

Report On
Stochastic Forecasting and Comparative Performance: An Optimized Technology Portfolio
vs. the DS30 Index on the Dhaka Stock Exchange

By
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An internship report submitted to the Brac Business School in partial fulfillment of the
requirements for the degree of Bachelor of Business Administration

Brac Business School
Brac University
September 2025

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Declaration

It is hereby declared that

1. The internship report submitted is my/our own original work while completing degree at Brac University.
2. The report does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate reference.
3. The report does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I/We have acknowledged all main sources of help.

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Letter of Transmittal

Safarath Ahmed

Lecturer

BRAC Business School

Kha 224, Bir Uttam Rafiqul Islam Avenue, Merul Badda, Dhaka

Subject: Submission of Internship Report

Dear Sir,

I am pleased to submit my academic internship report titled **“Stochastic Forecasting and Comparative Performance: An Optimized Technology Portfolio vs. the DS30 Index on the Dhaka Stock Exchange”** as part of the requirements for the Bachelor of Business Administration (BBA) program at BRAC University. This report documents my academic internship experience at X-Angel Ltd., an alternative investment firm in Bangladesh and explores how risk profiling techniques can be leveraged to design and market multi-asset class investment products tailored to diverse investor segments.

The report highlights key findings on the alignment of investor risk preferences with product structures, the challenges of implementing personalized strategies in emerging markets and the opportunities for innovation in investment marketing. It also provides practical recommendations for financial service providers seeking to enhance client engagement and portfolio outcomes through data-driven, risk-based product design.

I wish that this report can be of interest to the academic community and industry experts who are interested in the development of investment solutions in the emerging markets. Thank you for your time and consideration.

Sincerely yours,

Md Junaid Khan

21304070

Bachelor of Business Administration (BBA)

BRAC University

26 September, 2025

Non-Disclosure Agreement

This agreement is made between X-Angel Ltd. and the undersigned student Nowrin Rizvi at Brac University that the report does not contain any confidential information from the organization.

Md Junaid Khan

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Bachelor of Business Administration (BBA)

BRAC University

Jasim Mohammad Miah

Investment Manager

X Angel Limited

Acknowledgement

I am grateful to all those who helped me in preparing this report.

First of all, I would like to thank BRAC Business School for giving me the opportunity to do an internship. What my teachers taught me has been very useful in this work.

Many thanks to my university supervisor, because he was patient and helped me when I was in trouble.

I am especially grateful to X Angel Limited. Many thanks to my supervisor Mr. Jasim Mohammad Mia, who taught me hands-on and gave me the opportunity to work. I was able to apply what I learned as a finance major. He listened carefully to a junior like me, which means a lot to me.

I also thank my office colleagues Mr. Azad, Mr. Afnan Hossain and Mr. Sohel. They made me feel at home and answered my questions very easily. Without their help, I would not have learned so much.

Finally, thank you to my family and friends, who have always encouraged me.

Md Junaid Khan

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Bachelor of Business Administration (BBA)

BRAC University

Abstract

The focus of this study is on Bangladeshi investment firm X Angel Limited. It looks at how they work with their clients, markets and employees. During my internship, I saw that despite the company having huge opportunities, their strategies are very simple. As a result, they are not able to use their full potential. So in this report, I have given some simple suggestions. For example, help them in other ways than just giving money, work more with the government and create a good working environment to retain good employees. Hopefully, these suggestions will help in the development of the financial market in Bangladesh.

Executive Summary

This report was written as part of an internship on an investment firm in Bangladesh, X Angel Limited. Its main objective is to analyze the company's working methods and provide some suggestions to strengthen their position. The study is divided into two parts: one looks at the company's working strategies, and the other analyzes the results of their investments in the Dhaka Stock Exchange.

Our analysis shows that X Angel's strategies are currently very simple. As a result, they are not able to work fully effectively with customers, markets, and employees.

The report provides some simple suggestions to solve these problems. Such as:

- Helping companies in other ways, not just with money.
- Changing the rules of the market in collaboration with the government and others.
- Creating a good working environment to retain the best employees.

In addition, the report compares the technology sector stocks and the DS30 index, showing that although the profits are higher in the technology sector, the risks are also higher. Therefore, it is necessary to make a well-thought-out decision to invest in this sector.

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Chapter 1: Internship Analysis

1.1 Student Information

Name: MD Junaid Khan

ID:21304070

Program: Bachelor of Business Administration (B.B.A)

Major: Finance

2nd Major: Computer Information System.

1.2 Internship Information

1.2.1 Period, Company Name, Department/Division, Address

Period: 3 months

Company Name: X Angel Limited

Department / Division: Investment Department

Address: XIC Point, Holding No. Kha- 213/2, 213/3 and 213/5, Bir Uttam Rafiqul Islam Sarani,
Middle Badda, Dhaka

1.2.2 Internship Company Supervisor's Information

Name: Mr. Jasim Mohammad Miah

Position: Fund Manager, X Angel Limited

Education: BBA (Finance and Accounting) from BRAC University and Dhaka School of
Economics, University of Dhaka, PGD in Economics, Econometrics, and Quantitative
Economics

1.2.3 Job Responsibilities

During my internship at X Angel Limited – Investment Department, I performed tasks across investment analysis, fund operations, compliance, and internal communications. My responsibilities included, but were not limited to:

Investment analysis & modelling

- Developed and sustained valuation models consisting of prospective and existing investments (DCF, an analysis comparative to other companies, and scenario modelling).
- Stock market and industry synthesised data to generate investment speculations.
- Micro and macroeconomic trends were analyzed so as to feed assumptions and value inputs.
- Projected incomes and budget estimates to drive investor decisions.

Due diligence & legal / documentation oversight

- Supported financial research and assisted with review and preparation of legal documentation and data-room materials.
- Ready and structured reports to be used to obtain internal approvals and be reviewed by their investors.

Fund operations, reporting & risk management

- Short-term interference helps with fund operations services, such as portfolio reporting, databases, and the preparation of investor reports.
- Created a structure for Risk management, which involved multiple identification of different risk assessment patterns.
- Delivered back-office support, including compliance, finance, and operations, to assist in satisfying fund operational needs.

Stakeholder coordination & communication

- Organized and coordinated strategic meetings and follow-ups with AgTech founders and CEOs, helping to fulfill meeting agendas and minutes.
- Organized the information to represent portfolio companies to reporting and associated with the information reported back internally.
- Developed internal policies and aided in preparing materials that faced investors.

1.3 Internship Outcomes

1.3.1 My contribution to X Angel Limited

My primary contributions were to supply analytical assistance and efficiency of work to the Investment Department. Through my valuation development and conducting fundamental analysis, I enhanced the research efforts produced by the rest of the team, with insights that were backed by data to guide investment approaches. My support on portfolio reporting and database maintenance assisted the company in facilitating its internal processes so that the important data could be properly synthesized and easily accessed. Moreover, I directly contributed to the facilitation of essential business operations and the preservation of a high level of professional communication with external stakeholders by assisting in organizing strategy meetings and creating legal documents.

These donations allowed the Investment Department to keep pace with active dealings, improved the quality of reporting, and helped to expedite turnaround time in completing normal business activities.

1.3.2 Benefits to me

The internship was a valuable professional and technical learning experience:

- **Technical skills:** Practice in making valuation models, cash flows forecasting, and exploring the sector enhanced my financial modelling and analysis skills.
- **Practical exposure to private markets:** The most practical and effective experience was direct participation in the VC/PE investment process—where I was involved in critical steps like deal evaluation, vetting and document preparation. This experience not only provided an opportunity to put the theory learned in the pages of books into practice, but also developed a deep and relevant understanding of investment analysis, risk assessment, and deal structuring.
- **Understanding of fund operations:** Fund operations, Knowledge of portfolio reporting, investor reporting, and back-office operation understanding. Enhanced the understanding of the end-to-end fund management.
- **Risk awareness & compliance literacy:** I actively worked on risk documents and guidelines to gain a clearer insight into compliance needs and rigorous investment procedures.

- **Professional communication & stakeholder management:** Chairing meetings with founders/CEOs, as well as cross-group members, enhanced my practice of written and oral professional communication abilities.
- **Career understanding and development:** Interaction with fund managers, founders, and portfolio companies teams assisted me in defining my career objectives in the domain of investment management and expanding my professional network.

1.3.3 Problems / Difficulties (faced during the internship period)

Learning how to operate the mechanics of successful communication in an office work environment was one of the greatest challenges I encountered. Interdepartmental as well as vertical communication was significantly strained, which was new to me. This was not a good start, but it simply turned out to be an opportunity to learn. I learned, much better than before, the futility of such friction, and I am now firmly convinced that a wholesome relationship should be founded on open, respectful, and direct communication to be successful.

Nevertheless, every challenge presented them with an opportunity to learn, which enhanced my flexibility as well as work-related problem-solving.

