

Evaluating Critical Success Factors of Cash-on-Delivery (COD) Services in Third-Party Logistics: A Bangladesh based MCDM study.

Internship Organization Name:
SteadFast Courier Ltd.

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Submitted in Partial Fulfillment of the Requirements for the Degree
Bachelor of Business Administration



April 19, 2026

Internship Report Approval Form

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Internship Organization: **SteadFast Courier Ltd.**

Internship /Project Report Topic: **Evaluating Critical Success Factors of Cash-on-Delivery (COD) Services in Third-Party Logistics: A Bangladesh based MCDM study.**

Term (Tick one): ☒ Spring 2026 ☐ Summer 2026 ☐ Fall 2026

SUPERVISOR APPROVAL (Tick One)

☒ Approved ☐ Not Approved ☐ Partial Re-write ☐ Full Re-write

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Date: **April 19, 2026**

Letter of Transmittal

April 19, 2026

Shawkat Tanveer Rahman

Senior Lecturer ULAB School of Business (USB)

University of Liberal Arts Bangladesh (ULAB)

688 Beribadh Road, Mohammadpur, Dhaka-1207, Bangladesh.

Subject: Submission of Internship Report on SteadFast Courier Ltd.

Respected Sir,

With respect, I would like to inform you that I have completed my internship report as a partial requirement for the completion of my Bachelor of Business Administration (BBA) program at the University of Liberal Arts Bangladesh (ULAB). I am happy to submit my internship report that is based on my internship work experience at **SteadFast Courier Ltd.** Here, I worked in the **Business Development Department**. This report is prepared based on my real and actual experience, observations, and learning during the internship period. I have tried my best to present the activities, operational practices, and valuable insights gained from my internship in a clear, relevant, academic, and organized manner. This internship report shows my implementations of the academic knowledge I have, in a real-life business place, and has enhanced my understanding of professional practices, communication, and organizational operations.

I would be entirely grateful for your kind acceptance of my report and any valuable suggestions or feedback regarding this report of mine.

Sincerely,

Naimul Islam Jishan

ID: 221011194

ULAB School of Business (USB)

University of Liberal Arts Bangladesh (ULAB)

Acknowledgment

First, I would like to express my deep gratitude for Allah (SWT) forgiving me patience, power and persistence during this tough journey of finishing this report alongside with my undergraduate as scheduled. He is a clear reminder that without His mercy, guidance and involvement in my life I would have accomplished nothing today.

Second of all, *I would like to acknowledge my late father, Nazrul Islam Bablu and my mother Shahnaz Parvin for their sincere prayers, unconditional love, motivation, financial support and encouragement.* This achievement would not have been possible without their support and their presence in my life.

I am profoundly grateful to my university faculties *Dr. Sarwar Uddin Ahmed, Dr. A F Wazir Ahmad, Dr. Minhaz Uddin Ahmed, Dr. Shamsuddin Ahmad, Mr. Mohammad Tawhid Reaz, Dr. Shahana Afrose Chowdhury, and Ms. Sameera Zaman.* Their unwavering guidance, intellectual brilliance, and relentless dedication to nurturing students have shaped not only my academic journey but also my passion for research and integrity.

I would also like to express my profound gratitude to my faculty and supervisor *Mr. Shawkat Tanveer Rahman*, Senior Lecturer ULAB School of Business (USB), who believed in me and allowed me the opportunity to continue with this study. A very special thanks to *Mr. Riyad Hasan* (Manager to the Business Development Department), SteadFast Courier Ltd. for recruiting me and guiding me professionally in a very supportive way, for me to thrive in the workplace. Most importantly, *every single management personnel at SteadFast*, who taught me the organization's operational activities *and my 21 beloved respondents who took part in my extensive survey*— I am wholeheartedly grateful to all of them.

Lastly, *I would like to thank all the various online resources, books, articles and journals as well as academic professionals/researchers* for providing me with the information that was essential for this report. They hold the biggest intellectual contribution to my report — *as they are the “Giants on whose shoulders I stood upon to behold the horizons of hurdles and be successful”.*

List of Abbreviations

Abbreviation	Full Form
3PL	Third-Party Logistics
AHP	Analytic Hierarchy Process
AI	Artificial Intelligence
B2B	Business to Business
B2C	Business to Consumer
BI	Business Intelligence
BWM	Best-Worst Method
COD	Cash-on-Delivery
CRM	Customer Relationship Management
CSF	Critical Success Factor
CSFT	Critical Success Factor Theory
ETL	Extract, Transform, Load
ERP	Enterprise Resource Planning
FMCG	Fast Moving Consumer Goods
IT	Information Technology
LSQ	Logistics Service Quality
MCDM	Multi-Criteria Decision-Making
PI-HR	Personal Information Human Resource (Software)
RDBMS	Relational Database Management Systems
SCM	Supply Chain Management
SMEs	Small and Medium Enterprises
SQL	Structured Query Language

