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Final Project Paper

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FinEase

A Financial Literacy Application

I. Introduction

FinEase aims to increase the access and inclusion of financial literacy and make it more understandable for common people thereby empowering them to make strong and well-informed financial decisions. This project provides the User Interface mockups and creates mechanisms to conduct deep economic analysis and testing of the product in the real world.

Implementation Video | Figma UI Live Render | Figma Wireframes | Github Repo

II. Motivation and Target Audience

Inspired by the success of Grammarly's simple and intuitive extension, I embarked on a journey to create a similar application that could help people improve their financial literacy. As I delved deeper into the world of personal finance, I realized that financial literacy is a major issue that affects people from all walks of life. The lack of financial literacy is a pervasive issue in modern society. According to

recent statistics by Gitnux, just one-third of the world's adult population possesses financial literacy, indicating that 3.5 billion adults worldwide are not equipped with the necessary understanding of fundamental financial concepts. This highlights significant differences in financial knowledge across different regions of the globe.. This means that a majority of the world's adults and teenagers lack the basic knowledge and skills needed to manage their finances effectively. The reasons for this are varied and complex, but some of the contributing factors include a lack of financial education in schools, a lack of access to financial information and resources, and the complexity of financial products and services.

In light of these challenges, I developed FinEase, an application that aims to increase access to financial literacy and mitigate barriers to entry in creating financial investments by providing users with simple, easy-to-understand financial information and tools that can help them build a strong foundation of financial knowledge. By breaking down complex financial concepts into simple, digestible pieces, FinEase empowers users to make informed financial decisions that can help them achieve their long term financial goals.

FinEase is designed for anyone who wants to improve their financial literacy and make better financial decisions. This includes people of all ages and backgrounds, from teenagers just starting out to seniors planning for retirement. One important

target audience for FinEase is young adults who face significant difficulties in their early days to understand the intricately deep and complex financial world. This lack of financial knowledge can lead to poor financial decisions, such as taking on too much debt or failing to save for the future. By providing clear, easy-to-understand financial tools and a plethora of information, FinEase can help young adults build a strong foundation of financial knowledge and make informed decisions about their finances.

FinEase also aims to help individuals who have experienced financial setbacks, such as job loss or bankruptcy. These individuals may be struggling to manage their finances and may need guidance on how to rebuild their financial health. FinEase can provide them with the resources they need to make informed decisions and take control of their financial situation.

III. Concept

There are two components to the project. The first one involves technology to create the product and the second one involves economic analysis of how the product would impact the community in the world market. The product itself consists of two parts - a website application and a browser extension. The economic analysis, on the other hand, involves the creation of RCT experiments and mechanisms to test the application in the real world.

III.I. Technology

The technology component of the project is the backbone of the application and encompasses all aspects of the development process, from designing the website wireframe to coding the final product. To ensure a user-friendly experience, the application's UI design is an essential component of the development process. Therefore, I utilized Figma to create high-fidelity UI mockups of the entire website and the browser extension, allowing me to visualize the product's layout and user interface.

The next step in the development process involved the creation of the browser extension. This extension is an integral part of the primary software and enables the application to fetch data from the shared database. I worked diligently to ensure that the extension was created seamlessly and functioned smoothly in conjunction with the primary software. The extension was designed with simplicity and ease-of-use in mind, making it effortless for users to access financial information and resources while browsing the internet.

To ensure that the application met the highest standards of usability, I created detailed prototypes that facilitated a smooth and intuitive user experience. These prototypes enabled me to identify and rectify any issues in the user flows between different screens of the application, ensuring that users could navigate the application seamlessly.

III.II. Economics

The second part of the project involves analyzing the impact of the FinEase application in the real world. To accomplish this, I have devised a two-pronged approach that comprises a randomized controlled trial (RCT) experiment and traffic analysis.

The RCT experiment is a critical aspect of measuring the impact of the application, and it involves creating the implementation steps for a proper experiment. To ensure that the experiment is conducted correctly, I plan to create a rigorous and unbiased experiment. The implementation steps for the experiment will be well-documented to ensure that the experiment can be replicated in the future.

