Audience Size", named "Estimated Daily Results Reach" which is based on factors like past campaign data, the budget entered and market data. The numbers are provided to give an idea of performance of the budget. However, it only estimates but does not guarantee the results.

4.2.3.2 Targeting audience by gender, age, language & interest

We can also target the people we want to show our advertisements based on their gender type, age group, speaking language and interest. We can give parameter of the age group. For example, we chose the age group between from 18-65+ years old people. Only on the people of this age group will see the post. We can specify the gender to either "Men" or "Women" or make available for all by checking the "all" section. Also, we can target the people by the language they are using to use Facebook. We have set the language as Bengali & English (all) for our post.

We can target audience by their interest. These targeting audiences option may be based on:

- What people share on their Timelines
- Apps they use
- Ads they click
- Pages they engage with
- Activities people engage in on and off Facebook related to things like their device usage, purchase behaviors or intents and travel preferences

For our post we chose the keywords “burger”, ”crepes & waffles”, “dinner”, “eating”, “food and drink”, “lunch”, “waffle” who are interested in these words.

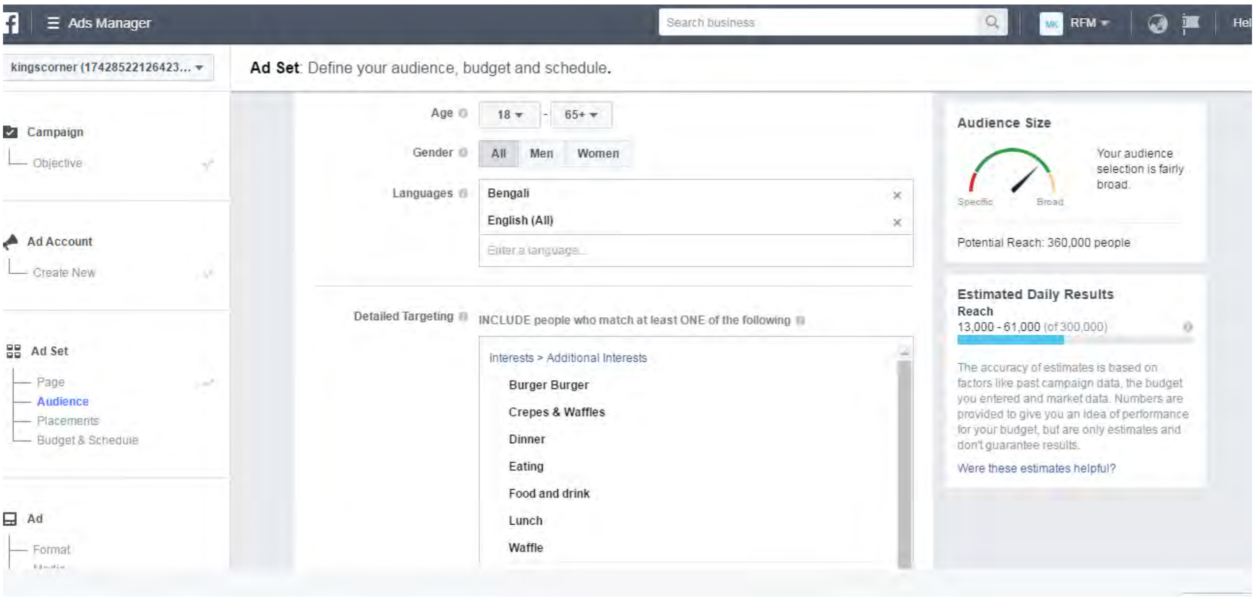

Figure 4.2.3.2.1 Targeting audience by age group, gender, language and interest

We can see the Estimated Daily Results Reach is slightly changing after targeting audience by age group, gender, language and interest as Facebook Business Manager has narrowed down the audience by using the detailed targeting.

After giving the details of our target audience we have to save all the information and proceed to the next step.

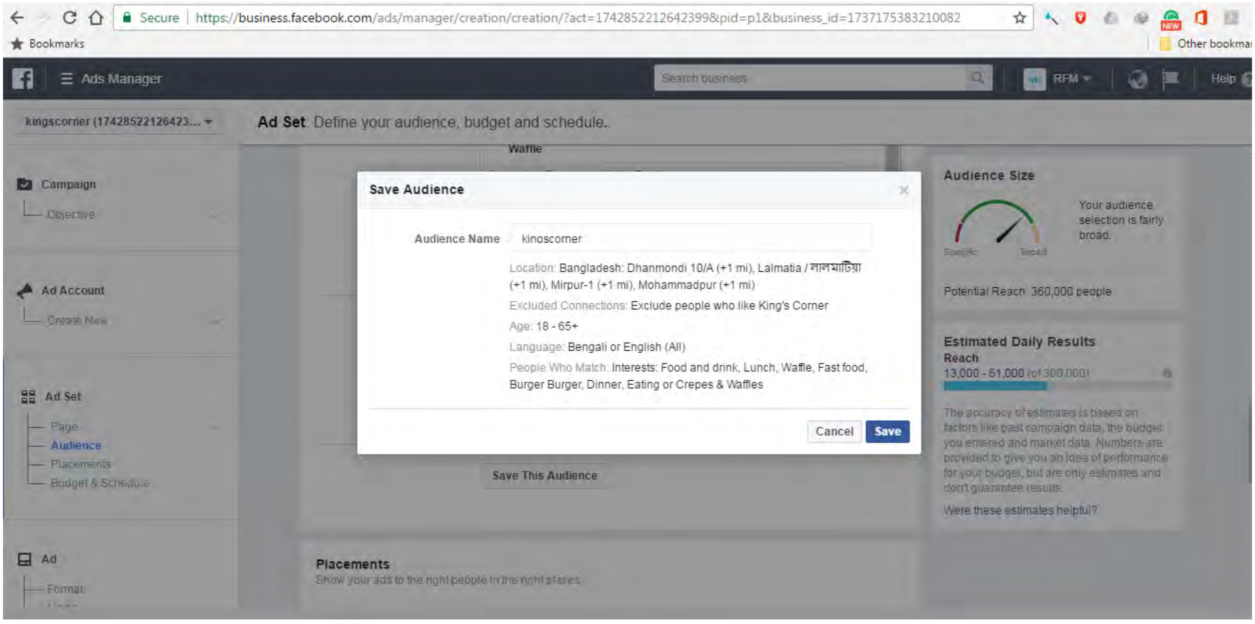

Figure 4.2.3.2.2: Saving the target group of audience after giving all the details

4.2.4 Budget and Scheduling

4.2.4.1 Budget

When one sets a daily budget, one is setting an average. This means that Facebook will try to get roughly the daily budget's worth of the result he optimized for every day. However, there may be certain days that are better opportunities than others to get more of that result. On those days, Facebook may spend up to 25% over the daily budget. For example, if one's daily budget is $10, Facebook may spend up to $12.50 on a given day.

Facebook does this to deliver the ads and spend the budget as efficiently and effectively as possible. However, one does not have to worry about overspending because the charges will average out over a calendar week. (A calendar week is Sunday to Saturday.) If Facebook spends more on a day with lots of opportunities for results, they will spend less on a day with fewer.

For budgeting, there are two types of budget available in Facebook Business Manager which are Daily Budget & Lifetime Budget.

Daily Budget is the amount one has indicated to spend on a specific ad set per day on average. Each ad set will have a separate budget, so keep this in mind if one has more than one active ad set in his account. On the other hand, a Lifetime Budget lets one to set an amount to spend over the lifetime of an ad set. Facebook will automatically try to evenly spread the amount one spend across the period of time that has been selected.