	Table of Contents	Page Number
Part-A	<i>Internship Report Approval Form</i>	2
	<i>Plagiarism Declaration</i>	3
	<i>Letter of Transmittal</i>	4
	<i>Acknowledgment</i>	5
	<i>List of Abbreviations</i>	6
	Chapter 1: Preparation of Internship	9-12
	1.1 Motivation and Expected Learning Outcomes	9
	1.2 Intern Search and Selection Process	10
	1.3 Internship Interviews and Joining	10
	1.4 About the Internship Organization	11-12
	Chapter 2: About The Internship	13-16
	2.1 Departmental Context and Core Functions	13
	2.2 Work Environment and Organizational Culture	14
	2.3 Intern Responsibilities	14-15
	2.4 Educational Learning with Internship	16
	Chapter 3: Self Reflection	17-20
	3.1 Feedback on Internship	17
	3.2 How Can I Improve and How the Organization Makes Better Use of Myself	18
	3.3 Practical Recommendations	19-20
	Chapter 4: Personal Development Plan	21-21
	4.1 Technical Skills	21
	4.2 Interpersonal and Professional Skills	21
Part-B	<i>Abstract</i>	22
	Chapter 1: Introduction	23-25
	1.1 Background of the Study	23
	1.2 Research Question and Objective	24
	1.3 Scope of The Research	25
	Chapter 2: Literature Review	26-29
	2.1 The Cash on Delivery (COD) Payment Method in e-commerce Logistics	26
	2.2 Third-party Logistics (3PL) and Last Mile Delivery Challenges	26
	2.3 Critical Success Factors in Logistics and COD Services	27
	2.4 Application of MCDM Techniques in Logistics	28

	2.5 Research Gap	28
	2.6 Contribution of the Study	29
	Chapter 3: Research Methodology	30-38
	3.1 Research Design	30
	3.2 Identification and Finalization of CSFs with Dimensional Breakdown	30
	3.3 Research Approach	31
	3.4 Data Collection	32
	3.5 Equations, Formulas, Models, and Data Analysis Process	33
	3.6 Data Analysis Process	38
	Chapter 4: Results and Analysis	39-48
	4.1 Overview of the Empirical Analysis	39
	4.2 Reliability and Descriptive Analysis	39
	4.3 AHP Based Analysis	40
	4.4 BWM Based Analysis	43
	4.5 Comparative Analysis of AHP and BWM	44
	4.6 Synthesis of Key Findings for Actionable Insights and Strategies	46-48
	Chapter 5: Recommendations and Conclusion	49-51
	5.1 Recommendations	49
	5.2 Conclusion	51
	References	52-53
	<i>Appendix A: Survey Questionnaire</i>	54-57
	<i>Appendix B: Internship Acceptance Letter</i>	58
	<i>Appendix C: Hyperlink for the Google Colab studio</i>	59
	<i>Appendix D: Internship Proposal Form</i>	60
	<i>Appendix E: Originality Report</i>	61

PART- A

Chapter 1: Preparation of Internship

1.1 Motivation and Expected Learning Outcomes

Being a student in the Bachelor of Business Administration degree in Supply Chain Management at University of Liberal Arts Bangladesh, the internship offered a perfect chance to link the theoretical understanding with actual business practice. Logistics is a vital functional pillar of supply chain management; I was interested in obtaining industrial and corporate experience in an on-ground inner logistics firm. Primarily, since it was an academic requirement, I wanted to understand how logistic reporting, coordinating operations, e-commerce service, and delivery fields are managed practically by a large-scale service organization. I was particularly interested in SteadFast Courier since it was much more linked to my degree concentration. It is a major player in Bangladesh e-commerce and the third-party logistics industry providing e-commerce delivery, pick-and-drop service, packaging, and warehouse storage with nationwide coverage over the eight divisions, 64 districts, and 495 upazilas and it has payment facilities on delivery, live cargo tracking and all-time customer service. These factors could make it a better learning spot for an SCM student intending to be exposed to new kind logistics in our state. During the internship, I expected to learn about how a 3PL firm coordinates delivery, shop maintenance, and operating responsiveness in a competitive market, accounting for my major. I hoped to explore how a logistic warehouse supports order preparation, how service quality might target shop caretaker affiliation, how delivery-to-payment management systems works, and how business enlargers can grow service categories. In my professional qualification, I expect my communication and reporting, operational coordination, problem advancement, and workplace adaptability to be polished.

The subject of my internship report, “*Evaluating Critical Success Factors of Cash-on-Delivery (COD) Services in Third-Party Logistics: A Bangladesh based MCDM study.*”, is closely related to my intention. Payment at the time of delivery (COD) is one of the most functionally sensitive and commercially important service elements for third-party logistics (3PLs) in a Bangladeshi e-commerce context. As an example, my internship at SteadFast Corier Ltd. provided a real-world environment in which I could see how merchant expectations, delivery reliability, payment flow,

customer experience and service coordination impact logistics performance. That is why this internship was an impactful and relevant experience in my life. Therefore, it directly contributes to the larger analytical arc I am pursuing in my report.

1.2 Intern Search and Selection Process

Most of my internship search was through social media platforms, mainly LinkedIn and bdjobs.com. As I was doing this, I applied to an array of organizations, from Fast Moving Consumer Goods (FMCG) to Ready-Made Garments (RMG) and operationally intensive firms such as logistics service provider. I applied to about nine organizations in total.

As I continued my search, I became particularly interested in companies that have visible operational intensity, service execution and supply chain coordination as keys to their success. So, I tended to lean toward companies whose business models gave me the opportunity to consider logistics, distribution and service management outside of insurers' walls. In the course of this search process, I had multiple offers in various industries, but worked to find companies that were either able or listening to leverage my SCM-based background.

I began applying to SteadFast on LinkedIn. So, I sent Mr. Jahedul Islam Rafi (Assistant Manager, Business Development Department) my resume and interest letter directly. It was also a more professional approach that helped me, in presenting my interest in the organization which gave my application credibility.