Once the RCT experiment is conducted, the next step is to assess the impact of the application based on the experiment's results. To this end, I have designed proper mechanisms to analyze the results of the RCT experiment, allowing me to determine the application's effectiveness in increasing financial literacy and empowering users to make informed financial decisions. By analyzing the RCT results, I can make data-driven decisions about the application's development and improve its features to understand and maximize its impact.

Apart from the RCT experiment, the other way that I plan to incorporate to analyze the impact of the application is through traffic analysis. This approach involves

analyzing the application's traffic data, such as the number of users using the application, their demographics, the number of sessions, and the average session length, to understand how users interact with the application and identify any areas for improvement.

IV. Implementation

The technological implementation section consists of two main parts - implementing the primary website application and implementing the secondary browser extension.

IV.I. Website Application

The website application offers three key sections to help users learn about investing and make better decisions. The first section is a dynamic stock market simulation that enables users to try trading and long-term investing in a simulated environment using real data. Through this tool, users can experiment with different stock portfolios and observe the steady growth of the market over time. The second section provides a comprehensive search function that offers quick answers to frequently asked financial questions and enables users to conduct detailed research and analysis before making any investment decisions. Lastly, the portfolio builder helps users track all of their investments in one place, providing a clear understanding of their returns and overall performance in the market.

IV.I (a) Stock Market Simulation

The stock market simulation section of the website is designed to offer users a hands-on experience of the stock market without risking any real money. It is a dynamic and engaging environment where users can experiment with different stocks and investment strategies using real market data, which means users can get a good idea of how their portfolio would have performed if they had invested real money. The simulation allows users to create and manage their own virtual portfolios, consisting of stocks and funds from different industries and markets. One of the key benefits of the stock market simulation is that it provides users with a risk-free environment to learn about the stock market and investing.

The simulation process starts with users creating their virtual portfolio by choosing stocks and specifying the number of shares they want to invest in. Then, they select a timeline to observe the performance of their portfolio. This timeline allows for both long-term investing and day trading options, enabling users to make decisions based on their investment goals and risk tolerance. Once the simulation is set up, users can start observing the performance of their portfolio. They can track the gains and losses based on market trends and situations.

At the end of the simulation, the website provides a deep analysis of the performance of the user's portfolio. This analysis includes charts and graphs that allow users to understand their gains and losses based on market trends and

situations. Users can review the investment strategies they used, and the website provides suggestions on how they can improve their portfolio. The analysis also includes information on the performance of the market as a whole, providing a benchmark against which users can compare their portfolio. This way, users can gain valuable insights into the workings of the stock market, including market trends, fluctuations, and patterns, and make informed decisions when they start investing real money.

IV.I (b) Advanced AI-based Search

The second section of FinEase aims to provide a seamless and efficient experience for users seeking financial information through an AI-based search function. This tool has been designed to be user-friendly and intuitive, making it easy for individuals with varying degrees of financial literacy to navigate and access information. The search function is powered by an AI algorithm, which allows it to provide quick and accurate responses to commonly asked financial questions, as well as suggested prompts for further exploration of related topics.

What sets it apart is its ability to provide country-specific details on procedures to invest in the US stock market, opening a demat account, and other critical topics. This feature is particularly beneficial to users who may feel overwhelmed or unsure of where to start with their research, as it offers tailored information specific to their location. The search function also assists users in conducting

comprehensive research and analysis of companies before investing, boosting their confidence in their investment decisions.

The search function is envisioned to mimic a large search box, providing users with straightforward answers to questions like "What is the procedure for investing in the US stock market?" and "What are the best agencies for opening a demat account?" Additionally, the search function will offer suggested prompts, similar to ChatGPT, encouraging users to explore related topics and questions like "How does day trading differ from long-term investing?" and "How is this particular company performing?" This feature will enable users to access relevant financial information quickly and easily, breaking down significant barriers to entry in the investment world.