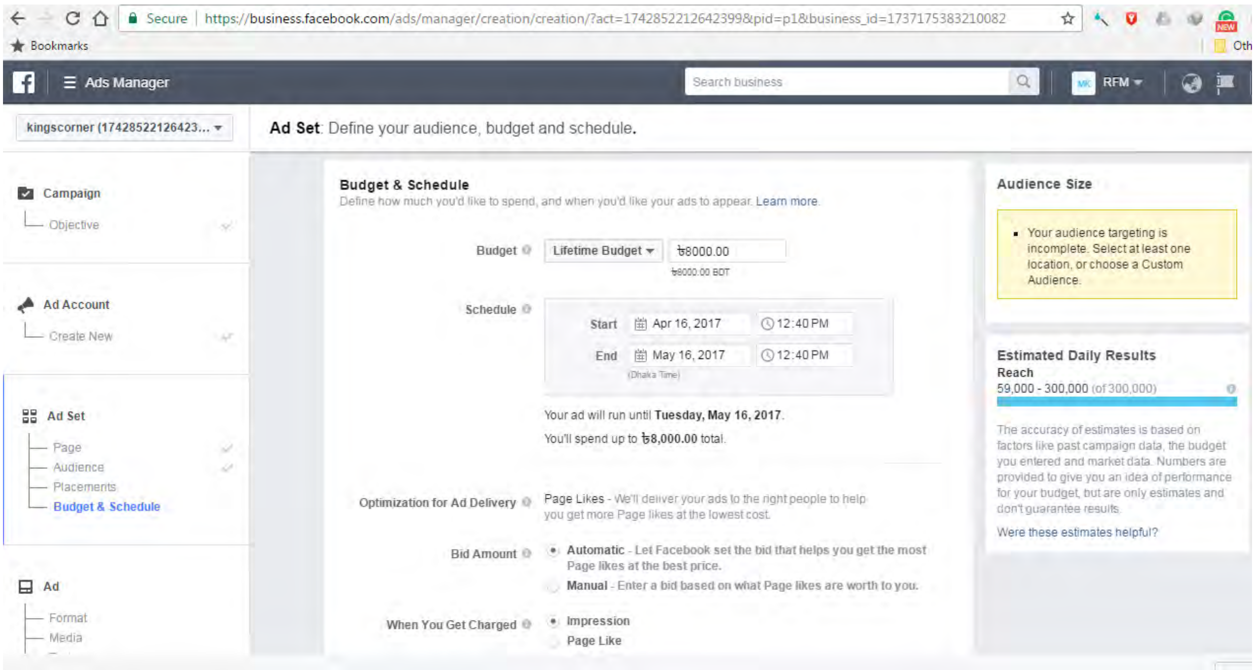

Figure 4.2.4.1.1: Setting up Budget for our ad post

We have set Lifetime Budget as our Budget type and set the amount 8000 BDT. As we want our ad to appear in for a month Lifetime Budget will be perfect. Also, it enables the option to schedule when the ad to start and finish.

Optimization of ad delivery option lets one to choose how one wants Facebook to deliver ads to people based on what one is trying to achieve. The selection affects who sees the ads to get the best results for the lowest cost.

Ex: If one chooses to optimize for link clicks, Facebook deliver the ad to the right people to help get the most clicks on the link in the ad for the lowest cost.

Bid amount is set to automatic to let Facebook set the bid that will help me to get the most page engagements worth for me.

The "When you get charged" option determines when one has to pay for the ad. For many optimization goals, one will pay each time the ad is served (known as an impression).

Some optimization goals also let one choose between impressions and actions (such as link clicks or post engagements). We have set that "impression".

4.2.4.2 Scheduling

In the Lifetime Budget option, we can set the date as we want and also can give the finish date. Furthermore, we can also select the specific time zone for the audience who will see the ad at that specific time. This is one of the unique option we have in Facebook Business Manager.

Figure 4.2.4.2.1: Giving specific time frame for the ad

The blue color showing at what time the ad will show to the target audiences.

4.2.5 Selecting media, text and links to create ad

We can choose how our ad will look. For example, it can be single image, single video, slideshow or a canvas. One can choose the appropriate format by the ticking the option.

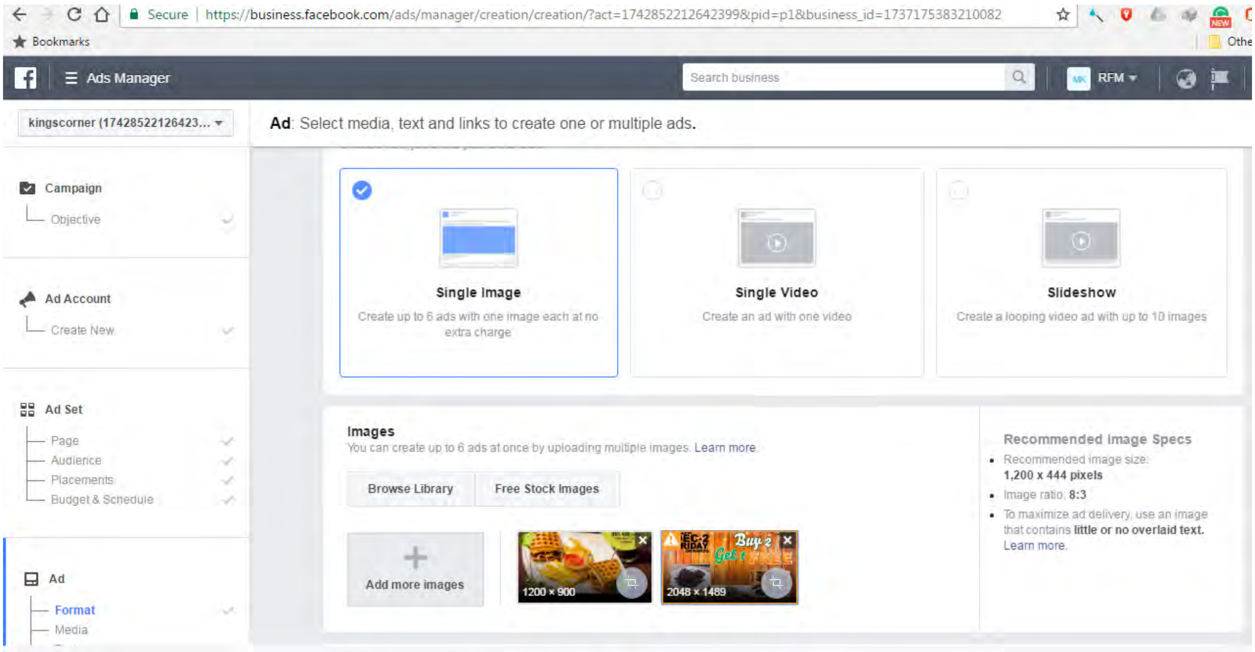

Figure 4.2.5.1: Format and select image for the ad

We can create up to 6 ads by uploading 6 images at max. After creating the content, setting up the format and selecting the image we can get a preview of our ad in the "ad preview" section. We can see the desktop newsfeed, mobile newsfeed, feature phone other available options.