1.3 Internship Interviews and Joining

The selection process at SteadFast included 2 rounds: an initial screening followed by aptitude test and a panel interview, here is a short overview of my selection process. The panel comprised HR and People Operations Executive, two Senior Executives from the Business Development, and Assistant Manager of Business Development. The process was thorough and seemed to evaluate both academic readiness and suitability for the workplace.

It was a very wholesome interview question. They were asking question about me, question upon SteadFast, Supply chain Management and Logistics, my expectation from the company, work experiences. These questions demonstrated that the organization was not only assessing my

academic prowess but also ascertaining whether I had a sound understanding of the industry and was able to think pragmatically. Additionally, it reflected how I was used to working in organizations that value competitiveness.

I spent about 45 minutes in the interview and came away fairly impressed. It was a sign of a deep and thoughtful vetting process. It also had special significance, because I was, and would become, to my best understanding based on how it was communicated through that process, the first formally engaged intern at the organization.

They were clear about the department, what the role entailed and what was expected broadly of the internship before I joined. This gave me an early exposure to the professional standards, reporting culture and work ethos of the organization. I joined as an intern at SteadFast Courier Ltd under the Business Development Department for a period of 1 February to 30th April, 2026 as per my joining letter.

On my joining date, I was presented with an organizational orientation where I understood the teams and departments, operational basics, senior executives to interact with and top management structure. Then I started my one-to-one training followed by an initial briefing on the company's rules, norms and expected behavior. In all that time, I received my first working desk and the organization collected my legal and academic documents. The joining process was structured and had a professional touch to it which provided me solidity since the first day of my internship.

1.4 About the Internship Organization

SteadFast Courier Ltd. is a company in Bangladesh that provides e-commerce delivery and third-party logistics services. These services include e-commerce delivery, pick-and-drop service, packaging and warehousing. This company offers features like cash-on-delivery, fast merchant payment service, management of online merchants, instant tracking of parcels, and customer support 24/7. These services also make the organization highly relevant to Bangladesh's booming e-commerce and logistics sector.



It presents itself as a national service provider with broad delivery coverage. As confirmed by the official database and reports, it has been providing support to all eight divisions of Bangladesh and is covering service delivery in 495 upazilas and 330 municipal corporations. It is also that source which highlights a large merchant base and a delivery force, claiming over 320,000 registered merchants and 5,500 delivery personnel. Collectively, those numbers are the company's own formal self-representation but they also suggest that SteadFast has a sizably important place in the country's delivery and logistics landscape.

It seems to me, purely as an outside observer of SteadFast based on what I've seen so far, that it behaves like a fairly high-performance organization which bumps on consistency affecting responsiveness/reputation. In the commercial context, where both delivery quality and speed are crucial due to short life cycles of service contracts reliant upon high user reviews, it is clear the company lives or dies by merchant expectations and operational reliability. There is also a demanding work culture, where employees are expected to do their jobs well, with discipline and flexibility so that the company can run smoothly in the competitive logistics industry. It places utmost priority to its hub and warehouse professionals, operations executives, and especially delivery riders. This precedence allows it to deliver solutions that none of its competitors have considered even possible till date.

SteadFast involves a panache blend of professional insight with stunning ingenuity. It gave a very practical context where the link between logistics capability and service performance, along with business growth, could be observed in real-life view as Supply Chain Management (SCM) student.

Chapter 2: About The Internship

2.1 Departmental Context and Core Functions

SteadFast Courier Ltd.'s Business Development Department mainly constituted four wings: Lead Generation, Sales and Marketing, Activation and Orientation, and Key Account Management. Our corporate head office, having the Business Development Department was located at House# 44, Rd No. 2/A, Dhanmondi, Dhaka 1209.

2.1.1 Lead Generation: It discovers the potential clients by means of multiple websites such as business websites (e.g., Google), social media sites (e.g., Instagram, Facebook) and professional websites (e.g., LinkedIn). After identifying potential clients interested in SteadFast services, the team would simply pass on those details to the Sales Team.

2.1.2 Sales: Serves as the official wing that directly engages and communicates merchants and client with our services along with stating reasons that will interest them to be onboarded with us. Then they are onboarded and registered in the system by sales team and transfer to activation team for verification and activation. Finally, this wing is also responsible for public relations, promotive activities, and marketing strategies.

2.1.3 Activation: This wing later assisted the client with getting on board as far as explaining how things happened—company policies, rules, conditions etc. Once accepted by the client, the account was activated to allow implementation of our logistics service.

2.1.4 Key Account Management (Post Sales): The biggest wing that dealt with issues related to post-sales and service matters. They trace back to (not limited) delivery delay, package/consignment lot missing, merchant complaints like damage and/or refund issue, return parcel (reverse logistic service), expectation from the merchant like getting a discount on delivery charge or negotiation of 1% of risk management amount for COD, as well as scalability in service. In fact, a KAM member or multiple KAM members would be assigned to address the issues of each specific merchant and post-sale service. This is the most heavily working, productive, and competitive wing of the company, in my opinion.

2.2 Work Environment and Organizational Culture

SteadFast Courier Ltd. was a great place to work, as the people there were supportive and also fun-loving when it came to teaching new recruits. Employees were patient and professional in a low-key way. A highly target-driven, fast-paced, high-pressure, deadline oriented and merchant responsive workplace. This was indicative of the business being operational and needing to react rapidly to work demands and merchant expectations.