1.3.4 Recommendations (to the company on future internships)

Application of Academic Knowledge: The company offers Bachelor of Finance majors a great opportunity to practice what they know. The practicality of the job enables them to be involved in the routine discussions of the happenings in the financial industry, and thus, it is an effective and suitable learning platform.

Equipment Provision: To cover the event of making the future interns well-equipped so that they will not grapple to take their initial steps in the workplace, it would be advisable that the company provide the interns with individual workstations or explicitly express that the interns are expected to bring their personal laptops. It will eliminate any delays or operational problems with equipment and will enable interns to be employed to their full capacity immediately.

Chapter 2: Organizational Analysis

2.1 Introduction, Objectives, Scope, Methodology, Significance, and Limitations

In this chapter, the researcher will conduct an in-depth organizational study of X Angel Limited, an alternative investment firm which is central to the dynamic state of the financial landscape in Bangladesh. The purpose of this carefully designed study is to fill the gap between business theory and crafting it into a practical and dynamic application in the real world scenario. The knowledge garnered herein would be vital to the realization of both strategic and operational complexities of an alternative investment firm operating in a nascent market.

2.1.1 Objectives of the Study

The fundamental aims, which drive this organizational analysis, are complex;

- To offer an overview of the corporate identity of X Angel Limited as a whole, it would be necessary to understand its history and explain its association with a local business conglomerate.
- Towards engaging in a critical analysis of the management practices of the company, giving a specific consideration through to its unique management style and further extensive examination of the human resource management process.
- To dismantle and review the marketing approaches of a firm that has a niche market based in the business-to-business (B2B) and business-to-investor (B2I) market.
- To scrutinize the financial performance of the firm and its accounting practices from available data in a detailed manner to give an understanding of the financial soundness of the firm and its prudence.
- To investigate how the firm manages operations, and how the information systems are incorporated to address part of the main business practices.
- To utilize the set analytical theories, including the Five Forces diagram and SWOT analysis, in order to properly research the company and its competition in terms of strategic strengths and competitive positioning in the industry.

2.1.2 Scope of the Study

The domain of this research can be explicated as an analysis of the organizational structure of X Angel limited and the operational environment. It will conduct an analysis based on secondary information, including publicly available data concerning the company in regards to its official reports, Web resources and press releases in addition to information within the industry that is backed by reliable sources. The financial analysis is founded in large part on the audited financial reports of its flagship fund, the X Angel First, in which it involves its X uses of funds for the period between February 6, 2023, and June 30, 2024. The study must be limited, necessarily, by the non-publicity of the long-term financial transactions of the parent company, which is in no way opened up to study by an investigator.

2.1.3 Methodology of the Study

In this study, the investigator applies a qualitative and descriptive approach to research to combine all data on a wide range of secondary sources in order to develop a coherent and descriptive portrait of the organization. This was assembled very carefully based on:

- The corporate Web site of the company that defines its mission, vision and investment philosophy.
- Vital fund correspondence documents and regulatory filings to the Bangladesh securities and exchange commission (BSEC).
- Relevant sporadic publications about the industry and scholarly journal articles that can offer some background information regarding the market I am dealing with (and hence the existing state of the industry).
- Professional network records and accounts that provide new data about the firm and its relationships, and the key personalities.

This approach, though helpful as a literature-based complete survey methodology, has the fundamental constraint that it is reliant upon the quality and exhaustiveness of information as publicly released, which is often the defining feature of studies of a privately based organization.

2.1.4 Significance and Limitations

The research has value because there is a lack of in-depth case studies on such a prominent alternative investment company in an emerging economy. It is a valuable academic source as it offers a practical manifestation of business theories. To the stakeholders, it provides a strong evaluation of the integrity of business operation and the position of the firm. Instead, as the primary limitation described, there is no original proprietary financial information of X Angel Limited itself, thus limiting the quantitative financial analysis to single, short-term analysis of its main fund.

2.2 Overview of the Company

2.2.1 Corporate Identity and Affiliation

X angel limited (XAL) was legally incorporated on March 15, 2017 and started living its operational life as "venture builder" in 2018. It is a privately limited corporation and the alternative investment and venture capital entity of the original business conglomerate, X Index Company (XIC) that is very well founded in Bangladesh. This attachment proves to be a distinctive attribute of XAL that grants it to have a large business network, strategic capital and a pool of multi sectoral skills obtained through the diversified portfolio of its parent company in the real estate, ceramic and energy sectors. The company is licensed and governed by the BSEC which is an essential piece of information which supports the authenticity and respect of compliance in the financial system of the country. The headquarters is located in the strategic location of Dhaka in Bangladesh, which makes the company the centre of the financial and business affairs of the country.

2.2.2 Vision, Mission and Investment Philosophy

X Angel Limited's corporate identity is forward-looking and ethical. The firm's stated vision is to "be a well-established and respected alternative investment firm and asset manager," with sustainability and ethics as key themes. They have translated this vision into a mission, aiming to create long-term value with social and environmental benefits by investing in high-growth startups. This dual focus of financial returns and positive impact is at the core of their investment philosophy, which is in line with the ESG mindset of the global economy.

The firm's investment philosophy is one of long-term vision and patience. They actively seek out "enthusiastic" founders who bring a unique perspective. In the venture builder model, XAL does

not just provide financial partnerships; it also provides strategic support to portfolio companies. At the same time, the firm adopts a sector-agnostic approach to explore opportunities for innovative and high-growth companies in emerging sectors. The combined leadership experience, working in over 15 sectors and managing over \$1 billion in P&Ls, has laid a solid foundation for this broad strategy.

2.2.3 Leadership and Corporate Governance

The corporate culture of governance is a reflection of the family leadership style combined with professionalism within the firm. The executive management team consists of:

- **Chairman:** Arch. Mazherul Quader
- **Chairwoman:** Mrs. Khurshid Mazher
- **Director:** Esha Mahin
- **Additional Managing Director:** Md. Mamunur Rashid FCMA
- **Chief Executive Officer:** Wahed Azizur Rahman
- **Investment Manager:** Jasim Mohammad

This committee looks for potential investments. They look after the profitability of the company and all types of investments. For the sake of risk, they carefully check everything before investing. The company strictly follows all the rules and regulations. Permission from the higher officials is required to do anything here.

These procedures and repeated checks and balances increase accountability and transparency, which are essential for a sound financial institution.

2.3 Management Practices

2.3.1 Leadership Style and Its Implications

X Angel Limited's leadership is not typical. They listen to everyone and take the company in a new direction. The company empowers small teams to make decisions, especially when it comes to vetting things carefully before investing in something. This makes the skilled team members feel part of the work and take responsibility. As a result, their analysis is better and investment decisions are more accurate. In this way, the company's strategy is not based on the words of one or two people, but on a combination of everyone's knowledge and experience. Therefore, their strategies are not imposed on the market, but are based on everyone's opinions, which is much

more effective.

Because of leadership, this company is not just about making money. Rather, it also works to improve society and the environment. This kind of thinking inspires employees and helps them align their personal ideas with the company's goals. It is an effective vehicle in its ability to acquire and keep the best employees in the competitive environment, because the employees are in demand that can provide some level of purpose to their positions. Such a leadership approach has played a pivotal role in creating a strong and motivated team, which is another key success factor of an alternative investment company that mostly operates under complicated and long lasting projects with slow recovery of profits.

2.3.2 Human Resource Planning and Management

In a company dealing in the alternative investment sector, the valuable asset would be the human capital. To this end, the process of human resource planning is very specialized and strategically oriented to the objective of the firm.

- **Recruitment and Selection:** The recruitment process is highly structured and goal-oriented; the company is looking to hire a limited number of skilled analysts and managers. Candidates, who are skilled in financial modelling, due diligence and deal structuring are preferred mostly. The recruitment process is likely to be transparent and systematic, which reduces HR-related risks during business expansion. The internship-based vacancies suggest that the company is building a talent pool from the outset—this aligns with their long-term strategy.
- **Compensation System:** While the specific system is not clearly known, three types of wages are generally prevalent—regular salary, performance bonus, or carried interest. These systems align the interests of employees with the long-term success of the investor and the portfolio. An effective payroll system is essential to drive this complex incentive.
- **Training and Development:** The company believes that effective training improves employees' work and careers. Constant attention is given towards Professional Development while keeping with the changing market environment and regulations. Being an alternative investment firm, their employees learn business operations and strategies in the real word and industry standard way.
- **Performance Appraisal System:** The work of employees is measured in two ways: 1) by

numbers (for example, how many new investments they bring in) and 2) by the quality of work (how well the analysis is done). This shows how much they are contributing to the company. Their evaluation also depends on the income of the team and the company as a whole. This method will help to increase competition and cooperation for good work among everyone.

2.4 Marketing Practices

X Angel Limited's main strategy is to build relationships with people. They prioritize personal contact and familiarity. They don't just give money, but also help with their experience and intelligence. They emphasize the quality of work rather than direct advertising. Through this, they can reach the right people. This is done in two ways:

1. Presenting themselves as knowledgeable: They show their expertise and interest in investing in new sectors, showing that they are not just investors, but also experienced consultants.