The AI-powered search function also has the ability to learn and adapt to user preferences over time. As users interact with the tool and provide feedback, the AI algorithm is able to analyze and incorporate this information to provide increasingly accurate and relevant responses. This ensures that the search function is constantly improving and evolving to meet the needs of its users.

The search function is a game-changer for individuals looking to enter the investment world. By alleviating the confusion and uncertainty surrounding investment procedures and company analysis, this feature empowers users to make informed decisions and invest with confidence.

IV.I (c) Portfolio Builder

The portfolio builder is a powerful tool that enables users to effortlessly track all of their investments in one centralized location, providing a comprehensive overview of their portfolio's performance and investment returns. With this feature, users will be able to easily manage their portfolio, keeping tabs on all of their investments without the hassle of manually tracking them.

The portfolio builder will also assist users in navigating the complex tax laws and rules that vary by country, ensuring that they stay up-to-date and maximize their investments. It will give them a more genuine value of their predicted profits taking into account the additional charges and taxes on their income so that users are able to understand their true aversion to risk. With the portfolio builder, users can rest assured that they are always in compliance with the latest tax regulations, minimizing their tax liability and maximizing their investment returns while making sure to stay within their risk limits.

In addition to providing detailed investment analysis and tax management, the portfolio builder also enables users to experiment with various investment strategies and asset allocations. It is an invaluable tool for both novice and experienced investors alike by allowing users to adjust their portfolio based on their risk tolerance, investment goals, and market conditions.

IV.II. Browser Extension

The browser extension component of FinEase will revolutionize the way people invest by providing intelligent financial analysis akin to Grammarly. Once the user is on a website where financial instruments are traded or where financial graphs are displayed, the extension will be triggered. At this point, an easy-to-identify "FinEase" Info button will appear, which when clicked, will open up a section containing a plethora of information about the graphs and other financial information in the website.

In addition, the extension will also provide suggestions on when to buy or sell based on profit and loss calculations based on prediction algorithms. This cutting-edge technology will enable users to make informed investment decisions, confident in the knowledge that they are receiving invaluable insights and analysis at their fingertips. This will help users navigate the often complex world of financial analysis with ease, empowering them to make smart investment choices.

Just as Grammarly has revolutionized the way we write and communicate by providing real-time suggestions and corrections, the FinEase browser extension, users will have access to a powerful tool that will help them stay ahead of the curve and make the most of their investments. It will empower users to learn about investment instruments on-the-go in any investment related website thus enhancing their financial literacy.

V. Economic Analysis and Testing

The second phase of the FinEase project aims to assess the real-world impact of the application. To achieve this, a two-fold approach will be taken, consisting of a randomized controlled trial (RCT) experiment and traffic analysis. The RCT experiment is a crucial aspect that involves developing a detailed plan for its implementation, ensuring its rigorous and unbiased nature, and well-documenting each step of the process to replicate it in the future. Subsequently, the RCT results will be analyzed to assess the application's effectiveness in increasing financial literacy and empowering users to make informed decisions. By leveraging data-driven decisions, the application can be improved to maximize its impact. The second approach involves analyzing the application's traffic data, such as user demographics, session duration, and usage patterns, to gain insights into user interactions with the app and identify potential areas of improvement. Through both methods, the impact of the FinEase application can be evaluated and refined to better serve its users.

V.I. Randomized Control Trial

V.I (a) Introduction

To test the impact of the FinEase application, a randomized control trial (RCT) will be conducted. This RCT will provide valuable insights into the impact of the FinEase application and its potential to improve investment outcomes for users.

V.I (b) Design

The RCT will be designed to control for spillover effects by ensuring that participants in the control group do not have access to the application or any other investment tools during the study period. Participants will be randomly assigned to either the treatment group or the control group. To ensure balance and reduce bias, stratification will be used to divide participants based on age, gender, income level, and investment experience. The location of the experiment and the breakup of the treatment and control group across stratas will be carefully determined to ensure that the results are representative of the population.

To conduct a proper stratified randomization, we will need to conduct a baseline study to determine the factors that affect investment behavior. We will collect data from potential participants on demographic factors such as age, gender, income level, and investment experience, among others. This baseline study will enable us to stratify participants into different groups based on these factors, ensuring that we have a balanced distribution across both the treatment and control groups.