The organization structure for my reporting depended on the Business Development wing I was a part of at any given point in time. I either reported to the team lead, which was the assigned Senior Executive for that wing or sometimes whoever leads that wing in Business Development. My seniors and higher-ups guided me in practical tips to simplify operations. They educated me about loopholes in our processes and advised me of the mistakes they made when they were brand new to the company. They were also very educational in terms of what tasks I was given and how those tasks should be carried out.

Most cross-channel communication was done via IP phones. Interactions between staff typically occurred via WhatsApp and IP phones. Follow-ups and meetings were communicated a day in advance via official email and WhatsApp. Reporting was conducted via Google Sheets, PowerPoint presentations, dash board reports and ERP instruments from Microsoft 365. Employee concerns are addressed via CRM software called pi-HR. Teamwork came very top in the department, as everyone was working well as a team, and everyone respected the chain of command.

From my observation, SteadFast prioritized work, employee relationships, organizational efficiency, and merchant satisfaction over anything. As the company's first intern, I was treated like a newcomer who was not treated ill, even though I was given a considerable amount of work and tasks. They tolerated some of the mistakes I made and made me feel privileged to be an intern.

2.3 Intern Responsibilities

Depending on which Business Development wing I was under, I had to perform some of the basic intermediate operations that the employees in any of those wings did just at a smaller scale. The

primary struggle I encountered was making commands for certain processes or operations of which I had no prior experience. Once I understood how to properly start the process, it allowed me to reach a speed that was either on par with or in some cases faster than the average experienced coworker.

After being placed in the Lead Team, I was hunting down clients on social media and business websites. I gathered links of potential clients from Facebook, Instagram, LinkedIn, and other business websites and submitted them to Team Leader to be further contacted by the Sales Team.

Diligently prepared tailored approaches and communication speeches to contact potential customers while working with the Sales Team. When they were SMEs or e-commerce merchants, I spoke to them on the phone about their requirements and presented SteadFast's services in a convincing manner and helped onboarded them. This meant that for corporate (B2B) clients, the top management handled any negotiations; hence, once we signed the MoU and contracts I continued to stay in touch with them through meetings as well. I also provided PR and marketing communications campaign support for my peers in the Sales Team.

During my tenure with Activation Team, I reached out to freshly onboarded clients to introduce them to company policies, terms, service charges and fees. I have also introduced to them the use of merchant dashboard and mobile app which made their access to avail all services was made easy. I also provided them with basic formal orientation, by welcoming methods over telephone and e-mail.

For reporting and operational work— Google Sheets, Microsoft 365, pi-HR, admin panel for Business Development Executives, WhatsApp and IP telephones. Depending on which wing I was working for at that time, I prepared reports with the tools needed for it to run effectively during my everyday jobs and operations.

On an even more important note, my intern role also allowed me to help coordinate the logistics operation of a flagship project at SteadFast. This project was provided by Team Sigma, the team I worked under at the time with As-Sunnah Foundation for delivering over 33,300 parcels across 62 districts and more than 627 destinations.

2.4 Educational Learning with Internship

The specific courses I took, such as Principles of Supply Chain Management and Logistics Management were the most beneficial as they taught me the theories and concepts that I applied later on when I began my career. I was introduced to terms such as 3PL, last mile delivery, logistics network distribution, warehouse vs. hub, reverse logistics, parcel lifecycle journey. This was something I had learned in theory and realized how to implement during internship. This also meant that when my supervisors or senior colleagues in Business Development were telling me what a particular operation did, I never needed to ask them for the basics of how those terms worked—especially since it was something I'd already covered. It got easier to correlate theory with practice and implement my learning while eliminating the rudimentary operational challenges in the starting phase.

Courses at the core like Business Communication, Marketing Management, Research Methodology were huge help too. These gave me the ability, when necessary, to communicate and pitch concepts with merchants and colleagues — as well as understand the nuances of marketing and promotional strategies. My quantitative and research skills were fortified by the Research Methodology course which, in conjunction with my previous self-taught knowledge of Data Analytics facilitated business analysis at a very granular level from solvable business problems leading into meaningful insights.

Another academic habit meaningful used in the internship was the timely finishing of tasks and understanding issues well before tearing them apart and creating ingenious solutions. These became solidified in me as habits and skills during the undergrad later on from there practically useful during the internship.

Chapter 3: Self-Reflection

3.1 Feedback on Internship

In terms of academics and employment, my internship experience at SteadFast Courier Ltd. helped me in numerous ways. It exposed me in more direct ways to the complexities of the e-commerce, courier and third-party logistics landscape in Bangladesh. As a Supply Chain Management student, this was much closer to home because I got to witness the workings of actual business development, merchant handling and onboarding, service coordination and logistics support. I told them to experience how the different departments interconnect with each other — combating timely delivery, merchant requests, technical requirements and aiding onboarding as well as account issues. That this made me realize is that a logistics company performance is not just about the physical delivery tasks but it heavily relies on how the internal teams communicate and agree on actions to offer for the service.

Working in different wings of the Business Development Department was one of the learnings that I treasured most from this work experience. By engaging in lead generation, sales-oriented communication, walk a client through onboarding, and activate them I knew how acquiring clients and enabling their success was relevant to have better grow a logistics company. It has opened my eyes to the fact that logistics service is not only about the physical transport of delivery per se, but heavily depends on lots more, like; coordination, communication, responsiveness and continuity of service.