2. Strengthening the brand: With the company name, they want to convey that they are not just there to give money, but also to be there as a strategic partner.

Those who run their own companies and who have investment experience are the main customers of X Angel. They are interested in investing in all kinds of sectors, so they are always looking for new companies.

Online: They have a website and all the necessary information for investors and company founders is provided there.

Professional Network: They connect with people through conferences, networking events, and membership in professional organizations.

Issues and Gaps in Marketing Critical: One of the primary issues that face the marketing conducted by XAL is the size and lack of visibility of the Bangladesh private equity market. Besides creating its own brand, the firm should also make efforts to sensitize the market to the importance of private equity as a source of finances. A possible weakness is that it does not have such a solid public relations plan to highlight its portfolio success, to outline its value statement, which may curtail its presence and recruitment to a wider talent and investor base.

2.5 Financial Performance and Accounting Practices

2.5.1 Financial Performance

The financial information is not made publicly available to anyone, but instead it is part of the structure of a private equity firm. Unlike publicly traded firms, private firms are not obligated to disclose the financial information to the regulators. Consequently, their financial information is usually closed to institutional and high-net-worth investor client groups with whom they hold a direct investment relationship and of which they have signed confidentiality agreements.

Due diligence and frequent reporting to these investors gives them an insight into the relevant information by the firm. This includes the norms of the private equity and venture capital business, whereby confidentiality safeguarding is not only a policy, but also a strategic concern.

The disparity between the nature and the degree of disclosure in the public and private markets establishes a substantive gap in the investment structure affecting investor decisions directly.

2.5.2 Accounting Practices

The financial statements of XAPFEF were prepared both under IFRS (with mentioned departures as required under BSEC rules) and on a basis of going concern. The books of the fund were audited by Syful Shamsul Alam and Co, a UHY based chartered accounting firm. This membership further presents a credible audit process.

XAL adheres to the key principles of IFRS (going concern, consistency, prudence). International commitment to the use of the International financial reporting standards (IFRS) is an indication that both local and international investors have increased transparency and trustworthiness in the financial reports. It also uses an accrual basis where interest is recognized upon the occurrence of the same (BDT 4.7m). Complete accounting cycle: Entries recorded, shared, tried, revised and brought to book, and reconciliation taken note of relates to accounting..

Consistency is presumed for 3-5 years (proxied since inception) accrual basis since 2017 guarantees reliability. Comments: Principles make it more credible; cycle accuracy makes it fair, disclosures make it more transparent yet asset-specific mechanisms might be better.

The report published by the auditor reveals a careful screening procedure of the key assets of the fund availing an impression of true and fair picture of the financial position of the fund in accordance with the rules and regulations of IFRS and the securities and exchange commission. Another element of regulation and ethical compliance is the fact that the company releases

quarterly and halfway reports regularly to stakeholders on an ongoing basis.

2.6 Operations Management and Information System Practices

2.6.1 Operations Management

X Angel Limited's working method is quite disciplined. It is very suitable for difficult and long-term work like private equity investment. It is a business created on a specific process:

- **Deal Sourcing and Pipeline Management:** A large part of the company's work is finding new investment opportunities. The company is always looking for and investing in new and fast-growing businesses and technologies (such as ICT, manufacturing, and pharmaceuticals). Their team's job is to find and vet such opportunities, so that they always have enough investment options at hand.
- **Due Diligence and Valuation:** Once a potential investment is identified, the due diligence process begins. This may include financial modeling, comparative analysis, and legal document review, and the intern has realistically covered these aspects in Chapter 1. Here, the company's analytics experts screen opportunities and mitigate risk.
- **Portfolio Management:** XAL is a venture builder, and its approach goes beyond just investing. The firm provides strategic advice to portfolio companies so that they can grow and meet their goals. As seen in the TRIPEGATE investment example, XAL helped build advanced booking technology.
- **Risk Management:** The firm ensures portfolio diversification and adequate leadership to address the high-cost risks of private equity. This is especially important in emerging markets where industry support institutions are few.

2.6.2 Information System Practices

Information is a key asset in the industry, and an alternative investment firm's information system cannot be ignored. While specific application software remains confidential, X Angel Limited uses a complex set of programs to oversee its operations.

- **Deal Management and CRM:** CRM systems are very useful for a company. It helps in finding new investors and keeping all the contact information with them. Through this system, all the documents can be kept safe. Therefore, there is no chance of any mistake and accountability can be ensured at every step of the work.

- **Financial and Portfolio Management Software:** One of the great strengths of X Angel Limited is their specialized software. This software helps companies to see all the financial accounting, market valuation, and investment information in real time. Through this, companies can easily see the progress and results of their work. In addition, it helps the company in generating accurate and timely reports for investors and in complying with the regulations of regulatory agencies.
- **Data Security and Data storage:** Since sensitive information and intellectual property are exchanged in investment decision-making, data security is given top priority. Angel X Limited uses robust cybersecurity measures and secure Virtual Data Room (VDR) to avoid cybersecurity risks while exchanging documents during due diligence.

The approach to digital transformation as expressed by the omnibus X Index Companies conglomerate implies the strategic value of information systems in the work of X Angel.

2.7 Industry and Competitive Analysis

2.7.1 Porter's Five Forces Analysis

In Bangladesh, the private equity/ venture capital market is infantile, and hence, the competition is distinct. A five-forced analysis provides a systematic analysis of the industry.

- **Risk of new entrants (High):** The current competitive market state in Bangladesh is nearly nonexistent, and has only a small number of entrants in the market which is regarded as a kind of Greenfield country to investors. The nonexistent competition may be appealing to new competitors. On the one hand, it is important to note that substantial capital asset requirements and the fact that one has to have a BSEC license inhibits new entrants into the sector; on the other hand, a protective policy may induce more companies to establish their units, thereby exerting more competition on the X Angel Limited.
- **Bargaining Power of Buyers (Limited Partners) (High):** Buyers of a PRIV fund are class of investors with high net worth. Since there are not many such investors in Bangladesh, their bargaining power is high. Such LPs may require good conditions, reduced charges, and increased openness. The marketing and governance practices adopted by X Angel should be strong enough to evoke trust and entice this small pool of capital.
- **Power of Suppliers (Founders) (Moderate):** The suppliers of investment opportunities include Founders of high-growth startups are the suppliers of investment opportunities.

Although most of the startups experience difficulties in accessing capital, the most interesting and brilliant companies are in high demand amid the few active PE/VC players. This quality price war generates a moderate bargaining power on the part of the high-potential founders since they are able to trade in more favourable terms.

- **Threat of Substitute Products (Low):** There are no major alternatives to private equity funding than usual bank loans or the use of the stock market. Yet, they are not always open to early-stage or high growth businesses that lack collaterals or exit through public listing. The role played by the private equity is, therefore, distinctive and comparatively irreplaceable to the provision of risk capital to these companies.
- **Competitive Rivalry (Moderate):** The rivalry is at its current level because the size of the active firms is low. Although X Angel Limited is a significant player, it will be competing with others which include Start up Bangladesh ltd., SBK tech venture, and maslin capital. This competition is not yet what is present on developed markets, but we can witness this competition rising as the market matures.

2.7.2 SWOT Analysis

Through the SWOT analysis, there is a brief overview regarding the internal strengths and weaknesses of X Angel Limited, the external threats and opportunities it is exposed to.

Table 1: SWOT Analysis of X Angel Limited

<u>Strengths</u>	<u>Weaknesses</u>
S1: Firm commitment to the X Index Company conglomerate with strategic support and extensive connections..	W1: Publicly announced investment portfolio, potentially preventing the attraction of new investors/founders.
S2: Ethical and transparent investment philosophy with the avowed emphasis on sustainability and a positive influence on society.	W2: The low number of employees in the operational department might dismiss its ability to do several intricate deals at the same time.

S3: The good corporate governance and regulatory compliance, manifested in BSEC licensing and intensive audit procedure.	W3: Financial information on the fund indicates that has a high percentage of liquid assets, implying that the pace of deploying capital is slow.
S4: Strong Management that has strong entrepreneurial and management experience in the public company.	W4: Functioning within a young and reedy private equity market full with structural challenges including repatriation of investments and insufficient exit options.
S5: A venture builder, The strategy is hands-on, which differs with other providers of capital.	

<u>Opportunities</u>	<u>Threats</u>
O1: High potential of growth since Bangladeshi private equity market is on the rise.	T1: Negative macroeconomic factors, such as, inflation and political pressures, which may affect returns on investment.
O2: Wide held agreement among policymakers about the existence of a robust market of the private equity to finance both SMEs and infrastructuration.	T2: The local M&A market may be very small with a significant amount of confidentiality that may constrain the possibilities to get late deals and exits.
O3: Thriving and expanding ecosystem of projects and business in Bangladesh seeking funding and entrepreneurial advice.	T3: Competition will rise due to the emergence of other local and international venture capital firms in the market.