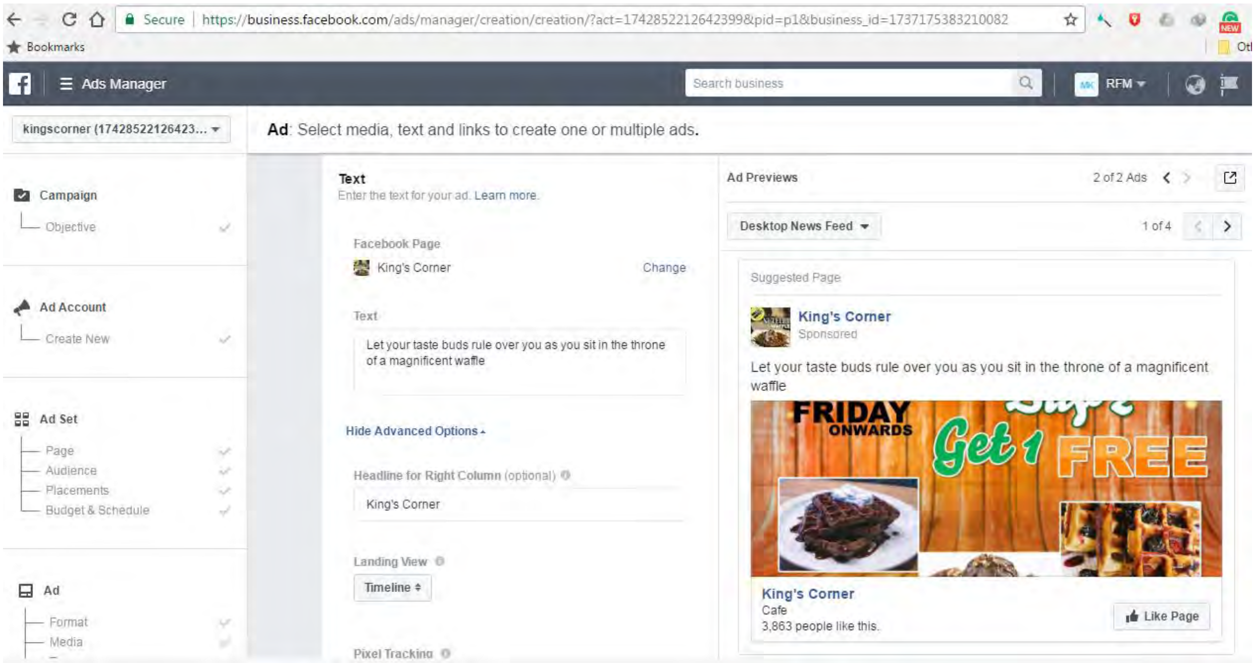

Figure 4.2.5.2: Preview of ad after format, selecting image and content

After finishing these steps, we can get the full summary of the preview of our ad. We can edit or place the order.

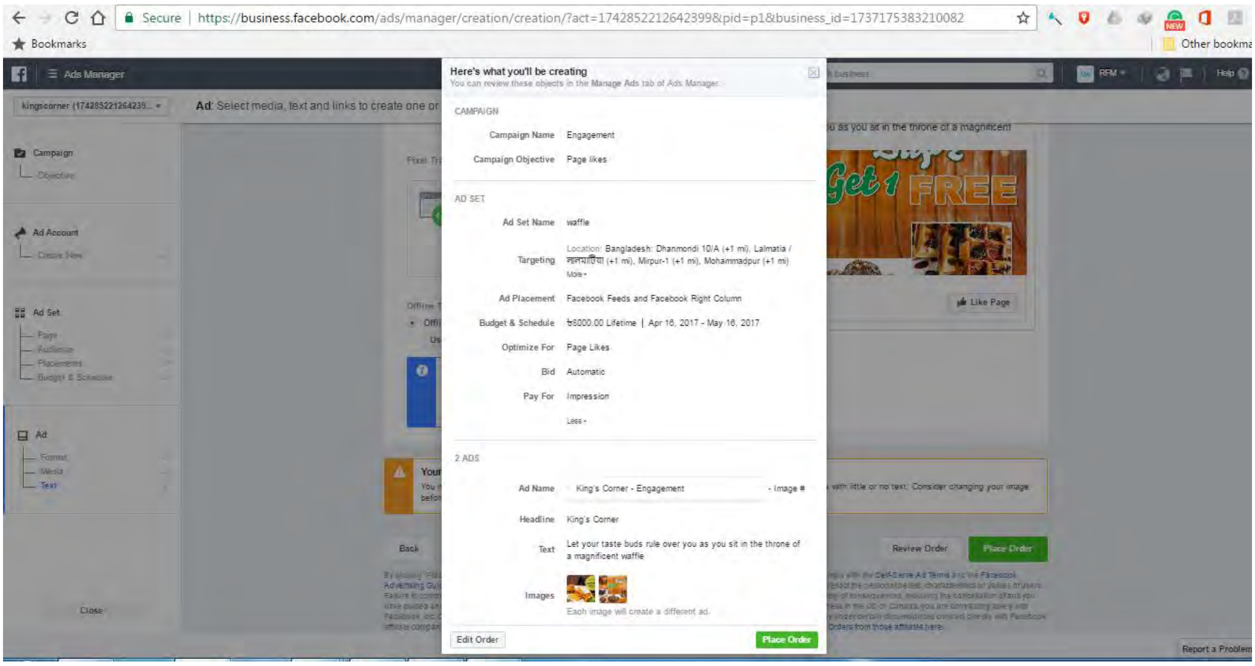

Figure 4.2.5.3: Summary of the ad

After this, when we click the "place order" button, we have to pay the budgeted amount through international credit card. The ad will be showed in Facebook feed according to detailed campaign information.

4.2.6 Preview of our ad after completion of the tasks in Ad Manager

After completing the steps in Facebook Business Manager, the ad will be shown to the group of audience that we targeted.

Figure 4.2.6.1: Overview of the ad in desktop newsfeed

Chapter 5: Result & Data Analysis

This document contains a detailed performance report of the Facebook page of 'King's Corner'. All data used in this report has been collected from Facebook Business Manager. The insights have been developed up on analysis of the data. The report takes into consideration the activities related to the page in the time frame of January 5, 2017 - March 30, 2017. Point to be noted, is that the page was created on December 5, 2016 and did not start any activity properly till one month later on January 5, 2017.

5.1 Page Audience:

5.1.1 Fan Growth:

The ‘King’s Corner’ Facebook page was promoted starting from January 5. Since then, page promotion has been conducted targeting a number of test audiences. For example, filtered and narrowed audiences consisting of only female, male of certain age group & top category Universities, etc. have been experimented. Based on the outcomes of these campaigns, a target audience was created that is providing the best result. The current total fan count of the page (as of March 30, 2017) is 4,660. Out of this, 2,731 fans have been acquired through page promotion advertisements. A total of USD 44 has been spent on page promotion advertisements. On an average, USD 0.02 was spent to draw in each fan. The remaining number of fans have been dragged in either from boosted posts, or in organic methods. Generally, cost to acquire each fan depends on the type of the page. If it is a restaurant page, or a renowned brand, cost per fan can be as low as USD 0.01. But in other cases, cost may reach up to USD 0.08 or even more, depending on the audience specification. Considering these factors, we can be assured that our expense has been well-utilized.