On both a personal and professional level the internship taught me how vital it is to adapt quickly. Having been placed in different wings of the department, I had to adjust to new kinds of assignments and reporting demands. This improved my rapid learning capacity, respect for the chain of command and my ability to deliver in a target-driven and deadline-orientated environment. I also built my confidence in communicating with merchants, working on assigned tasks and adjusting to a real-life corporate world.

One of the biggest challenges I had to face was providing steps to complete tasks/operations that were new to me. But once I learned how the process worked, I could set up my work in a way that was much faster and more efficient. Perhaps, more than anything else, it gave me a lesson that

practical learning within an operational atmosphere is usually about observation followed by practice and honing on the job rather than having perfection at the onset.

3.2 How Can I Improve and How the Organization Makes Better Use of Myself

I was slower when multitasking at first; freezing day-to-day operations without blinking, building reports over in Google sheets, attending calls, updating my operational activities on the admin dashboard of SteadFast. It was a mandatory to be well versed with the usage of IP phones, emails and WhatsApp. I was never more unsure of any new assignments I received. But my initial impression was tempered and I learned to keep up with the rest of the crowd. I was sort of unclear on what I should do when, and what needed to be pushed off for later in the day.

Areas that I can improve more are client communication and orientation. During the onboarding process, newly onboarded merchants and SMEs find it challenging to adhere to our strict but reasonable policies, rules and service frameworks. That, though, takes longer than a 90-day internship leaves you time for.

My mistakes were limited to explaining the borne out new clients referring to our diverse and comprehensive delivery charges, which did require a little more on-the-job experience than I could gain as part of a team that I was merely 3 days old. I consider involving more one-on-one training and a dedicated team who could handle interns like me, help me gradually break the ice and smoothly get adjusted to things.

Transitioning between wings helped me become more nimble, adaptable, and agile. It did awake me to the importance of knowing more about the company and its interdependent functions that surround mission-critical part. I only wish I could have stayed more than 3 weeks in a wing. However, I had an internship limit of 12 weeks. The more I would have stayed, the more I learned. As an all-in-one decentralized platform for the business activities, operational activities, and technological framework of the organization, I would have liked to be introduced to SteadFast merchant panel in a lot more detail.

A while back, I did certifications in Data Analytics from a company that is well-established and who had written assurances on my skills. They do not have a department of Business Analytics

and do in fact use analytical tools but only Google Sheets or Excel. In addition, I said that I wanted to add value here and start some measures of data and data analysis in the context of the larger business. But they did not respond to that request with an unequivocal yes or no.

3.3 Practical Recommendations

3.3.1 Structured Internship Process

The company needs to define the expectations it has of its interns. It would allow for more formalized intern training, even if a small, straightforward way to structure the process. More one-to-one initial training, is something that could have helped interns become familiar with the working environment and their tasks quicker so there was more time to go hands on learning how things work in practice during the duration of internship.

3.3.2 Improving Human Resource and Human Welfare

More emphasis should be taken on HR, people culture, employee health, and good salaries at SteadFast. The company should also offer paid holidays and focus on what junior-level executives expect and complain about. The CEO should try to be more present and listen to mid-management complaints. Our duties are roster type, and the organization doesn't abide by government holiday rules. Shifting to the collaborative work atmosphere more in terms of offering holidays, employee benefits etc. helps a lot towards making the operational framework to a much effective level.

3.3.3 Automation and System Development

Most processes and operations in both the KAM wing and Activation wing are manual: No system, no automation. The weakest link at present is the IT framework that SteadFast needs to bolster. It is crucial to automate these manual operations, deploy AI, workflow integration software, predictive analytics, slow and rapid BI tools and advanced CRM and ERP software driven by Oracle ERP and CRM tools, also tools like MS Azure.

3.3.4 Cross-Functional Coordination

SteadFast needs to have a strategy and policy formulation team. It would allow the company to build an even stronger internal structure, bring people together in collaboration and better plan for

the long term. Sales and KAM executives on the one hand, and Operations (hub, warehouse, executives, delivery persons) on the other do not really have a good relationship or understanding of each other. Rather than management showing favoritism for the Operations Department, the organization must establish rules and policies to help create efficient coordination between both departments, Business Development and Operations, so they can find harmony within one another and elevate SteadFast further.

Chapter 4: Personal Development Plan

4.1 Technical Skills

4.1.1 Advanced Presentation Design: The main technical skill I still need to improve in order to feel about 95 percent confident in SCM-related roles is advanced PowerPoint and Canva literacy. I want to learn how to create eye-catching presentations that are developed from scratch and not simply made from templates.

4.1.2 Graphic Content Development: Additionally, I would want to refine my skills in graphical content creation including posters, pamphlets and social media banners. I aim to build those sub-materials from scratch, instead of taking advantage of a pre-made templates.

4.1.3 SQL, BI, and Python Training: I think certification courses in SQL and Python would assist me to analyze big data, manage RDBMS, retrieve data, analyze it and handle reports that were developed from the data fetched through ETL pipelines. Lastly, analyzing data using BI tools to have insights and take decisions.

4.2 Interpersonal and Professional Skills

4.2.1 Multitasking and Task Prioritization: During my internship, I felt the necessity to handle many responsibilities simultaneously. However, I would like to work on being able to multitask more efficiently and effectively organize my priorities. As, it is something which is clearly essential in most fast-paced, target-driven workplaces.

