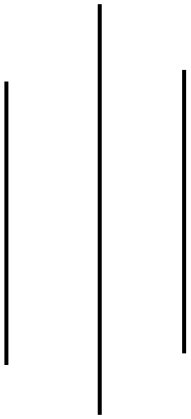
Optimizing recommendation system for online business



Name: Sonish Khanal

Student ID: S373425

Unit: Project Management Risk and Reliability

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Executive Summary

The world is totally dependent on the use of the internet. The ease that the internet provides in the present world is second to none. And one of the beautiful feature that has been expanding is online business or also known as e-commerce. The use of e-commerce is rapidly growing in the present world. The main aspect of the gradually increasing the use of e-commerce in this present world is due to its ease of use which is due to ecommerce recommendation system. E-commerce recommendation system is making online business much efficient, and easy to use and is helping the entrepreneur in growing the business. It makes it easier for customer to find the product they want by looking at the history of their search. This recommendation system has also been beneficial for the entrepreneurs cause it makes the use of ecommerce efficient and much interactive to customer which leads to growth of business.

Introduction

So firstly, what is E-commerce? E-commerce is the process of selling and buying product and services online. This process is quite simple the customers rather going to markets they sit at their home and by the use of internet they buy the products using electronic payments and upon receiving the payment, the retailer send their items to the customer (Fuscaldo, 2022). E-commerce has been one of the most beneficial materials of internet. The use of e-commerce is highly regarded among the present society and the e-business are also doing a great success. But how the e-commerce has been so successful among the people, how people are able to get the things they need so easily using e-commerce, and all this is possible due to the use of recommendation system in e-commerce. So a recommendation system is an information filtering system that aims to forecast the potential rating or preferences that a user may assign to a certain item. Put simply, it's an algorithm that recommends suitable products to users (Kumar Agrawal, 2021).

Quantitative Analysis

The term quantitative analysis is a method to comprehend the financial market and helps to create a better investment decisions. It entails analyzing financial data using statistical and mathematical methods. In today's market where there is plentiful data and highly sophisticated computer technology quantitative analysis can be a potent instrument that allows for a more in-depth understanding of the financial environment (Kenton, 2020).

Net Present Value Analysis

The difference between the current value of cash inflows and outflows over a given period of time is known as net present value, or NPV. To understand the profitability of a planned investment or project, net present value (NPV) is used in capital budgeting and investment planning (Fernando, 2023).

	A	B	C	D	E	F	G	H
1	**Financial Analysis for Online Business Recommendation system**							
2	**Created by: Sonish Khanal**		**Date: Dec 6, 2023**					
3								
4								
5	**Discount rate**	8%						
6								
7				**Year**				
8		**0**	**1**	**2**	**3**	**Total**		
9	Costs	320,000	165,000	10,000	10,000			
10	Discount factor	1.00	0.93	0.86	0.79			
11	**Discounted costs**	**320,000**	**152,778**	**8,573**	**7,938**	**489,289**		
12								
13	Benefits	0	145,500	291250	315250			
14	Discount factor	1.00	0.93	0.86	0.79			
15	**Discounted benefits**	**0**	**134,722**	**249,700**	**250,256**	**634,678**		
16								
17	Discounted benefits - costs	(320,000)	(18,056)	241,127	242,317	**145,388**	← **NPV**	
18	Cumulative benefits - costs	(320,000)	(338,056)	(96,929)	145,388			
19				↑				
20	**ROI** →	**30%**						
21			**Payback in Year 3**					
22	**Assumptions**							
23	Enter assumptions here							
24	The benefits for year 1 and 2 was assumed to be 60 %							
25	The benefits for year 3 was assumed to be 65 %							
26	The discounted rate was assumed to be 8%							

Figure 1: NPV calculation

After looking at the risk of the investment, total capital and expected return in certain time I analyze the discounted rate (Kristensen, 2023). The discounted rate is 8%. The average benefit of ecommerce after using recommendation system was more than double (Skovhøj, 2022). So here I calculated about 60% profit for years 1 and 2 and 65% for years 3. After calculating the costs and cash flow the NPV of the company after 5 years was $145,388.

Project Concept

1. Objectives

The two main objectives of the project are:

- To boost the sales of company: With the help of a recommendation system the company is looking to increase sales by making a better user experience and also guiding users towards buying similar products.
- Increase user engagement: With the better recommendation software users will tend to spend higher amount of time in discovering new product due to which the time spend on website will be higher which will ultimately foster the website.