O4: Positive trends in global private market in 2025 with a projected recovery in activity in deal making.	T4: Regulatory and structural obstacles likely to scare away foreign investment and are difficult when doing business in the local context.
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2.8 Summary and Conclusions

In the emerging market of Bangladesh, where the demand for alternative capital is growing, X Angel Limited has emerged as a well-organized and strategically positioned investment institution. Its identity as the alternative investment arm of a large industrial group provides the institution with strong institutional support, which is a clear competitive advantage over new and independent market participants.

The institution's management structure combines participatory and transformational leadership, which plays a key role in encouraging innovation and attracting skilled manpower in specialized and competitive sectors. Their fund accounts show that they have been very cautious from the start and have always been cash-rich. This shows that they understand the uncertainties of the market well. XAL adheres to international accounting standards and employs trusted auditors. To be successful in the long term, they will need to leverage their own strengths—good relationships, ethical standards, and direct work experience—to overcome the challenges of new markets and meet the demand for alternative capital.

2.9 Recommendations/Implications

Here are some simple tips for X Angel Ltd. to do better:

- **Utilize money quickly:** The company has a lot of money lying idle. This is good on one hand, but it can lead to missed investment opportunities. So they should make quick decisions and invest money in good places.
- **Increase publicity and relationships:** Companies usually do not publish news about their investments, so they should promote themselves more through public relations and content marketing. Telling everyone about their success stories will help attract new companies and investors.

- **Give companies more than just money:** X Angels' job is not just to give money. They should build deeper relationships with the companies they invest in. They should teach them by hand and let them use their large network.
- **Help develop the market:** X Angel is a big name in this new market. So they should work together with other institutions and the government. This will solve the big problems of the market and create a strong future.
- **Give importance to employees:** A good working environment is very important in small organizations. X Angel should always spend on improving the skills of employees and create an environment where everyone works with a specific goal. Because, good employees are the key to success in this sector.

Chapter 3: Project Part

3.1 Introduction

This chapter begins the empirical research as described in the project proposal, and concerns itself with the stochastic predictions and comparative performance analysis of an optimised portfolio of technology versus the DS30 index in Dhaka Stock Exchange (DSE) framework. As the standard stock exchange of Bangladesh, the DSE has gone through tremendous growth and has especially thought the technological market, both due to its efforts like Digital Bangladesh and the growing number of investments in digital infrastructure. It provides the background details, defines the problem of the research, outlines the specific goals, presents the importance of the study, and determines its scope basing on historical data, January 1, 2024 - September 14, 2025, examined as of 10:26 PM +06, September 24, 2025. The approach utilizes the modern portfolio theory (MPT), Monte Carlo and geometric Brownian Motion (GBM) to fill the various loopholes in the process of making investment decisions according to the stages of the proposal and presents active results to the stakeholders in the dynamic world of financial markets in Bangladesh.

3.1.1 Background and Problem Statement

In Bangladesh, over 30 blue-chip companies that operate in different sectors are listed in the Dhaka Stock Exchange and displayed through the DS30 index as a performance indicator to capital mobilization. The findings indicate that since January 1, 2024 to September 14, 2025, an annualized return of 2.036 on an investment is observed in the DS30 and the standard deviation is 15.88 with the minimum after-tax-loss corresponding to -1.69 and the maximum corresponding to 1.69 (see figure6.png). Such stability indicates the composition of established firms in the index presented in the line chart "DS30 Closing Price Fluctuation" which is gradually increasing as indicated by decreased volatility.

At the same time, the technology-driven sphere has become one of the most rapidly growing ones as a result of telecommunication and IT development. The chosen stocks included as Robi Axiata Ltd (ROBI), Adn Telecom Ltd (ADNTEL), Grameenphone Ltd (GP), Intech Ltd (INTECH) and Bdcom Online Ltd (BDCOM) 11 include a high level of price variability, which is reflected in the stacked area chart of image1.jpg under the title of Closing Price Fluctuation Tech Stock. Prices varied over the sampled period (e.g., between 27.2 BDT and 30.6 BDT) as ROBI, ADNTEL, GP, INTECH, and BDCOM. As was to be expected, corresponding log returns had broader swings:

ROBI (-2.58% to 3.89%), GP (-0.63% to 1.62%), INTECH (-7.61% to 9.47%), ADNTEL (-2.41% to 3.59%), and BDCOM (-5.71% to 6.90%), and the volatility of the market and the growth perspective of the sector as a whole. This difference is even more prominent with annualized returns, with INTECH at 27.929% and an annualized standard deviation of 52.579 opposed to the conservative portfolio of DS30.

The key issue identified in the proposal is that there is no prominent stochastic framework to assess whether the optimized technology portfolio will be more effective than the DS30 by considering risks. The last discussion and optimization of the portfolio using MPT and Excel Solver gave the portfolio a weight of 10% ROBI, 5% ADNTEL, 40% GP, 40% INTECH and 5% BDCOM and expected return is 10.762, volatility 27.924 and Sharpe Ratio of 9.89 (risk-free rate: 8% based on BD bond yields). But in the absence of probabilistic projections (Monte Carlo simulation, I.e. median of 24708.16 BDT) of 40 years, or more commonly 250 days (50-300+ BDT) GBM trajectories, investors do not have a clear indication of risk-return trade-offs in the future. This paper refers to this additional need by considering the historical analysis together with stochastic modeling to guide investment decisions within the emerging market in Bangladesh.

3.1.2 Objective(s)

With respect to the research objectives of the project proposal, this study intends to offer a strong stochastic and comparative research of optimized technology portfolio as compared to the DS30 index. The aims in particular are as follows:

1. The objective to distinguish maximum Sharpe Ratio with log returns and closing prices at the end of the day, January 1, 2024, to September 14, 2025, with weights of 5 to 40 percent per stock to ensure the portfolio is diversified fits the goal to build an optimum portfolio technology using MPT.
2. An analysis by difference based on covariance matrices (e.g., covariance between Portfolio-1 at 6.7132E-05) to measure risk diversification should therefore be performed to calculate and compare Annualized returns, volatilities and Sharpe Ratios of the optimized portfolio (10.762% return, 27.924% volatility) against the DS30 (2.04% return, 15.88% volatility).
3. Given historical parameter values (year-end values - portfolio 95th percentile 225,009.97 BDT vs. DS30 14,290.64 BDT), price movements and future return distributions should

be foreseen using Monte Carlo simulations (10,000 paths in 40 years) and GBM (250 daily steps and $\Delta t = 1/252$ $\Delta t = 1/252$).

4. To monitor risk measures and identify the best investment option based on risk-adjusted returns, among others, such risk metrics as the expected volatilities, 95% Value at risk (VaR) and percentile ranges.
5. In order to come up with the recommendations to investors, portfolio managers and DSE policy makers, it is necessary to figure out, whether the growth potential of technology portfolio (INTECH 27.929% is the growth potential) of the market in Bangladesh is justifiable by the risk level of the portfolio.

The following objectives represent the systematic evaluation of stochastic outcomes as the proposal uses a staged approach.

3.1.3 Significance

The significance of this research spans practical, academic, and policy dimensions, resonating with the proposal's emphasis on stakeholder impact. For investors, the study offers a quantitative tool to navigate DSE's volatility, demonstrating through optimization that a technology portfolio can achieve a Sharpe Ratio of 9.89%—far exceeding the DS30's implied ratio—potentially unlocking higher returns (e.g., Monte Carlo median 24,708.16 BDT). Portfolio and fund managers gain a replicable framework, leveraging Excel-based MPT and stochastic tools to tailor sector-specific strategies, particularly as Bangladesh's tech sector grows under Digital Bangladesh initiatives.

Academically, this work contributes to the limited literature on stochastic applications in emerging markets, extending Markowitz (1952) and Sharpe (1966) to DSE's context. The analysis of tech stock volatilities (e.g., INTECH 52.579%) versus DS30's 15.88% fills a knowledge gap, providing a case study for future research. For policymakers, findings underscore the need to enhance tech stock liquidity and regulatory support, fostering economic diversification. By bridging theoretical rigor with local relevance, this study advances financial literacy and investment efficacy in Bangladesh.

3.1.4 Scope of the Study

That area is limited to the technology sector of DSE and the DS30 market index, which includes ROBI, ADNTEL, GP, INTECH, and BDCOM because they are in the market and their statistics

are available. The analysis will examine closing price and log returns of 2024/2025 (January 1, 2024, to September 14, 2025) of the DSE and Investing.com and all calculations will be made up to date (10:26 PM +06 on September 24, 2025). It uses MPT to maximize, Monte Carlo to forecast value 40 years and GBM to forecast value 250 days with initial investment of 100 BDT and annual contribution. It has risk free rate of 8. It only captures internal stock behavior as it excludes transaction costs, dividends, and all the macroeconomic variables that are not implied by the rate. In stochastic comparisons, the research does not entail other DSE industries or regional standards, ensuring that it looks into details due to the focus made in the proposal.