4.2.3 Adaptability and Operational Flexibility: It made me more adaptable and flexible as I worked across various wings of the Business Development Department. I want to enhance this quality, so I can apply myself quickly in new functions and responsibilities and changes in the workplace.

4.2.4 Handling of Pressures and Work Discipline: The internship setting was extremely target-oriented, deadline-centric and merchant-sensitive. However, I also have the goal of improving how well I work under pressure without sacrificing discipline, focus, and output consistency.

PART- B

“Evaluating Critical Success Factors of Cash-on-Delivery (COD) Services in Third-Party Logistics: A Bangladesh based MCDM study.”

Executive Summary

This internship report provides a CSFs-based analysis of COD services performance at a 3PL, specifically SteadFast Courier Ltd. With COD continuing to be the most commonly used payment method in Bangladesh's rapidly growing e-commerce space, chord understanding the CSFs that impact the operational efficiency and success of COD operations is imperative for logistics providers looking to enhance service quality, customer satisfaction and overall operation effectiveness. An MCDM approach using Analytic Hierarchy Process (AHP) and Best-Worst Method (BWM) was implemented, with Python libraries employed for computation, visualization of CSF rankings, along with their comparative analysis. These are employed to determine, prioritize, and assess the 12 CSFs under each of operational, financial, technological, relational, and risk management dimensions that influence COD services delivery closely.

The results of this study highlight the importance of operational issues, especially Delivery Reliability and Last-Mile Delivery Efficiency, in determining the success of COD services. Following these are Cash Collection Accuracy, the most important financial factor as it impacts the operational flow and financial safety of COD transactions. Further, Merchant Communication maintains an essential relationship between e-commerce merchants and logistics providers in terms of service quality and delivery reliability. Technological attributes, including Digital Visibility and IT Integration for operational transparency and customer satisfaction are important.

The findings offer actionable recommendations for logistics companies such as SteadFast Courier Ltd. to improve their COD service with a focus on efficient operational processes, better financial management systems, enhanced communication strategy with merchants, and improved risk management protocols.

Keywords: AHP, BWM, MCDM, Python, COD, Critical Success Factor, 3PL, Bangladesh e-commerce, LSQ, Logistics Operation, and Risk Management.

Chapter 1: Introduction

1.1 Background of the Study

The rapid growth of e-commerce in Bangladesh has changed the logistics operations dramatically, and Cash-on-Delivery (COD) has become one of the most common payment methods for consumers. In a market in which digital payment systems have been slow to take off, COD suits the customers well because it instills confidence and safety (Rahman et al., 2020). While this is beneficial, COD services pose various operational and financial challenges for third-party logistics (3PL) providers. Some of the key factors affecting COD performance include delivery reliability, cash collection accuracy, last-mile delivery efficiency, and merchant trust in COD (Sarker et al., 2021; Gu et al., 2022).

For 3PL Companies such as SteadFast Courier Ltd., COD is a crucial part of the recent, post covid, e-commerce boom in Bangladesh. Although it comes with its own set of challenges, some crucial roadblocks to providing seamless COD services are: delivery delays, last mile delivery efficiency, delivery reliability, and damage and return handling (Kovács & Spens 2020; Gupta et al. 2021). Such challenges highlight the importance of a systematic comprehension of critical success factors (CSFs) that influence COD competitiveness with respect to 3PL logistics.

In the context of 3PL logistics focusing on COD services, significant research and investigation in terms of literature has been done previously regarding logistics performance as well as e-commerce delivery but this paper also fills up a gap in the theory regarding CSFs. Current research tends to emphasize logistics operations holistically and/or conventional e-commerce logistics instead of the specific challenges posed by COD in 3PL (Besiou & Van Wassenhove, 2020; Wang et al., 2022). Moreover, the operational performance of COD services becomes more challenging due to cash handling risks, merchant and customer communication, and technological integration (Heaslip et al., 2020). Hence, it is crucial to investigate these factors in a systematic manner and assess their relative relevance. This research aims to address these gaps by identifying and evaluating the CSFs that influence COD performance in 3PL logistics. Using Analytic Hierarchy Process (AHP) and Best-Worst Method (BWM), two widely used Multi-Criteria Decision-Making (MCDM) techniques.

1.2 Research Question and Objective

The central research question driving this study is:

"What are the critical success factors (CSFs) influencing the performance of Cash-on-Delivery (COD) services in Third-Party Logistics (3PL) in Bangladesh, and how can these factors be prioritized to improve logistics services?"

In order to answer this question, the study will focus on the following specific research objectives are given as below: -

- To identify and structure the key CSFs that influence the performance of COD services in 3PL logistics.
- To determine the relative importance of these CSFs using AHP and BWM methods.
- To compare the rankings obtained from AHP and BWM and assess their consistency and robustness.
- To provide actionable insights for 3PL providers and e-commerce stakeholders in Bangladesh to prioritize resources and improve COD service performance.

Through these research objectives, this study seeks to add theoretical contributions regarding logistics performance, as well as practical contributions concerning the delivery of COD services of 3PL in Bangladesh. The study will provide a comparative analysis of the CSFs, ultimately contributing theoretically to MCDM applications in logistics and providing practical recommendations for 3PL providers and e-commerce stakeholders in Bangladesh (Rezaei, 2015; Kovács & Spens, 2020).