2. SWOT Analysis

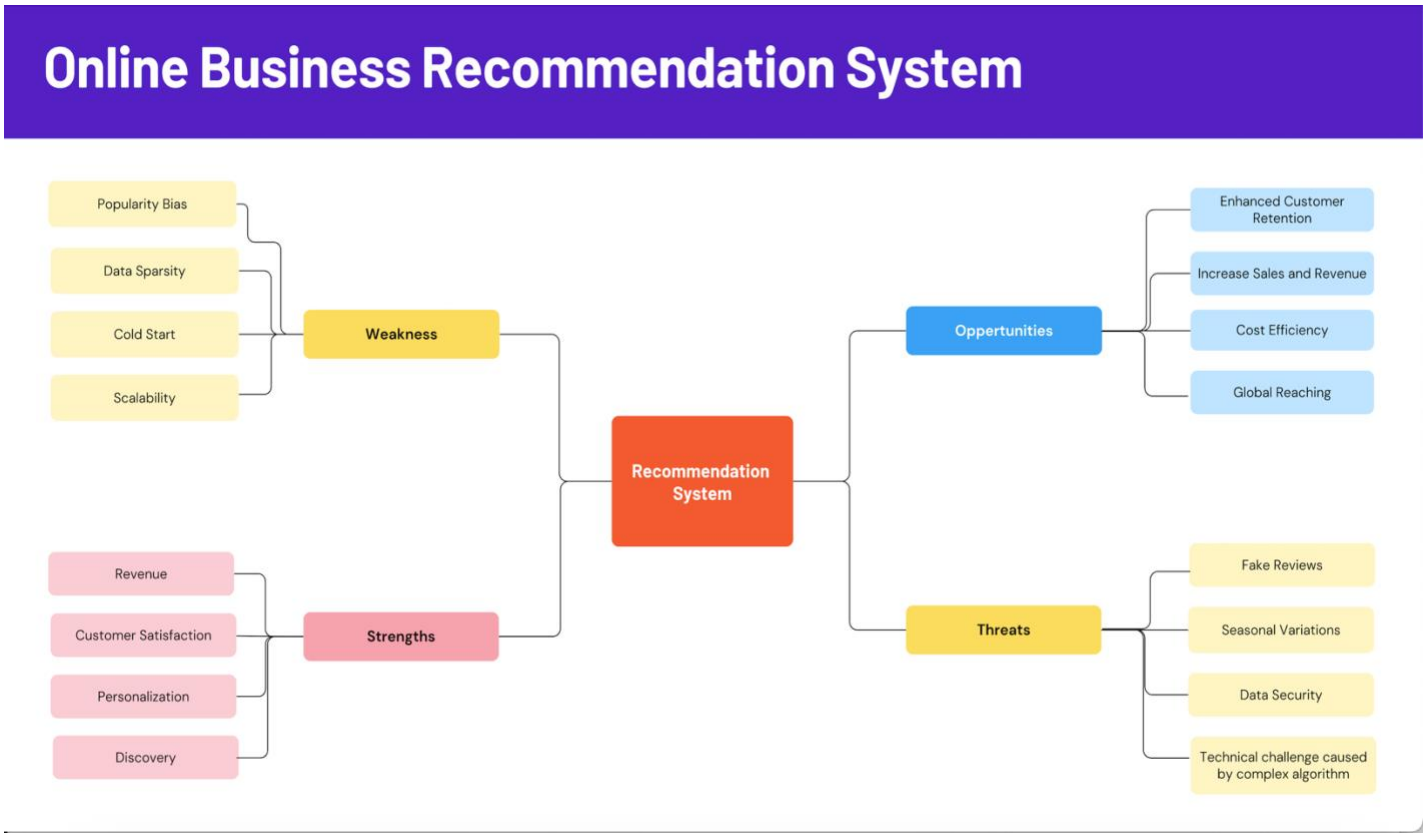

Figure 2: SWOT Analysis (Bush, 2019)

3. Stakeholders

The list of stakeholders is:

- Project Sponsor (Tutor of Darwin)
- Staff Members (Developers)
- Project Manager

4. Assumptions

- The system assumes that the feedback and the ratings that user has added speak truly about the user preferences.
- The system makes the assumptions that for the long amount of time the user preferences remain unchanged.
- The system has assumed to have access to a sufficient amount of user purchase, browsing, and preferences history ensuring their privacy.
- The system makes the assumptions that, the information of the items present in the website are correct and up-to-date.
- The system assumes that even though the increase in users and informations the response and recommendation accuracy is consistent.

5. Project Constraints

The main constraints for the project are:

Scope: A recommendation system for any online business can cover a wide range of online retail topics. The main scope of an online business recommendation system is to make suggestion for users looking at their history of purchase and preferences. So the scope of the project must be enhanching user experience, increase the sales of the business and customer satisfaction.

Time: The time within which the project must be completed was 2 years. During which the development, testing, and deployment must in done so that the project major objectives will be fulfilled.

Cost: The budget for the project was $500,000 but the cost to develop the project was a little less which was $485,000 at which the salary for the members involved in the project development was given and some necessary software was also bought.

Costs

The total cost for developing the whole project was $485,000, which includes the salary for project manager, two employees and also the cost of developing the software.

Project Manager

A project manager has to look after every detail of the project. His main aim should be to deliver projects on time, within scope and also within budget. The role of project manager is crucial so the cost of project manager is bit high than the two developers. As a project manager, they have to manage after project planning, look out for risk, motivate his team members, look after the standard of project, assign the task to his team members, inform the stakeholders about how the project is progressing and also he has to be flexible. With such different roles, his income after working 1.5 years is $165,000.