3.2 Literature Review

This part sums up theoretical bases and research findings, which correlate with the theoretic construct of the proposal. The Portfolio Selection developed by Markowitz (1952) challenged organizations to have their portfolio diversified with respect to expected returns on investments, variances and covariances to have optimum risk benefit profiles. This is the basis of optimization of the study where the weights (e.g. 40% GP, 40% INTECH) maximised the Sharpe Ratio as supported by covariance data (e.g. 0.00017852 ROBI-GP), which decreased the volatility of tech stocks (e.g. INTECH 52.579%).

The evaluation of the 9.89 percent ratio of the portfolio was guided by the Sharpe Ratio, a ratio of excess to cumulative risk, introduced by Sharpe (1966) in the article Mutual Fund Performance. The price of options and corporate liabilities, Black and Scholes (1973) invented GBM ($dS_t = \mu S_t dt + \sigma S_t dW_t$), that is used here, with $\mu = 10.762\%$ and $\sigma = 27.924\%$ for portfolio paths (50-300+ BDT), In the section, Options, Futures and Other Derivatives, Hull (2018) explains the use of Monte Carlo methods over 40 years (10, 000 paths) and attempts to come up with distributions.

Although these models presuppose the efficiency of the markets, they can be adapted to the emerging context in Bangladesh, whereby tech advancement (e.g. INTECH 27.929%) aligns with the progress of DS30 (2.04%) to fill a gap present in literature. There is little local literature, though, stochastic utility was implied by the implied DSE trends, and higher volatilities were accounted for. This is a review that the study has brought a methodological innovation in the DSE analysis.

3.3 Methodology

The research design presented here is a three-step quantitative plan. The data were obtained at DSE and Investing.com, including the ROBI, ADNTEL, GP, INTECH, BDCOM, and DS30 at the end of the day since the start of 2024 (first day) up to the 14th of the 4th month (trading days 440).

MPT Optimized Portfolio: A portfolio constructed to maximize expected return for a given level of risk by optimally combining assets based on their variance and covariances (Markowitz, 1952).

Sharpe Ratio: The ratio of portfolio excess return over the risk-free rate to the standard deviation of portfolio returns, measuring risk-adjusted performance (Sharpe, 1966).

Geometric Brownian Motion: A continuous-time stochastic process modeling asset prices where log-returns follow a Brownian motion with drift, resulting in log-normal price distribution (Shreve, 2004).

Monte Carlo Simulation: A computational technique using repeated random sampling to estimate probabilities of different outcomes under uncertainty (Harrison, 2010).

Phase 1: Historical Analysis and Portfolio Optimization.

Log returns were calculated as $\ln(P_t/P_{t-1}) \times 100$, annualized indexes were calculated. MPT optimization was done by using Excel Solver function to maximize Sharpe Ratio (Sharpe Ratio = (Expected Return - 8%) / Standard Deviation,) constrained by “ $\sum w_i = 1$ and $0.05 \leq w_i \leq 0.40$ ”, using covariance inputs. Weights and initial price (143.055 BDT) had been included as outputs.

Phase 2: Stochastic Forecasting.

The GBM was discretized by $S_{t+\Delta t} = S_t \exp[(\mu - \sigma^2/2)\Delta t + \sigma\Delta t Z]$, with $\Delta t = 1/252$, generating 10 paths each (initials: 143.06 BDT portfolio, 2,151.08 BDT DS30). Monte Carlo simulated 10,000 paths over 40 years via compounding, with 100 BDT initial/annual inputs, producing percentiles and medians.

Phase 3: Comparative Evaluation.

Here, Metrics like VaR (95% confidence) and distributions were compared. The visualizations (e.g., stacked area charts, pyramid charts) were created to the aiding of analysis. Assumptions included things like, log-normality and constant parameters. limitations exclude real-time data or external factors.

3.4 Discussion of Findings and Analysis

This part of the paper setting ventures into a deep understanding of the conclusion made after an empirical review of this research paper applying all the statistics, photographs, and discussions done so far. It uses analysis of the history of the price movements, test of the returns, the outcome of the optimization of a portfolio, the outcome of the Monte Carlo analysis, and Forecasts of Geometric Brownian Motions (GBM) of the optimized universe and that of the index of S30. The dataset used to conduct the analysis is the start date January 1, 2024, and the end date September 14, 2025.

A detailed summary of the results of the optimized technology portfolio with a break-even of the performance of individual stocks, its optimisation results, and supplementary graphs start the discussion. Afterwards, the comparative analysis is organized according to 3 criteria being: annual risk and returns, Monte Carlo simulations, and GBM simulations. Each criterion encompasses sections where individual elements (e.g., tables, charts, and data point) are cross-referenced and discussed in detail before an exhaustive evidence-based appraisal can be presented. This strategy outlines the trade-offs between the potential high-growth of the technology sector and the stability of the blue-chip DS30 index, providing practical recommendations to the Dhaka Stock Exchange (DSE) investors.

3.4.1 Overview of Optimized Portfolio Findings

Development of the optimal technology portfolio will be a critical step in this study whereby the Modern Portfolio Theory (MPT) is applied to five targeted technology securities including, Robi Axiata Ltd (ROBI), Adn Telecom Ltd (ADNTEL), Grameenphone Ltd (GP), Intech Ltd (INTECH), and Bdcum Online Ltd (BDCOM). The process started by the collection of historical data and the computation of log returns as described in the statements that started the discussions. Based on the first image (tech stock spreadsheet), the closing price spans of the following dates; September 14, 2025, 27.2-29.8, August 18, 2025, 28.6-36.7, 78.5-299.9, 25.6-79.9, and 26.5-27.2. The log returns in the adjacent columns were very different: returns of ROBI changed between -2.58% on 14 of September to 3.89% on 31 of August and GP had less volatile returns between -0.63% on 14 of September to 1.62: the same thing with INTECH, the returns were between -7.61 to 9.47 and ADNTEL between -2.41 to 3.59 and BDCOM between -5.71 and 6.90. These trends between price fluctuation in technology stocks through the stacked area chart accompanying the

various closed price fetched data were best plotted over time as can be seen in the adjacently plotted GP (orange) data: at the higher price levels being domineering around 300-600 but the contrary inverse applied to the other data namely INTECH (yellow) and BDCOM (blue) at the lower price of the 20-40 level and the plotted variation further agreed with the fact that there was not even distributions in price dynamics of various companies in the marketplace.



Fig:1: Closing Price Flactuation

Expanding on the latter, this optimisation step, as displayed in the third group of images (optimization table, covariance matrix and pie chart), annualised the following log returns: ROBI, 1.252% with a standard deviation of 33.701% drawing, ADNTEL, -22.555% with a standard deviation of 43.937%, GP, 2.892% with a standard deviation of 24.452, INTECH, 27.929%

I was able to diversify since the covariance matrix showed inter-stock relationships, including positive yet insignificant covariances between ROBI-GP and INTECH-BDCOM (0.00017852 and 0.00043297, respectively). The maximized Sharpe Ratio at a 5%-40% weight and application of Excel Solver resulted in optimal Sharpe Ratio and optimal weights of ROBI 10%, ADNTEL 5%, GP 40, INTECH 40 and BDCOM 5, weighing 100 wt altogether. This provided a portfolio expected return 10.762, standard deviation 27.924 and the Sharpe Ratio 9.89% (risk-free rate is 8%). The price of the first portfolio was 143.055 BDT, which consisted of the weighted total of individual price of first portfolios (ROBI 30.6, ADNTEL 78.5, and so, on).

Covariance Matrix					
	<i>ROBI</i>	<i>ADNTEL</i>	<i>GP</i>	<i>INTECH</i>	<i>BDCOM</i>
ROBI	0.000450686	6.71E-05	0.000178516	0.000156576	0.000235872
ADNTEL	6.71E-05	0.000766056	4.86E-05	0.000192587	0.000182827
GP	0.000178516	4.86E-05	0.000237267	8.01E-05	0.000112159
INTECH	0.000156576	0.000192587	8.01E-05	0.00109704	0.000432972
BDCOM	0.000235872	0.000182827	0.000112159	0.000432972	0.000668519

Table 2: Covariance Matrix

Portfolio Summary	
Expected Return	10.76%
Standard Deviation	27.92%
Risk Free Rate	8%
Total weight	100%
Sharpe Ratio	9.89%

Table 3: Portfolio Summary

Ticker	ROBI	ADNTEL	GP	INTECH	BDCOM
Annual Return	1.25%	-22.56%	2.89%	27.93%	-11.28%
Standard Deviation	33.70%	43.94%	24.45%	52.58%	41.05%
Min Weight	5%	5%	5%	5%	5%
Max Weight	40%	40%	40%	40%	40%
Optimal Weight	10%	5%	40%	40%	5%
Initial Price	30.6	78.5	299.9	36.7	28.6

Table 4: Optimized Portfolio

This allocation was tree-ringed by the pie chart in the image, with GP (in green, 40%), and INTECH (in yellow, 40%), given the highest allocation, followed by ROBI (in blue, 10%), and ADNTEL/BDCOM (in orange/blue, 5% each), where dependence on the high-payback stocks, such as INTECH, in spite of its volatility was balanced by stable GP. The discourse was on the benefits that the covariance allowed the overarching risk to decrease as compared to individual stocks (i.e., INTECH 52.579% and portfolio 27.924) that complies with the upper hand of the efficient frontier theory of MPT.