In addition to stratifying participants, we also need to ensure that we prevent spillovers between the treatment and control groups. Spillovers can occur when participants in the control group are inadvertently exposed to the treatment,

either through word-of-mouth or through external sources. This can create a bias in the study results, as the control group is no longer a true representation of individuals who have not used the FinEase application. To mitigate the risk of spillovers, we will implement strict measures to ensure that participants in the control group do not have access to the FinEase application or any other investment tools during the study period. This includes restricting access to the application to the treatment group only and conducting regular checks to ensure that participants in the control group are not using the application.

A placebo control group would not be feasible due to the nature of the application and its purpose. A placebo control group is used in clinical trials where participants receive a sham treatment, such as a sugar pill, to compare against the treatment group that receives the actual drug. This helps researchers to isolate the effects of the drug from other factors. However, in the case of the FinEase application, it would not be ethical to provide a group with an application and not provide them with proper financial advice. Providing them with an application without any financial education or guidance could potentially lead to negative outcomes, such as making poor investment decisions or not understanding basic financial concepts. This would not only harm the participants but could also have negative consequences for the research itself. Therefore the only control group that was used in the experiment was kept completely devoid of the intervention.

V.I (c) Treatment

To ensure that the participants are randomly assigned to the treatment or control group, invite-only access to the FinEase application will be provided. The study can be easily administered remotely and therefore would span around the world and go on for a significant amount of time spanning anywhere between 1-3 months. Participants will be informed about the study and invited to participate. Those who express interest will then be randomly assigned to either the treatment or control group using stratification based on demographics, income levels, and investment experience.

The treatment group will be given access to the FinEase application, which will include instructions on how to use the features of the app to manage their finances effectively. They will also have access to a help desk where they can ask questions, receive guidance, and get support for any issues they may encounter while using the app. On the other hand, the control group will not have access to the FinEase application or any other investment tool during the study period except resources available freely over the internet. This is essential to ensure that the control group's outcomes are not influenced by any external factors that could affect their investment decisions.

To measure compliance, the frequency and duration of the treatment group's use of the FinEase application will be tracked. This information will be used to determine how effectively participants are engaging with the application, and whether there is a correlation between the frequency of usage and investment outcome.

V.I (d) Outcomes:

The null hypothesis is that the FinEase application will have no significant impact on participants' investment decisions or outcomes, while the alternative hypothesis is that the FinEase application will have a positive impact on participants' investment decisions and outcomes. To test these hypotheses, a percentage change in investment outcomes will be measured for both groups before and after the study period. The treatment group's percentage change will be compared to the control group's percentage change to determine the effect of the FinEase application. A statistically significant difference with alpha value of 0.1 between the two groups will indicate that the FinEase application had a positive impact on investment outcomes. A power of the test above 80% would put it above the desired requirement. This power analysis will take into account factors such as the expected effect size, the level of significance, and the standard deviation of the outcome measure.

V.I (e) Metrics

The metric used to judge the impact on individual investment outcomes will be a composite score based on the following factors:

- Return on investment (ROI): This metric will measure the increase or decrease in investment returns for each participant.
- Risk-adjusted returns: This metric will measure investment returns adjusted for risk factors such as volatility and drawdowns.
- Diversification: This metric will measure the extent to which participants diversified their investments to mitigate risk.
- Financial literacy: This metric will measure the participant's financial knowledge before and after the study period.

V.I (f) Data Collection

Data collection will be done using a combination of surveys and financial data obtained from the participants. Participants will be asked to complete a survey before and after the study period to measure changes in their financial literacy and investment decisions. Financial data will be obtained from the participants' accounts with their consent. The data collected will be stored securely to protect the participants' privacy and confidentiality.

V.I (g) Analysis

The data collected will be analyzed using statistical software such as R or Stata.

Descriptive statistics will be used to summarize the data, and inferential statistics will be used to test the hypotheses. A multivariate regression analysis will be conducted to control for confounding variables such as age, gender, income level, and investment experience. The analysis will also take into account the effects of non-compliance.