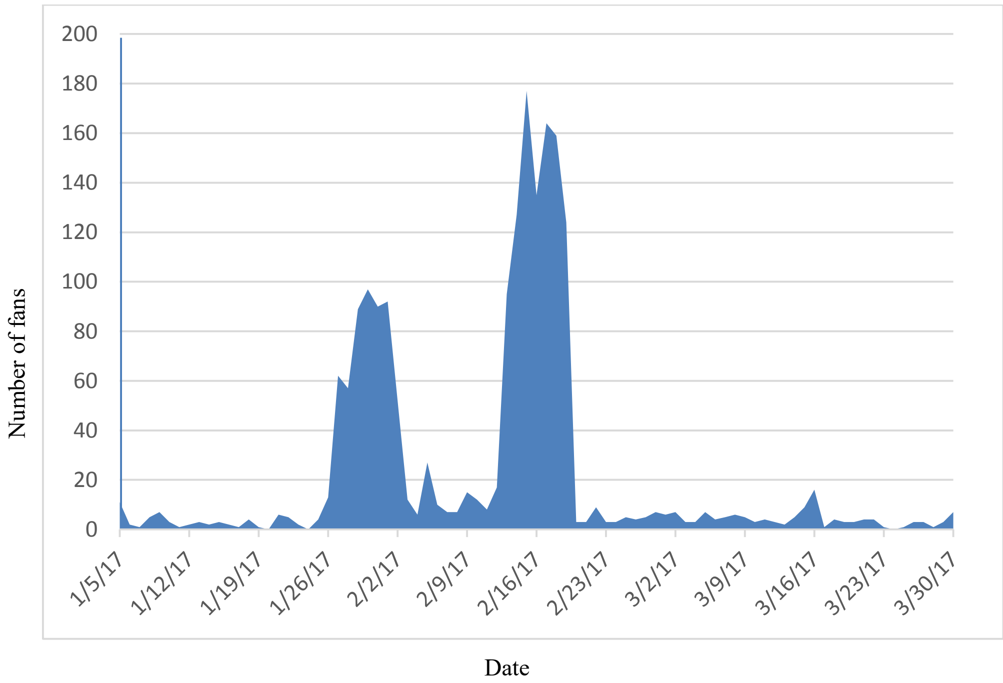

Figure 5.1.1.1: Daily Growth of fan numbers

The chart above represents the daily growth of fan numbers within the specified period.

5.1.2 FAN DEMOGRAPHIC: GENDER AND AGE

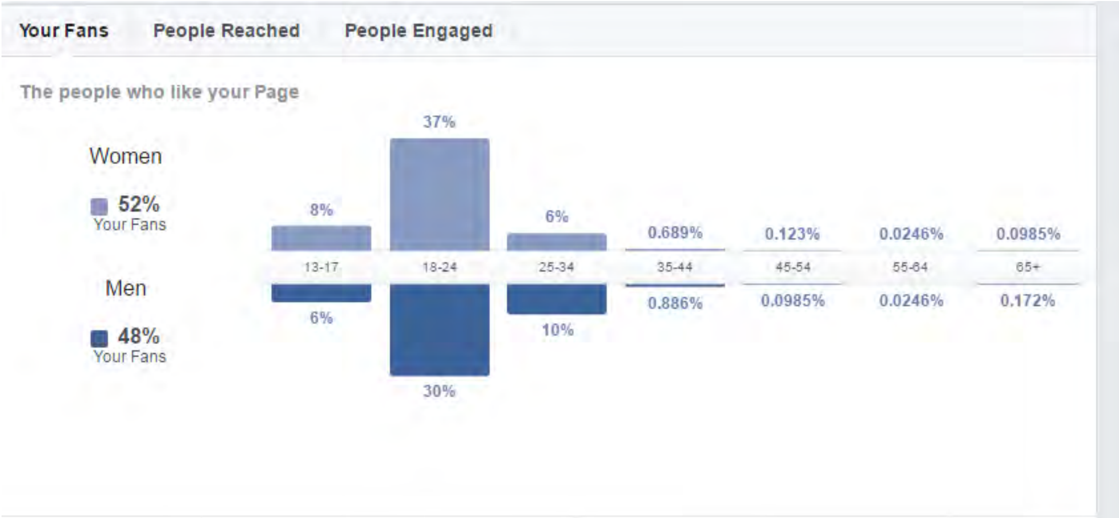

Figure 5.1.2.1: Fan Demographic of Gender and Age

The audience of the page are almost equal to 50% in case of gender. In terms of age group, the majority of the audience is in the 18-24 age bracket. 33% of the total audience fall in this category. 29% of the audience fall under the next largest age category, which is 25-34. Therefore we can be assured that the audience on our page represent our target group for the platform and hence, they are relevant.

5.1.3 FAN DEMOGRAPHIC: LOCATION

The fans were acquired keeping in mind our target audience of the platform. The primary location targeted for fans was Dhaka. As a result, 95% of the audience on the King's Corner page are living in Dhaka. Almost 99% of the fans reside within Bangladesh.

Country	Your Fans	City	Your Fans	Language	Your Fans
Bangladesh	4,005	Dhaka, Dhaka Division...	3,888	English (US)	2,969
Australia	11	Chittagong, Chittagong...	41	English (UK)	1,056
United States of America	8	Narayanganj, Dhaka D...	16	Bengali	27
Malaysia	6	Sylhet, Sylhet Division,...	10	as_IN	3
United Kingdom	5	Khulna, Khulna Divisio...	6	Spanish	2
Canada	3	London, England, Unit...	5	bp_IN	1
India	3	Kuala Lumpur, Malaysia	4	Indonesian	1
China	2	Tangail, Dhaka Divisio...	3	Malay	1
Saudi Arabia	2	Rajshahi, Rajshahi Div...	3	Portuguese (Brazil)	1
Qatar	2	Jessore, Khulna Divisio...	3	Simplified Chinese (Ch...	1

Figure 5.1.3.1: Fan Demographic by Location

Hence, we can be assured that the audience built in the page are relevant in terms of geographic location.

5.1.4 FAN DEMOGRAPHIC: CHECK INS

Figure 5.1.4.1: Fan Demographic Check in

The chart shows check in in King's Corner restaurant. When an offer was published and boosted we can see the increase of check in at that time. However, the graph shows decent amount of check-in in general.

5.2 Page Performance

5.2.1 PAGE LIKE:

After promoting and boosting King's Corner page we can clearly see the outcome. The likes have increased in a significant way from 5th Match Onwards.