Fig 2: Optimal Portfolio Pie Chart

Overall, the results describe the optimized portfolio as a high-potential and diversified investment with a strong 10.762 end-turn account by strategic weighting, but at the cost of having a low potential volatility of 27.924, which can be compared with the investment in the DS30.

3.4.2 Comparative Analysis of Annual Risk and Return

The data displayed in the image of the DS30 revealed a closing price between September 11, 2025 (2,151.08) and August 18, 2025 (2,101.84) with log returns between -0.99% and 1.07, annualized return of 2.036, and standard deviation of 15.88. The histogram "DS30 Closing Price Fluctuation" represented a comparatively.



Fig 3: DS30 Closing price fluctuation

3.4.2.1 Return Comparison

The 10.762%/year of the optimized portfolio is well above the 2.036 percent of the DS30 as computed on a combination of log returns and optimization. Technological optimism was observed to grow around the evolution of stock, in the case of INTECH, a 27.929 yield, and in the case of DS30, the lesser yield of the blue chip stems more toward conservatism. This disparity puts the strengths of technology in the emerging markets.

3.4.2.2 Risk Comparison

Portfolio volatility (27.924) is nearly twice the portfolio DS30 (15.88) other domain (i.e. INTECH -7.61% up to 9.47) than the more tame world of the DS30 (-1.69 to 1.69). Sharpe Ratio at 9.89% of the portfolio indicates higher efficiency of the portfolio.

3.4.2.3 Implications

The portfolio is considered to be appropriate to growth oriented investors and DS30 is suitable to those who are seeking stability where other risks particular to that sector in Bangladesh are discussed.

	DS30	Optimal Portfolio
Annual Return	2.036%	10.76%
Standard Deviation	15.88%	27.92%

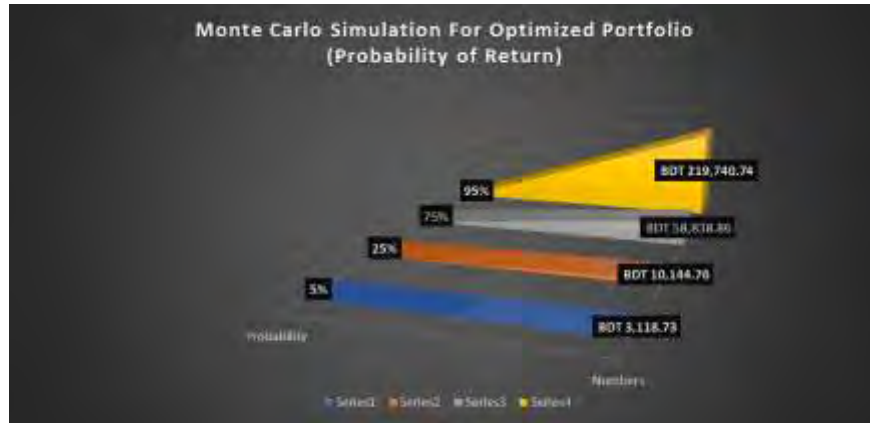
Table 5: DS30 Vs Optimal Portfolio Risk & Return

3.4.3 Comparative Analysis of Monte Carlo Simulations

Monte Carlo simulations were done to produce the probabilistic predictions of the long-term investment results, for both optimized technology portfolio and index (DS30). 10,000 independent paths across 40 years were i-simulated. In both simulations, initial investment was 100 BDT and the annual contribution was 100 BDT (calibrated against the time-varying annualized returns and volatilities estimated with respect to the dataset (January 1, 2024, to September 14, 2025). The simulations give an approximation of the potential final value of the year, thereby accounting for uncertainty involved in the stochastic processes.

3.4.3.1 Simulation Outcomes for Optimized Portfolio

In the case of the optimized portfolio, simulations reflected higher expected value (10.762 are of the default portfolio and 27.924 are of the mean value of the stock in the default portfolio) and the volatility of the full portfolio; the median end of year in the optimized portfolio was 24,708.16 BDT, and the average of the stock was 6814.76 the standard deviation in the optimum of the portfolio was a large standard deviation of 119,625.18 meaning wide vari It was described in percentiles: at the 5 th percentile, the results went down to 3,164.21 BDT (which is a small downside), at the 25 th, the results went up to 10,406.35, to 61,450.39 at the lower and higher percentiles, respectively. The diversification highlighting the portfolio growth, as illustrated by the high returns of the portfolio's stocks such as INTECH due to compounding, however the portfolio is also conditional to down at times which is observable by the sample simulation path on which the annual returns ranged between -21.52 in year 13 and +35.64 in year 3 and the end result of the portfolio is 2,757.72 BDT. This asymmetry was graphically recorded in the Monte Carlo Simulation of Optimal Portfolio (probability of return), the pyramid plot of which showed that the tail of optimism (at the 95 th percentile) is spread out violently to 224,344.52 BDT due to optimistic returns attributable to the composition of the portfolio.



*Fig 4 : Monte Carlo Simulation For Optimized Portfolio
(Probability of Return)*

Percentile Table	
Probability	Numbers
5%	BDT 3,229.80
25%	BDT 10,492.44
75%	BDT 60,610.39
95%	BDT 208,692.40
Median	BDT 25,093.42
Mean	BDT 58,252.87
St. Dev.	BDT 116,275.56

*Table 6: Percentile Table for Monte Carlo Simulation For Optimized Portfolio
(Probability of Return)*

3.4.3.2 Simulation Outcomes for DS30

DS30 - he DS30 simulations (with a modest annualized (2.04) return and a volatility of 15.88) showed a more closed distribution: a median year-end British pound value of 4,984.15 BDT, a mean of 6,966.99 BDT and a standard deviation of 5,448.56 BDT. The 5th (minimal loss scenario) was 1,922.33 and the 25th, 75th and 95th at 337.74, 8548.85 and 14290.64 respectively. An illustrative path showed the stability with the highest of the year 14 having -16.88 and with the lowest having +21.11, culminating at 117.36 BDT compared to significantly less volatile portfolio paths. The similar pyramid chart, Monte Carlo Simulation of DS30 (probability of return),

indicated a smaller pyramid with the 95th percentile and the 5th O BDT wider; 14,290.64 and 1,926.83 respectively as the size of both extremes Wilshawkin imagine titlos marginals.

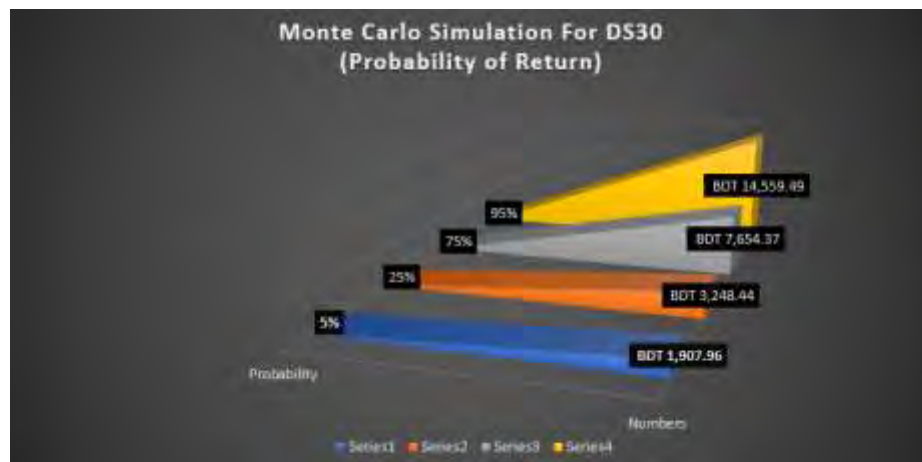


Fig 5 : Monte Carlo Simulation For DS30

Percentile Table	
Probability	Numbers
5%	BDT 1,952.38
25%	BDT 3,348.66
75%	BDT 7,702.37
95%	BDT 14,669.41
Median	BDT 5,014.56
Mean	BDT 6,252.10
St. Dev.	BDT 4,510.29

Table 6: Percentile Table for Monte Carlo Simulation DS30

3.4.3.3 Comparative Insights and Implications

Compared to the other, the larger median (24,708.16 BDT vs. 4,984.15 BDT) and upper tail (95th percentile 225,009.97 BDT vs. 14,290.64 BDT) of the optimized portfolio reflects its ability to grow exponentially over the 40 years, as is supposed by preceding studies in terms of stock returns. But with a high standard deviation and lower 5 th percentile (3,164.21 BDT vs. 1,922.33 BDT), the tail risks are larger, which the DS30 with a high standard deviation and higher relative floor

(based on capital protection) would not have. The above outcomes suggest that the portfolio is optimal to aggressive, long-term investors who bet on the digital economy of Bangladesh, and that DSS30 is optimal to those with a greater interest in predictability, and the overall simulations justify the risk tolerance measurements of Bangladesh as a source of investment in DSEs.