V.II. Traffic Analysis

For FinEase, an application traffic analysis experiment can provide valuable insights into how users interact with the FinEase application and website. By tracking user behavior and analyzing user experience, FinEase can identify pain points and improve the overall user experience. This can lead to increased user engagement, retention, and ultimately, revenue. For example, FinEase may find that users are dropping off at a certain stage in the account creation process. This could indicate a need to simplify the process or provide more guidance to users. By making these improvements, FinEase can improve the user experience and increase the number of completed account creations.

To conduct the traffic analysis experiment, we would need to define metrics and key performance indicators (KPIs) that align with our goals and use services like Google Analytics. This could include metrics such as bounce rate, time on site, and conversion rate. By tracking these metrics, we can understand how users are engaging with FinEase and identify areas for optimization. For example, if we find

that users are spending very little time on a particular page or are bouncing back quickly, this could indicate that the content or user interface needs improvement.

Additionally, a traffic analysis experiment can help FinEase test and refine different aspects of the application and website. For instance, FinEase may want to test different layouts, call-to-action buttons, or navigation menus. By tracking user behavior and analyzing the data, FinEase can determine which variations perform better and make data-driven decisions on how to optimize the user experience. Furthermore, by monitoring the effectiveness of different marketing campaigns, FinEase can tailor its advertising strategy to maximize conversions and improve user acquisition. By identifying which campaigns generate the most traffic, leads, and conversions, FinEase can allocate its resources more efficiently and improve its return on investment.

VI. Challenges and Solutions

- Creating High Fidelity Mockups: One of the biggest challenges in creating high-fidelity mockups using Figma was ensuring that the design decisions made sense from the perspective of the end user. To address this challenge, I deliberated on every UI and UX decision to cater for user needs and expectations and ensured that the final product was very user-friendly.
- Technical Challenges of Creating the Application: Creating the FinEase application from the UI mockups presents several technical challenges. One

of the main challenges is ensuring that the application is scalable and able to handle a large volume of users. To address this, a robust back-end infrastructure needs to be created so that it can support the anticipated user base.

- Challenges of Running the Experiment: Running a remote randomized control trial that spans worldwide presents several challenges, including obtaining approvals from different countries, dealing with non-compliance, and mitigating spillovers. To address these challenges, several mechanisms have been discussed previously in the report. As for conducting the experiment remotely across people in different timezones, detailed planning, coordination, and support from all the participants is highly essential.
- Maintaining Ethics and User Privacy: This of utmost importance in any study. To ensure ethical conduct, all the guidelines set forward by the Institutional Review Board (IRB) will be followed and informed consent will be obtained from all study participants. Additionally, steps will be taken to protect user privacy by anonymizing all data collected during the study and storing it on secure servers. We also made sure to comply with all applicable laws and regulations in the countries where the study will be conducted.

- Gathering participants to conduct research: Another challenge in gathering participants for the RCT experiment could be difficulty in recruiting a large and diverse enough sample. To address this challenge, monetary compensation might be seen as a means. This compensation could be offered in the form of a gift card or a small cash payment, which could be distributed electronically. By offering this compensation, we could increase the likelihood of participation and ensure a diverse and representative sample for our study.

VII. Potential Improvements

- Development of a mobile application: While FinEase is accessible through a web browser, it may be more convenient for users to access the platform through a mobile application. Developing a mobile application could improve the user experience and increase accessibility.
- Addition of investment planning tools and finance-related course content: Currently, FinEase focuses primarily on budgeting and expense tracking. To provide a more comprehensive financial management solution, the platform could include investment planning and analysis tools and finance-related courses, allowing users to manage their investment portfolios, track performance, and further educate themselves. This would make FinEase a one stop solution for expanding financial literacy.

- With regards to further economic analysis and creating sustained business models, the next steps could be to introduce a premium subscription based plan to access certain features of the application and further experiments and analysis could be conducted to figure out how likely people are to pay for using certain application features.