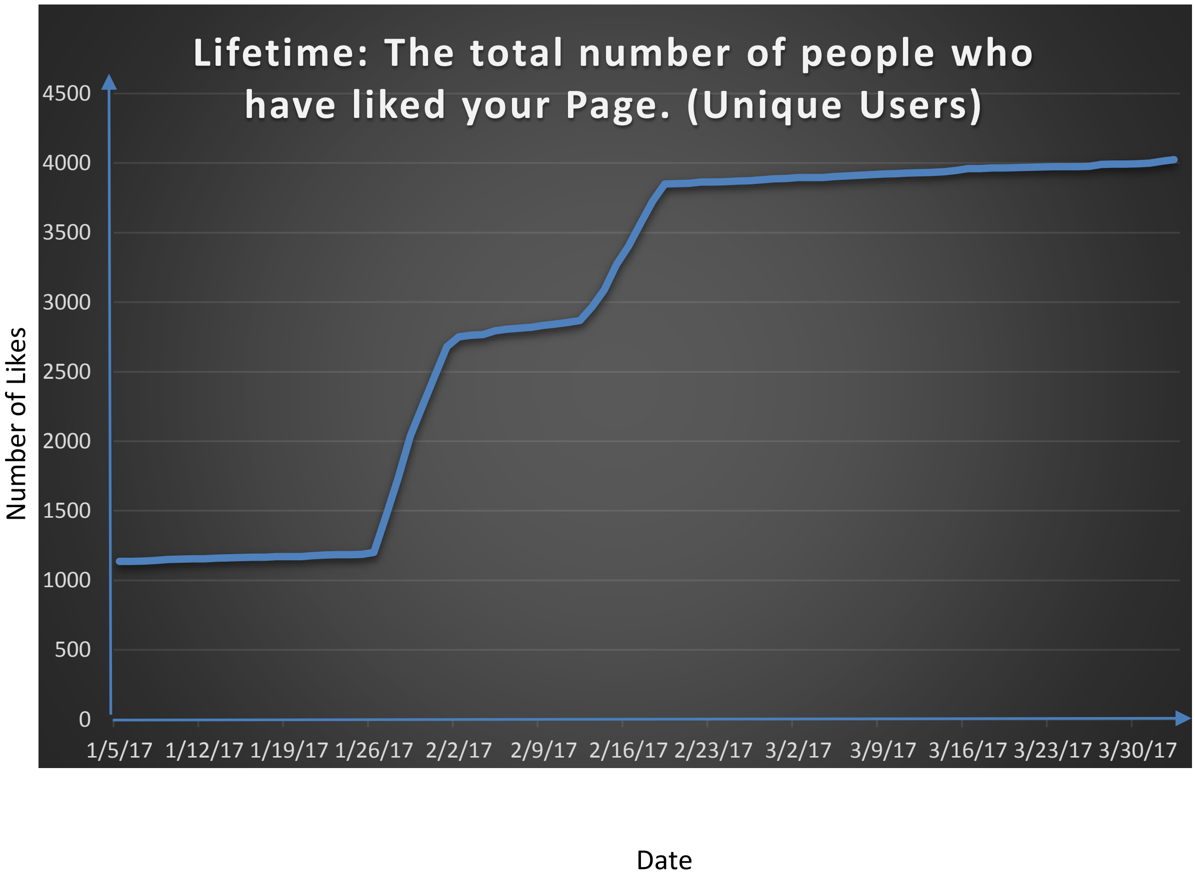

Figure 5.2.1.1: Increment of page like in numbers

5.2.2 PAGE IMPRESSIONS:

Impressions are the number of times a post from your Page is displayed. People may see multiple impressions of the same post. For example, if someone sees a Page update in News Feed and then sees that same update when a friend shares it that would count as 2 impressions.

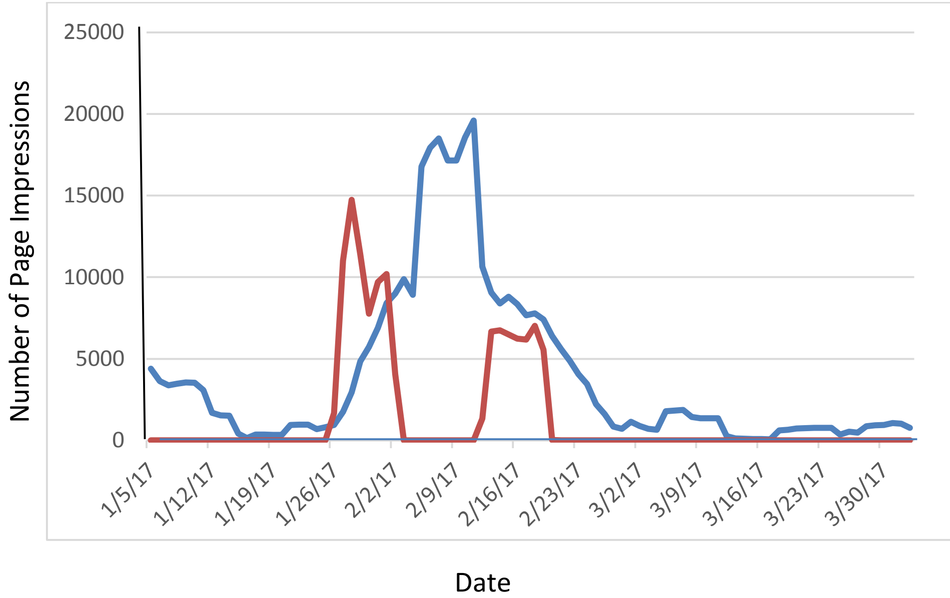

Figure 5.2.2.1: Total number of Page impression

Organic impressions are when your posts were seen in News Feed or ticker or on visits to your Page. These impressions can be by people who have liked your Page and people who haven't. On the other hand, paid impressions are when a sponsored story or advert pointing to your page is seen by a user. The total number of impressions is the combination of the organic and paid impressions. Typically, for a page of this category, it is natural to assume that paid impressions would be significantly higher than organic impressions. It can be observed that organic impressions are close to the number of paid impressions. So the organic reach percentage is considerably healthy. This indicates that the engagement rate is high, which leads the content to be driven to users' timelines through their friends who have engaged with King's Corner Page. This also indicates that the page is not being 'forced' to the audience and it is being accepted well.

5.2.3 PAGE REACH:

Reach is the number of people who received impressions of a page post. Reach might be less than impressions since one person can see multiple impressions. For example, if a person sees a page update in News Feed and then sees that same update when a friend shares it that would represent a reach count of one. In other words, reach is the number of people who were served any activity from your Page, including your posts, posts to your Page by other people, Page like adverts, Mentions and check-ins.

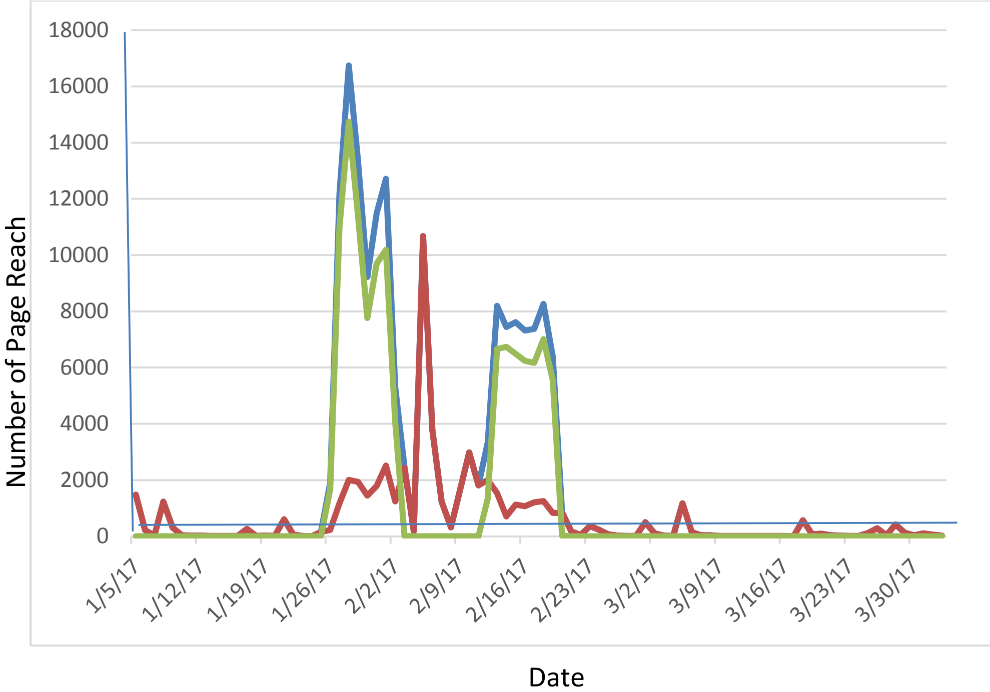

Figure 5.2.3.1: Daily total, Paid & Organic Page Reach

The chart above illustrates the daily number of people who have seen any content associated with the King's Corner Page (unique users). Much like for the case of impressions, it can be assumed that the more the organic reach, the better the performance. It is again, natural that paid reach would be significantly higher than organic reach. The fact that there is not much difference between daily paid and organic reach, indicates that the page is being accepted well by the audience and it is not being 'forced'. This leads to the fact that the audience are accepting the contents published from the page, which probably has to do a lot with the quality of the contents.