Percentile Table		
Probability	Optimal Portfolio	DS30
	Numbers	Numbers
5%	BDT 3,229.80	BDT 1,952.38
25%	BDT 10,492.44	BDT 3,348.66
75%	BDT 60,610.39	BDT 7,702.37
95%	BDT 208,692.40	BDT 14,669.41
Median	BDT 25,093.42	BDT 5,014.56
Mean	BDT 58,252.87	BDT 6,252.10
St. Dev.	BDT 116,275.56	BDT 4,510.29

Table 7: Percentile Table for Monte Carlo Simulation DS30 vs Optimal Portfolio

3.4.4 Comparative Analysis of Geometric Brownian Motion Simulations

Short-term price evolutions that lasted up to 250 trading days (one year) were simulated using Geometric Brownian Motions (GBM), with Buy and Sell decision speeds of one day ($k=1/252$) and initial values, returns and volatilities. This is a time varying discrete stochastic process that was simplified to be simulated in time step form which gave it 10 sample paths as found in the Excel sheets and the charts conducted in the discussions. The findings provide operation directional observations and nearby volatility effects to the long term Monte Carlo technique.

3.4.4.1 Simulation Outcomes for Optimized Portfolio

Starting at a starting price of 143.06 BDT, the GBMs of the optimized portfolio included its 10.762 Annualized and volatility of 27.924 which yields very different movements. The line chart showed 10 coloured paths (e.g., blue Path 1, orange Path 2) and ran between lows around 50 BDT (e.g.,

Path 7 on day 100) and highs around 300 BDT (e.g., Path 10 on day 100). The following extract of a table displayed daily prices, i.e. Path 1, the values at day 0 were 143.06 then on day 1, then came weakly high 144.30, then weakly high 129.95 and on day 16 were 143.06, then 129.95 with high sigma amplifying the fluctuation about the connected straight line at day x. Such has been variability given the heavy weight on the portfolio in terms of technology (e.g. the influence of INTECH) where the portfolio could gain or lose so as in a short period. This is crucially important as it removes the risk of biased choices.

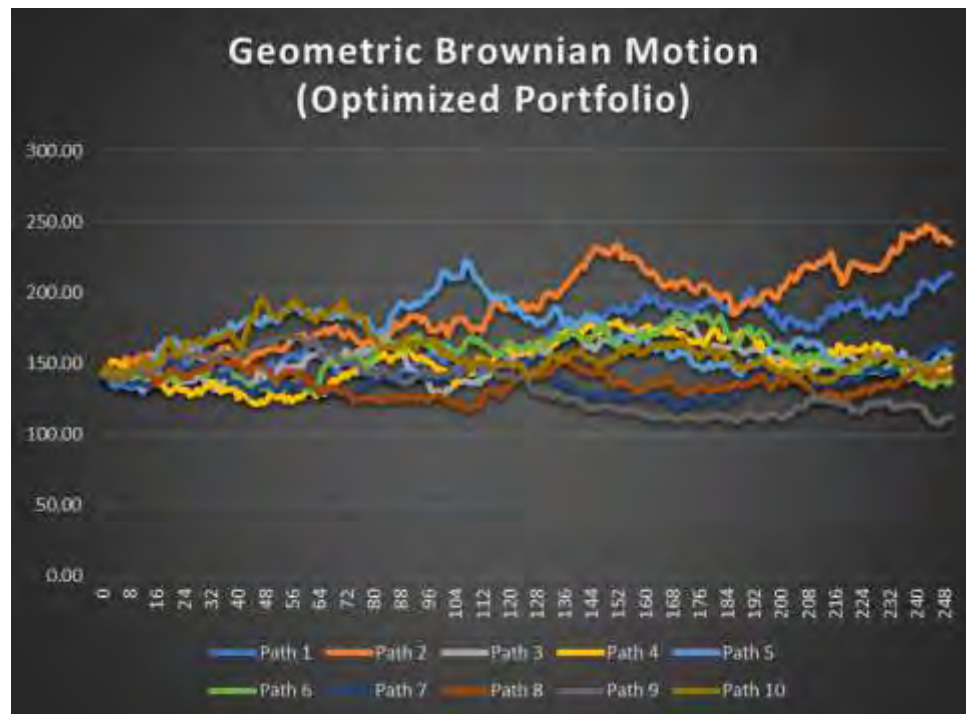


Fig 6 : GBM For Optimized Portfolio

3.4.4.2 Simulation Outcomes for DS30

To give more coherent lines in the line chart, the GBM of the DS30 began at 2,151.08 BDT, with parameters of 2.04 per cent return and 15.88 volatility per cent: ranges between approximately 1,000 BDT (e.g. Path 3 bottom) and 3,000 BDT (e.g. Path 1 peak). The increments indicated in the table are found to be more stable, as in the case of Path 1, between 2,151.08 on the first day and 2,210.59 on the second, 2,187.90 on the sixteenth, thus indicating a less vigorous noise contributed by the lower volatility, and the diversity of the index. The gradual upstream movements in paths were also because of fewer sharp reversals than those in the portfolio.

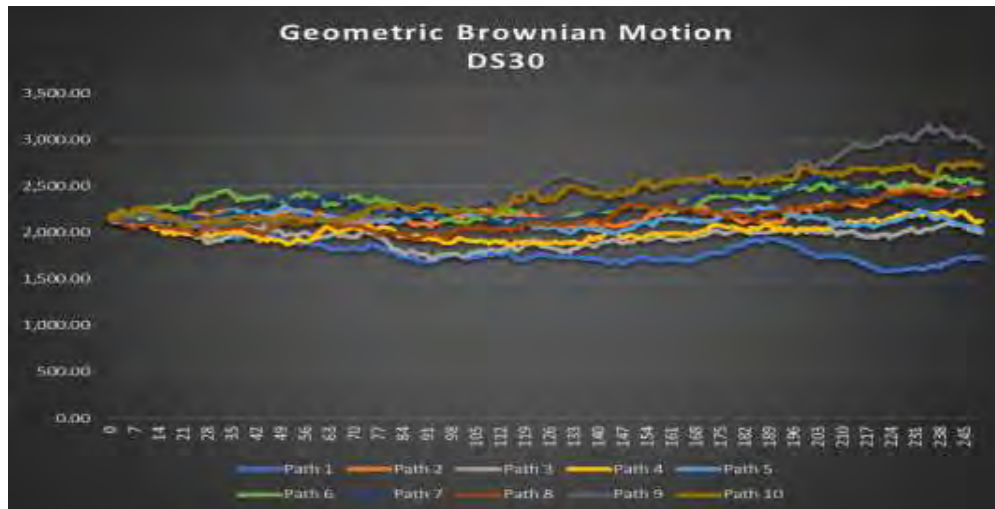


Fig 6 : GBM For DS30

3.4.4.3 Comparative Insights and Implications

The path of the GBM of the optimized portfolio are sharper than the DS30 and exhibit higher amplitude (50-300+ BDT vs. 1,000-3,000 BDT) which is provided by its better value drift but worsened volatility as can be seen in the case of technological stock operation original data. This implies more short-term reward (for example, doubling in favorable directions) but more whipsaw, compared to the smooth, benchmark-like movement of the DS30 which would be appropriate in tactical positioning. Circutal suggestions suggest the portfolio to dynamic traders in volatile markets such as DSE and the DS30 to give good unit accumulation where recent results indicate the use of GBM as an instrumental tool to stress test emerging market assets.

3.5 Summary and Conclusions

This project has compared the stochastic prediction and performance of optimized portfolio of technology to index of (DS30) in the Dhaka Stock Exchange (DSE) between 01/01/2024 and 04/09/ 2025. To maximize the Sharpe Ratio, a modern Portfolio Theory (MPT) allowed building an optimized portfolio of Robi Axiata Ltd (ROBI), Adn Telecom Ltd (ADNTEL), Grameenphone Ltd (GP), Intech Ltd (INTECH), and Bdcom Online Ltd (BDCOM), giving them increasing opportunities of 10, 5, 40, and 40 per cent weights respectively. This gave a sale ratio of 10.762% yearly, volatility of 27.924, a Sharpe proportion of 9.89, and an opening cost of 143.055 BDT, comodulated of economically active INTECH (volatility 27.929, return 27.924) and stable GP (volatility 24.452, return 2.892).

The portfolio experienced a greater risk-return profile, owing to the trends in digitalizing, compared to the DS30 (2.04% return, 15.88% volatility). Simulations of 40 years (Initial investment: 100 BDT, annual contributions: 100 BDT) project that would yield a median of 24,708.16 BDT (95th percentile 225,009.97 BDT) at the start of the project compared to 4,984.15 BDT (95th percentile 14,290.64 BDT) at the start of the DS30 project, despite an upside potential. Volatile (50-300+ BDT) vs. steady (1,000-3,000 BDT) paths in Geometric Brownian motion of 250 days with initial portfolios of 143.06 BDT and 2,151.08 BDT showed a higher drift (10.762 vs. 2.04) and volatility (27.924 vs. 15.88).