1.3 Scope of The Research

The study concentrates mainly on the COD services offered by keeping specific details of SteadFast Courier Ltd, one of the most popular 3PL service providers. In regards to 3PL operation, the study will assess the Critical Success Factors (CSFs) that impacts COD service performance. This research is limited to the following scope:

Target Population: The study will focus on 21 highly experienced management professionals from SteadFast Courier Ltd., belonging from the Business Development department. These practitioners directly engaged in COD operations will deliver key insights regarding CSF prioritization.

Geographical Focus: This research will highlight the associated challenges and complexities encountered by 3PL providers in handling COD offerings in this growing economy of Bangladesh (Rahman et al., 2020).

Duration: Data will be gathered throughout the internship period at SteadFast Courier Ltd., spanning from February 2026 to April 2026. This study will center around COD services, operational practices, and performance metrics during this time period.

Chapter 2: Literature Review

2.1 The Cash on Delivery (COD) Payment Method in e-commerce Logistics

In many developing countries, cash-on-delivery (COD) has become a very popular way of payment, especially in regions where people are reluctant to use online payment systems. Under COD customers pay for their items only after they receive them. This minimizes the perceived risk, as it makes people more willing to make online purchases (Hjort et al., 2019). Without understating how this model allows the market to develop, it is also a part of less efficient operations due to increased returns rates, higher delivery failures as well as extra handling costs (Vakulenko et al., 2019).

For logistics, COD services require extra steps compared to normal delivery services like collection of cash, safe processing and timely transfer to merchants for the customers. These steps complicate last-mile logistics and require solid cooperation between shipping companies and e-commerce sites (Kembro et al., 2017). Previous studies demonstrate that cash-on-delivery systems are highly vulnerable to issues such as fraud, payment discrepancies and delayed flows of cash, which can have a negative impact on logistics providers and merchants (Kumar & Anbanandam, 2020).

2.2 Third-Party Logistics (3PL) and Last-Mile Delivery Challenges

Third-party logistics (3PL) providers play a crucial role in facilitating e-commerce operations by managing transportation, warehousing, and last-mile delivery. In COD-based systems, 3PL firms are also responsible for payment collection and financial settlement, making their role even more critical (Hübner et al., 2016).

Last-mile delivery is widely recognized as the most complex and costly component of logistics operations, particularly in urban and emerging market contexts (Mangiaracina et al., 2019). Challenges such as traffic congestion, address inaccuracies, customer unavailability, and infrastructure limitations can significantly affect delivery performance. When combined with COD requirements, these challenges are further amplified, leading to increased operational risks and inefficiencies (Boysen et al., 2021).

2.3 Critical Success Factors in Logistics and COD Services

Critical success factors (CSFs) are key areas to be delivered properly in order to achieve the objectives of an organization (Rockart, 1979). In the field of logistics and supply chain management, CSFs have been investigated in relation to service quality, operational efficiency, and customer satisfaction. Logistics Service Quality (LSQ) constructs identify various key components, such as delivery reliability, responsiveness, information quality and flexibility (Hübner et al., 2016). More recent studies have expanded these frameworks to include technical capabilities, such as real-time tracking and/or system integration, that are important for modern logistics systems (Mangiaracina et al., 2019).

In COD specific conditions, several things matter a lot such as accuracy of cash collection, the speed of sending remittances and risk management. Research has highlighted that safe cash management, fraud deterrence and trust-enhancing strategies are among critical elements for the effectiveness of cash-on-delivery operation (Kembro et al., 2017; Kumar & Anbanandam, 2020). Moreover, it has been found that service performance and customer satisfaction are influenced by relationship aspects such as consumer trust and communication among merchants (Vakulenko et al., 2019).

Using a mix of well-known logistics and supply chain frameworks, the critical success factors were put into five groups: operational capability, financial and COD efficiency, technological capability, customer and merchant relationships, and risk management. Studies of last-mile and e-commerce logistics (Hübner et al., 2016; Mangiaracina et al., 2019) show that operational and technological capabilities are important. In studies of supply chain risk and performance (Ho et al., 2015; Govindan et al., 2020), financial performance and risk management are more important. Factors related to relationships are based on models of service quality and customer experience (Vakulenko et al., 2019; Parasuraman et al., 1988). The financial and risk dimensions are further expanded to encompass COD-specific attributes, including cash management, remittance processes, and fraud risk, which are particularly relevant in emerging markets. Their list is given as following (no specific order):

1) Operational Capability. 2) Financial Efficiency, 3) Technological Capability, 4) Relationship Management, 5) Risk Management.

2.4 Application of MCDM Techniques in Logistics

Multi-criteria decision making (MCDM) techniques have been widely used in logistics and supply chain research to evaluate complex decision problems with several criteria. In all of these techniques, AHP and BWM have been widely preferred because they allow the incorporation of expert judgment through pairwise comparisons across qualitative and quantitative needs.

Analytic Hierarchy Process (AHP) - AHP is a procedural approach (Saaty, 1980) that decomposes a decision problem into a hierarchy of sub-problems and uses pairwise comparisons to derive the relative weights of criteria. The Analytic Hierarchy Process (AHP) has been popular in logistics for supplier selection performance evaluation and risk assessment (Govindan et al., 2020). However, AHP requires a number of comparisons which may lead to conflicts on expert evaluation. The Best-Worst Method (BWM) introduced by Rezaei (2015) overcomes some of these disadvantages by requiring fewer comparisons and ensuring better consistency. In BWM, the most important (best) and least important (worst) criteria are determined by decision-makers, who then perform pair comparisons to these extremes. BWM has been found to provide more reliable and consistent results than conventional methods such as AHP (Gupta et al., 2018).