5.2.4 PAGE ENGAGEMENT:

Engagement is one of the most important measures of Facebook performance, if not the most important measure. Impression and reach figures provides indication of the quality of activity generated from the page. But engagement specifies exactly how many people found activities generated from the page interesting enough to click.

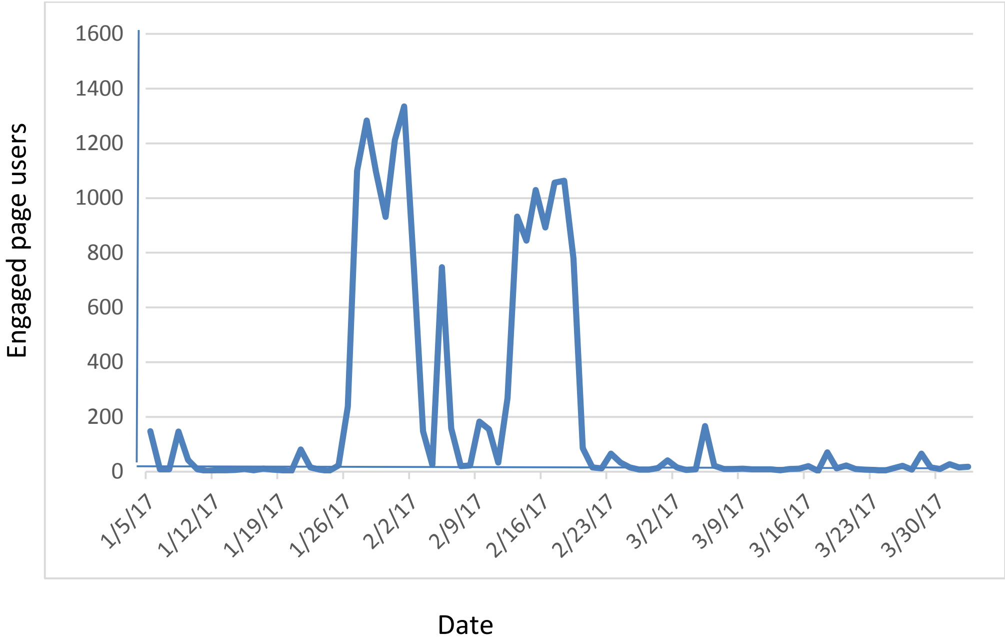

Figure 5.2.4.1: Daily number of people engaged with the page

The chart above illustrates the daily number of people who have engaged with the Page (unique users). Engagement includes any click or story created. The fluctuations can be associated with content release dates. When a content was released from the page, page engagement went up, which is very predictable. This proves the fact that in order to keep the audience engaged, it is vital to release content regularly. However, whether the engagement percentage is healthy or not, should be judged individually for each content.

5.2.5 PAGE VISITS:

Page visits or views are a crucial metric for a page because it gives you an idea about the size and scale of your audience. The unique visitors metric gives you a more realistic and accurate sense of the size of your audience. This number shows you how many people have actually visited the page too know more about the page after seeing the content on their news feeds. The total page views tells you the daily page views from users logged into Facebook. How it differs from unique page views is that, there might be cases where a single user visits your page multiple times a day. The unique page views ignore the multiple visits and they are counted as one unique view from one unique user.

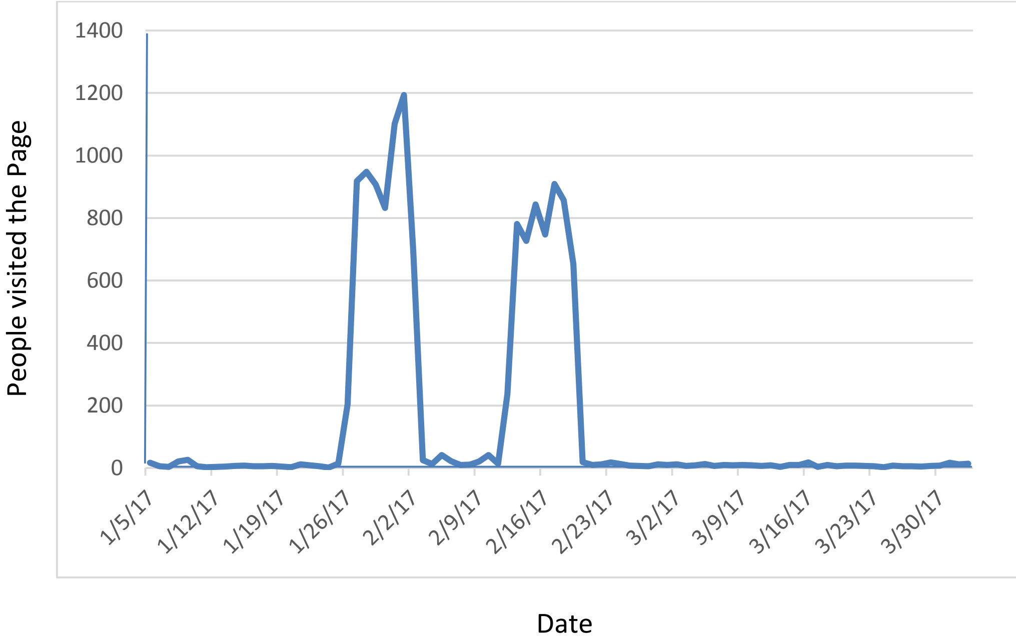

Figure 5.2.5.1: Daily number of people visited the page

The chart above illustrates both the daily number of people who visited the page. High visits on a particular date indicates that the content shared on that particular date intrigued them in a way that made them want to check out the page along with its other contents.

5.3 Content Performance:

5.3.1 CONTENT PERFORMANCE OVERVIEW:

The two most important numbers to judge content performance are: engagement rate and percentage of organic reach. 10% engagement rate and 20% organic reach typically translates to great performance.