Developers

There were two developers for developing the recommendation system for this online business. Those developers were assigned different task. With understanding the business requirements to testing there were lots of task that these two developers had to do. Their task were to develop algorithm, integrate with system, build the system user-interface, look after security and privacy and also to do the testing. The income of those two developers were $100,000 a year which makes it total to $300,000 for 1.5 years.

Others

Other than giving salaries to the team members another important aspect where the project has to invest some capital, was to develop the software. As most parts include coding but for better privacy for the user, software was bought which cost $20,000 which makes up to altogether $485,000.

Major Risks

Risk is an uncertain factor about the future that creates a deviation in expected revenues or results. The degree of uncertainty an investor is willing to accept in order to profit from their investment is measured by risk (The Economic Times, 2019).

Table 1: Risk Table

Risk	Likelihood	Consequence	Risk Level
Scalability	Likely	Moderate	Medium
Data Sparsity	Rare	Minor	Low
Cold Start	Likely	Moderate	High
Privacy	Possible	Major	High
Dynamic User Preferences	Possible	Moderate	Medium

1. Scalability

With the increase in people and items, data gets added with makes hard for recommendation system as an increase in data causes loads of processing to increase. So as an online business that might flourish the risk of scalability can affect the project horrendously (Xin, 2015).

Solution:

Scalability problems can be addressed by using clustering techniques. Their main job is to utilize a clustering technique to divide up the users into segments and use each segment as a neighborhood. The partition is then utilized as the user's neighborhood, and for each active user, its neighborhood is chosen by looking into it. Once the neighborhood selection is finished, a prediction can be produced using traditional filtering procedures. The application of clustering algorithms has two main advantages. First off, it lessens the data set's sparsity. Second, it splits the data more finely, which lowers the rate at which predictions are generated (Fayyaz et al., 2020).

2. Cold Start

New item in online business will have less interaction among users which causes lack of review and this lack of review on the new items will not be able to impact the data set which will lead the item to be unrecognized and causes bad start(Fayyaz et al., 2020).

Solution:

To mitigate the problem of cold start the developer can use the method called naïve bayes model. Despite being the simple method, this method has been proven to be most accurate. Here the various qualities are taken to be mutually independent aspects of the items. This allows one to estimate the properties of a new item using a set of qualities that are absent from the training set (Fayyaz et al., 2020).

3. Privacy

While sharing information lots of private data such as address, payment history are shared and while poorly managed these data can affect heavily to the users (Xin, 2015).

Solution:

To solve the major effect of a data breach we can use the help of the companies that focus on security factors, we can select those companies that preserve user privacy by implementing strong security measures, by encrypting data and stick with data protecting laws.

4. Data Sparsity

With the huge increment in users there can be the huge increase in review that might also have spams review which will affect the recommendation system to find about user preferences and priorities (Zhang et al., 2020).

Solution:

This major risk of data sparsity can be reduced by the help of actively looking after the feedback given by the user and using filtering methods to pick the correct feedback and removing the spams from the feedback.

5. Dynamic user preferences:

With the change in time and the needs the user's mind can be changed. The item that they might prefer at a certain point might be change by the new item. So, with the update of user preferences if the recommendation system could not update it can fall back.

Solution:

The way to update the recommendation system is to check the user feedback in a real-time. Managing and analyzing user needs and feedback can be the greatest factor to help to sustain the recommendation system.

Timescale

Among the triple constraints of the project, time is one of them. Managing and delivering the project on time means the project is completed in a successful way. The time limit for this project was 2 years (104 weeks). The project was divided into different segments to complete in the given time.

1. **Planning and gathering requirements (1-6 weeks)**

During this stage project was planned and according to the plan requirements were gathered.

2. **Data collection and preprocessing (6-12 weeks)**

During this stage a huge amount of raw data was created which was then changed into the clean and managed data for recommendation.

3. **Designing Algorithm (12-23 weeks)**

During this stage a structured algorithm was designed for developing the project.

4. **Development (23-43 weeks)**

During this phase using all the resources till date the well structured recommending engine was created for the business.

5. **Testing (43-53 weeks)**

Here the developed project was tested using unit, integrated and system testing for removing all the errors in the software.

6. **Deployment and optimization (53-78 weeks)**

After all the task were done now the here the project was delivered to the real world for the customers.

Figure 3: Timescale Chart

Conclusion

With the completion of this assignment, I understand how important a business case can be for the development of the project. With the business case, it can be much easier to address the upcoming problem in business and also easier to find the solution to mitigate it. It helps in the involvement of all the members involved in the project for doing the various task. As business case can be the tool for the communication among every member in the project to understand the scope, know the risk involved in the project and to have better knowledge on the results. With the help of business case we can do a future prediction on how the company will grow in upcoming years. Not only that with the topic that I choose I also get to understand how important it is to have a recommendation system in any online business as it totally reflect huge amount of advantages to the customers and also the sellers. I am grateful for getting to work in this assignment so that I can have great knowledge on the baseline of any projects, and how can it be carried on for the creation of successful projects. And I want to thank my friends and teachers for helping me get out of the problems I was stuck on.

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