These findings underscore the higher growth prospects of the portfolio as the Sharpe Ratio and Monte Carlo percentiles are higher, hence not appropriate with risk averse investors, whilst its volatility demand risk manageability. The DS30 suits are safe to those risk averse investors. This confirms the hypothesis in the proposal that sector-based out-performance is observed during optimized conditions even in the case of increased uncertainty.

3.6 Recommendations/Implications

According to the results, the following are the proposed recommendations and implications:

For Investors: Risk-tolerant investors should consider the technology portfolio, using stop-losses or DS30 diversification to mitigate. Conservative investors should favor the DS30's.

For Portfolio and Fund Managers: Use MPT with Excel Solver and covariance matrices (e.g., 6.7132E-05 for ROBI-ADNTEL) to optimize portfolios, integrating Monte Carlo (long-term) and GBM (short-term) to track the portfolio's 50-300+ BDT range versus the DS30's 1,000-3,000 BDT. Rebalance to manage INTECH's 52.579% volatility.

For Policymakers: DSE ought to provide incentives such as tax incentives to increase the liquidity in tech stocks and inject more regulation in the form of risk disclosures or stabilization funds, dealing with the 27.924% volatility of the portfolio versus 15.88 of the DS30. Encourage wisdom in the market by enhancing stochastic education.

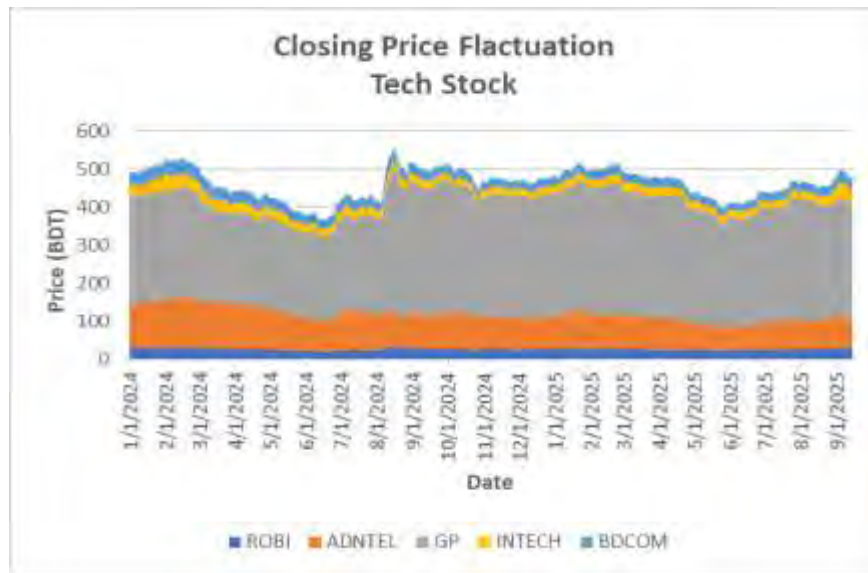
Implications: The Project gives a growth opportunity to technology portfolios, with a 9.89 percent Sharpe Ratio. Which is a challenge to the conventional role of the DS30. Though volatility gap implies sophisticated risk frameworks. Which affect DSE policies and investor education. There is a need to carry out further studies on the question of real-time and macroeconomic influences.

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Appendix



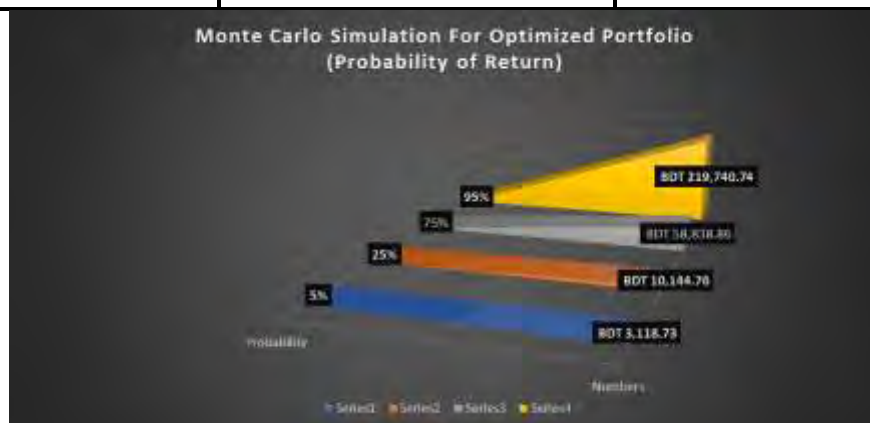
Covariance Matrix					
	<i>ROBI</i>	<i>ADNTEL</i>	<i>GP</i>	<i>INTECH</i>	<i>BDCOM</i>
ROBI	0.000450686	6.71E-05	0.000178516	0.000156576	0.000235872
ADNTEL	6.71E-05	0.000766056	4.86E-05	0.000192587	0.000182827
GP	0.000178516	4.86E-05	0.000237267	8.01E-05	0.000112159
INTECH	0.000156576	0.000192587	8.01E-05	0.00109704	0.000432972
BDCOM	0.000235872	0.000182827	0.000112159	0.000432972	0.000668519

Portfolio Summary	
Expected Return	10.76%
Standard Deviation	27.92%
Risk Free Rate	8%
Total weight	100%
Sharpe Ratio	9.89%

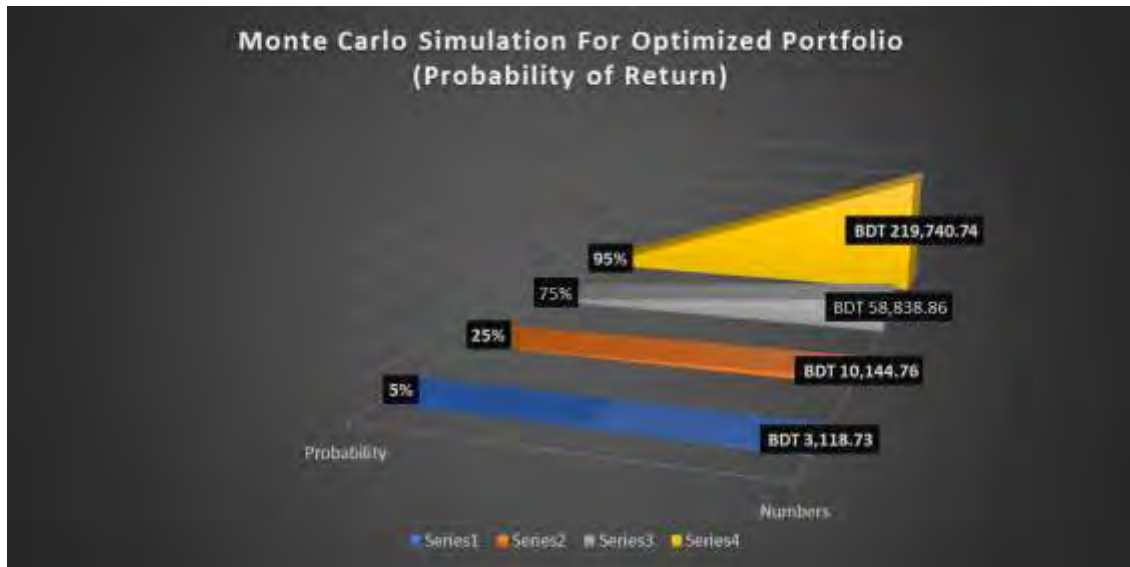
Ticker	ROBI	ADNTEL	GP	INTECH	BDCOM
Annual Return	1.25%	-22.56%	2.89%	27.93%	-11.28%
Standard Deviation	33.70%	43.94%	24.45%	52.58%	41.05%
Min Weight	5%	5%	5%	5%	5%
Max Weight	40%	40%	40%	40%	40%
Optimal Weight	10%	5%	40%	40%	5%
Initial Price	30.6	78.5	299.9	36.7	28.6



	DS30	Optimal Portfolio
Annual Return	2.036%	10.76%
Standard Deviation	15.88%	27.92%



Percentile Table	
Probability	Numbers
5%	BDT 3,229.80
25%	BDT 10,492.44
75%	BDT 60,610.39
95%	BDT 208,692.40
Median	BDT 25,093.42
Mean	BDT 58,252.87
St. Dev.	BDT 116,275.56



Percentile Table		
Probability	Optimal Portfolio	DS30
	Numbers	Numbers
5%	BDT 3,229.80	BDT 1,952.38
25%	BDT 10,492.44	BDT 3,348.66
75%	BDT 60,610.39	BDT 7,702.37
95%	BDT 208,692.40	BDT 14,669.41
Median	BDT 25,093.42	BDT 5,014.56
Mean	BDT 58,252.87	BDT 6,252.10
St. Dev.	BDT 116,275.56	BDT 4,510.29