VIII. Conclusion

Throughout this project, I have explored various aspects of creating a financial education platform, including the development of a website and browser extension as well as conducting randomized controlled trials and traffic analysis experiments. By taking a user-centered design approach, I was able to create a high-fidelity prototype that is intuitive and easy to use. I recognize that there will be challenges along the way, such as technical difficulties in creating the actual application and logistical issues associated with running a large-scale RCT and traffic analysis experiment remotely. However, I am confident that I would be able to overcome these challenges and help millions of people around the world start their journey towards financial independence.

Through the economic analysis part of this project I hope to highlight the importance of financial education and the potential impact it can have on individual financial well-being. By conducting a rigorous evaluation through a

randomized controlled trial, I plan to establish a causal relationship between the use of the FinEase platform and improvements in financial literacy and behavior.

I acknowledge that there is still more work to be done to improve the platform and better serve the needs of users. Moving forward, I plan to take the insights gained from this project and continue to refine and enhance the FinEase platform. I will also work towards expanding our reach to a more diverse and global audience, while ensuring that the platform maintains the highest ethical standards in terms of user privacy and data protection.

I am really excited about the potential impact that the FinEase venture can have in empowering the community to make informed financial decisions and improve their financial well-being. I believe that by continuing to innovate and improve the platform, I can make a meaningful contribution to increasing the world's financial literacy levels and help individuals achieve their long term financial goals.

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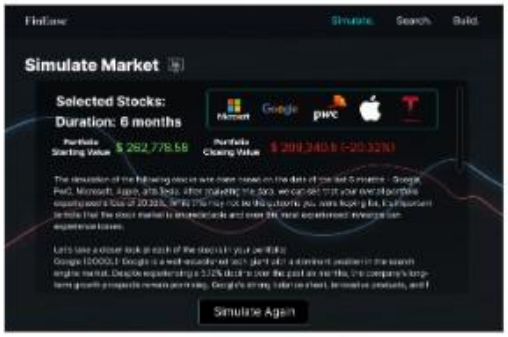
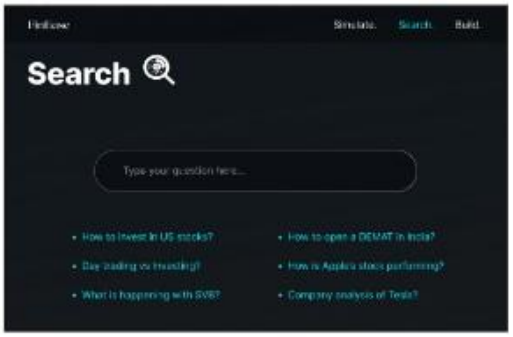
X. Appendix

Home Page

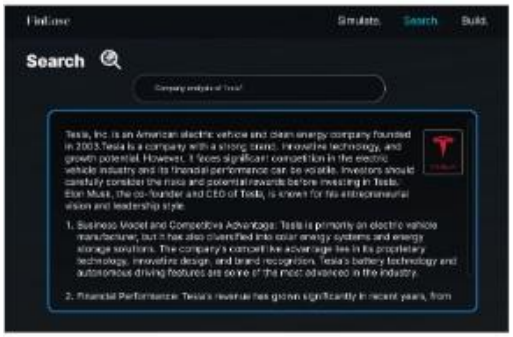
Simulation Page



Simulation Results



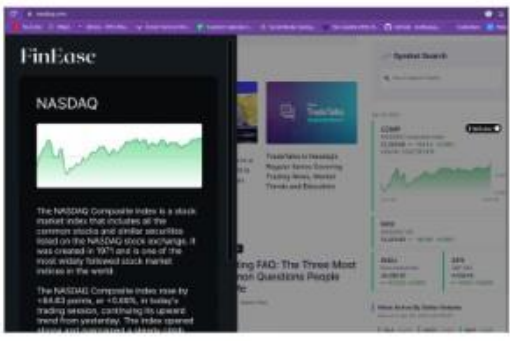
Search Page



Search Results

Portfolio Builder Page

Portfolio Stocks Page



Browser Extension