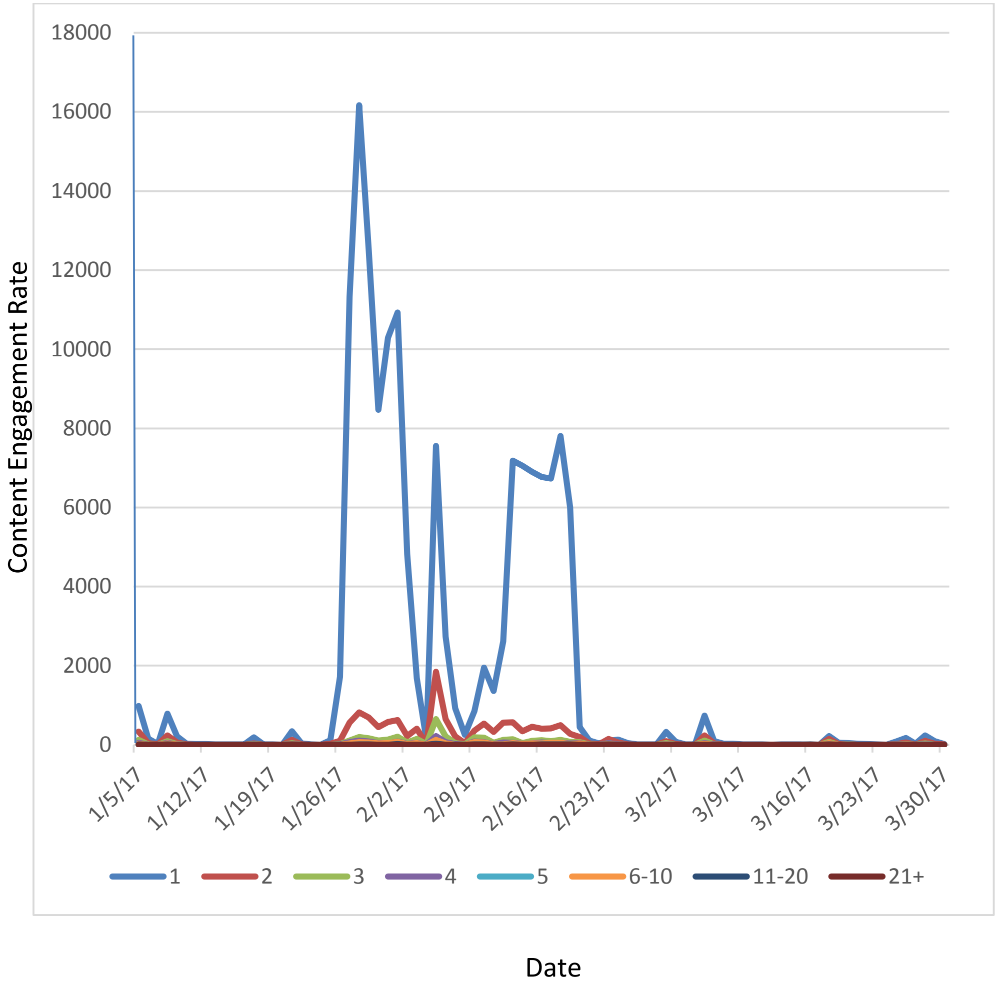

Figure 5.3.1.1: Daily Number of People see the published post

The chart above illustrates the daily number of people who have seen a content Published by the King's Corner page for 1 to 21+ number of times. It can be observed that the average engagement rate of the posts are meeting the standards. In case of the average percentage of organic reach, the page is not just meeting the expectations but exceeding them by quite a margin.

5.3.2 LIST OF PUBLISHED POSTS:

Figure 5.3.2.1: Published post-1

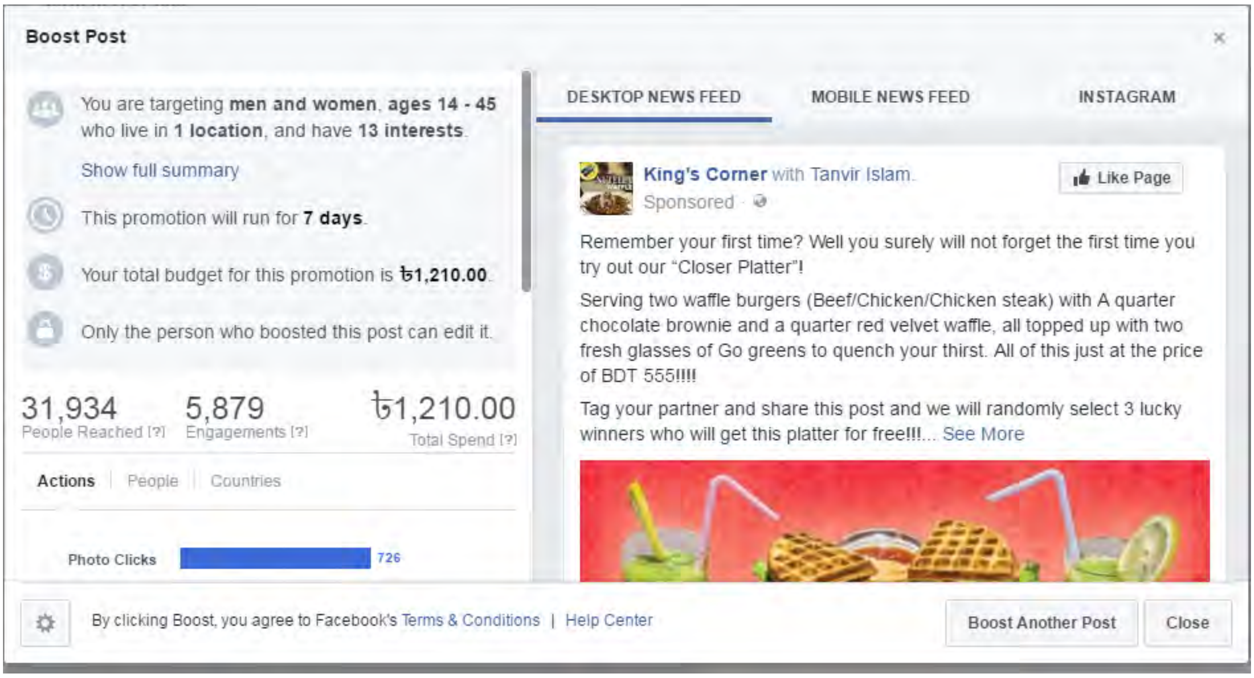

Figure 5.3.2.2: Published post-2

There were a total of 2 posts published within the period. Other major measures of content performance include likes/reactions, comments and share. These should be considered as secondary indicators.

5.3.3 BEST TIME TO POST:

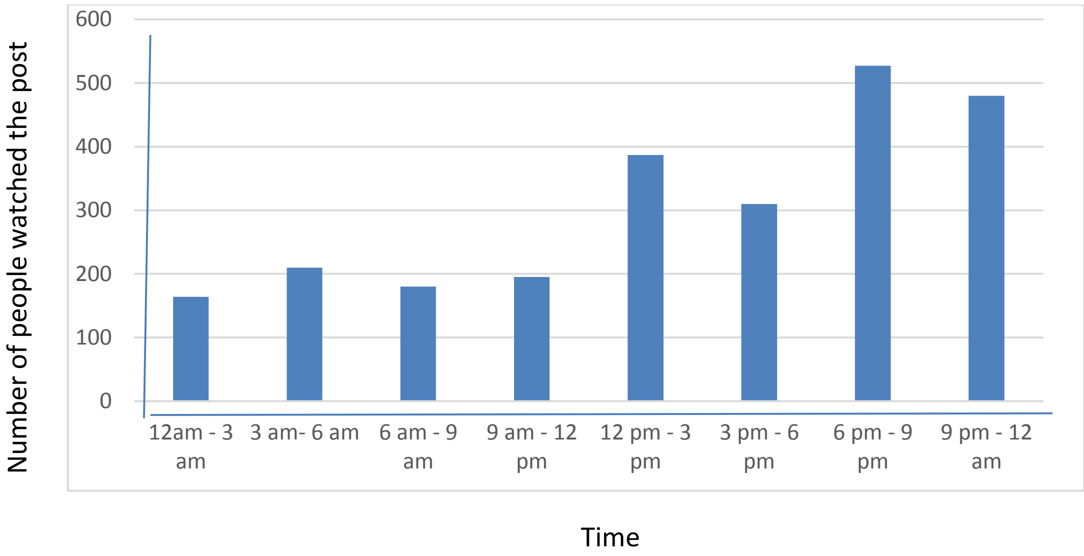

Figure 5.3.3.1: Post Engagement by Time

When a user goes on Facebook, he sees the most recent stories by people/ pages he or she is connected to, or stories that have been engaged with by a lot of people on his or her friend list (top stories). Even though we cannot absolutely guarantee the latter, we can work on the former. If we post at the time when the most number of users are online, the post will be considered as a ‘recent story’ for the user and therefore, has a higher probability of reaching them.

As we can see from the data, the best time to post is the timeframe between 6pm to 9pm compared to other time frames. That particular time slot has comparatively higher reach for the posts. This might be the case because, users tend to have more free time at the end of the day and are more probable to be active on social media.

5.3.4 BEST DAY TO POST:

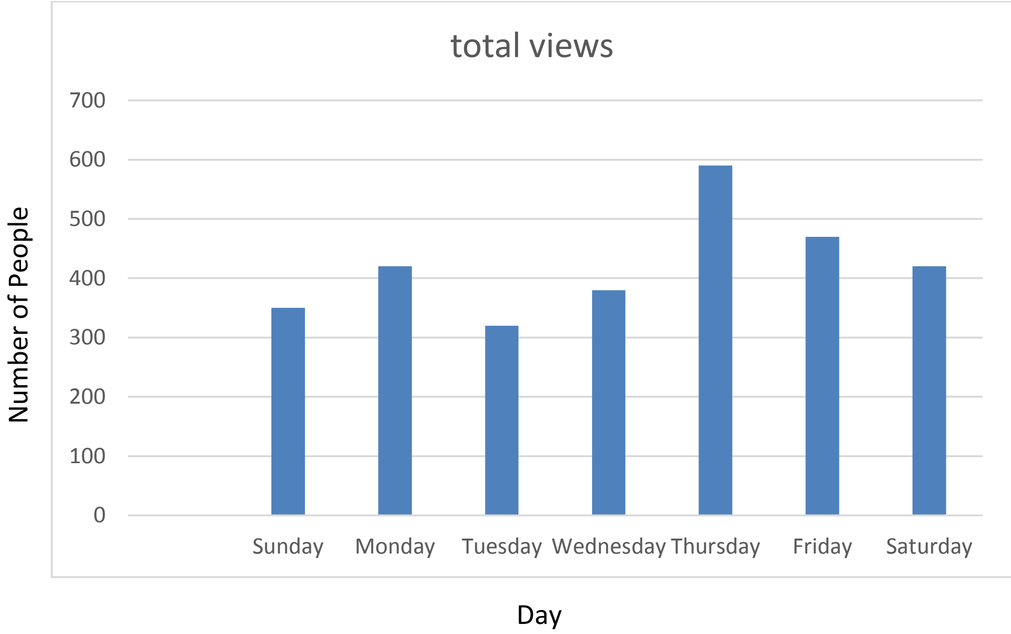

Figure 5.3.4.1: Post engagement by Day

As we can see, Thursday is the best time for us to post. Since Friday is normally a holiday for everyone, people tend to relax a bit on Thursday nights, which leads them to browsing Facebook more. Also, information extracted from our Facebook page activities indicate that posts released on Thursday gives us the best reach.

5.4 REVENUE GENERATION:

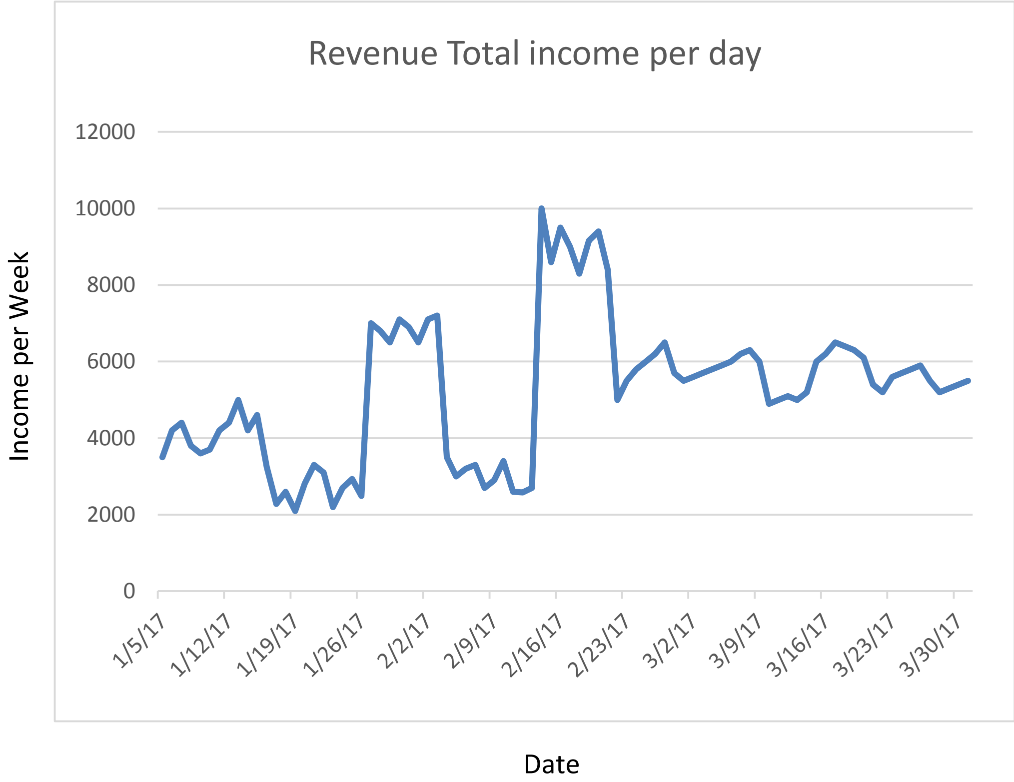

Figure 5.4: Total income per day

As we can see, before posting any ad and creating content, the revenue was around 2000 BDT per day. After introducing new menu and creating ad of that menu the revenue increased up 7,500 BDT per day. Furthermore, giving a offer in Valentine's Day, the revenue increased again up to 10,000 BDT per day. We can see after creating ad for the restaurant the average revenue after that has gone up to 4000 BDT per day.

Chapter 6 Conclusion

In a nutshell, it was a very helpful experience throughout the whole thesis project. The F-Commerce phenomenon is a rapidly growing phenomenon in the social marketing sector and if organizations can grasp this concept by the core then they can open their business up in front of a network of 845 million people online via different platforms on social media. [18] The thesis project gave us a unique experience of amalgamating both the computer science field with the marketing field of F-commerce and bring out significance different in the growth of a real life restaurant. Our team is looking forward to learn the concept of F-commerce extensively and hopefully work with bigger organizations in different field of works and incorporate our ideas and expertise to produce high-end results and quality applications for the upcoming future.

6.1 Limitations

The main limitations we faced while developing our thesis project is due to capital and locational issues. The processes that we used to create the contents that boosted the overall growth, in terms of sales and revenues, of the restaurant was mainly through Facebook Business Manager tool. We were not able to develop more unique marketing strategies and contents since the capital budget that the restaurant authority allocated for the project was not sufficient enough. Also there was a locational aspect of the restaurant because in our country's perspective, Mohammadpur is not known to be a renowned place to have great accommodated restaurants. That is why the target audience was limited to us area wise and the contents we developed sometimes might have not attracted the potential customers whose residents were more distant from the restaurant. Therefore, our team had to improvise our techniques and marketing strategies to specific and limited demography of the population in nearer areas.

6.2 Future Work

The purpose of our project is trying to meet the goals of our customers by using the process introduced in this proposal structure to have an f-commerce application/website from functional design which is simultaneously connected with the Facebook page of the business organization, in this case the restaurant. We will overall try to increase the revenue of the restaurant and its reach throughout the country. We would also try to apply different marketing strategies by adding unique contents to the Fb page and website simultaneously, with automated transmission of updates/modifications. We would like to continue working under this method for further diversifying new businesses like other restaurants or apply this methodology in different fields like online clothing stores, etc. We would also like to increase the portability of the project, where the website would be made compatible on mobile devices by creating a mobile application of the restaurant and exclusive mobile site. Lastly, we would keep the system sustainable and secured through various updates and on-demand smartphone and traditional features.

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