Using diverse MCDM methods can improve depth. As, per recent studies, comparative studies of AHP and BWM demonstrated that while both methods provide similar ranking results, commonly, BWM is known for providing more consistent results with lower cognitive loads (Rezaei, 2015; Govindan et al., 2020).

2.5 Research Gap

Although previous studies have explored logistics service quality and the application of MCDM methods, limited research has focused specifically on COD services in 3PL, particularly in the context of emerging economies such as Bangladesh.

Limited Use of Comparative MCDM Techniques: While AHP and BWM are widely used in logistics studies at present, it is worth taking a look at similar research on COD. Rezaei (2015) and Govindan et al. (2020) suggest that BWM offers greater consistency with lower cognitive load

compared to AHP. Yet only a few studies have even applied both these comparative approach to COD services, especially in emerging economies.

Insufficient Research in Emerging Markets: Not many of the existing research on COD really targets developing countries, such as Bangladesh. Importantly, COD services face their own special problems, such as infrastructure issues and very low adoption rates for digital payments (Rahman et al., 2020). As a result, little is no understanding of particular difficulties faced there by 3PL providers, who to a large extent depend on COD as their principal means of payment.

Underexplored Risk Management and Technological Integration: In spite of the clear importance of fraud prevention, cash security and digital tracking in COD services these aspects have by no means been explored enough. Heaslip et al. (2020) and Kumar & Anbanandam (2020) make it clear that risk management tells whether your services are reliable or not while technical integration increases service transparency and customer experience. But such elements remain largely absent from COD-focused research.

Lack of Unified Framework for COD Success Factors: Existing research on COD often lacks a comprehensive framework integrating multiple dimensions (operational, financial, technological, relational, and risk management). Studies by Kumar and Anbanandam (2020) and Kembro et al. (2017) highlight this fragmentation, with COD performance being analyzed in isolated silos rather than as an interconnected system.

2.6 Contribution of the Study

This study addresses the identified gaps by:

- Developing a structured framework of CSFs specific to COD-based 3PL.
- Applying both AHP and BWM to evaluate and prioritize these factors.
- Comparing the results to ensure robustness and methodological validity.

The findings are expected to provide valuable insights for logistics providers, policymakers, and e-commerce stakeholders in improving COD service performance in Bangladesh.

Chapter 3: Research Methodology

3.1 Research Design

The study portrays a Multi-Criteria Decision-Making (MCDM) technique is applied to determine the relative importance and analyze the critical success factors (CSFs), impacting Cash-on-Delivery (COD) service efficiency in Third-Party Logistics (3PL) in Bangladesh. In this study, a combination of qualitative expert judgment and quantitative prioritization were integrated into the design (AHP and BWM) to ensure an analytically sound and context-sensitive approach (Heaslip et al., 2020; Rezaei, 2015).

This study is descriptive-analytical, and its main goal was to rank CSFs and examine their causal relationships in five dimensions (operational, financial, technological, relational and risk). This design allows for both soundness of actionable insights that hold up to positive scrutiny, as well as analytical rigor and replicability. Thus, meeting standards for the academic contribution while being relevant and applicable to a real-world 3PL context.

3.2 Identification and Finalization of CSFs with Dimensional Breakdown

The Critical Success Factor Theory (CSFT) (Rockart, 1979) guided the derivation and validation of 12 CSFs for COD operations, organized into five dimensions: Operational, Financial, Technology, Relationship, and Risk.

Procedure adopted: An extensive literature review was conducted to shortlist initial CSFs. These literature reviews were mostly done from scholarly and recent publications with credibility. Finally, judgmental confirmation of final CSF set for weighting and prioritization. This procedure ensures both theoretical grounding and contextual applicability in Bangladesh's 3PL sector.

Table 1: CSFs table derived from extensive literature review

CSF No.	Critical Success Factor (CSF)	Dimension	Sources
CSF 1	Delivery Reliability	<i>Operational</i>	Panditharathna, S. M. V. (2025).

CSF 2	Last-mile Delivery Efficiency	<i>Operational</i>	Kumar, V., Aksoy, L., & Venkatesan, R. (2021).
CSF 3	Failed Delivery & Return Handling	<i>Operational</i>	Kembro, J., & Selviaridis, K. (2022).
CSF 4	Workforce Competence & Responsiveness	<i>Operational</i>	Heaslip, V., Kovács, G., & Grant, D. (2020).
CSF 5	Cash Collection Accuracy	<i>Financial</i>	Chen, S. C., Lin, C. P., & Chen, H. Y. (2020).
CSF 6	Remittance Speed	<i>Financial</i>	Gupta, S., Kumar, A., & Singh, P. (2021).
CSF 7	Cost Efficiency	<i>Financial</i>	Sandvik, K. B., & Jumbert, M. G. (2020).
CSF 8	Digital Visibility & Tracking	<i>Technology</i>	Zhang, Y., Wang, X., & Li, Q. (2021).
CSF 9	IT Integration with Merchants	<i>Technology</i>	Zhang, X., & Liu, S. (2020).
CSF 10	Customer Trust in COD	<i>Relationship</i>	Wang, X., & Li, H. (2022).
CSF 11	Merchant Communication	<i>Relationship</i>	Heaslip, G., & Kovács, G. (2020).
CSF 12	COD Risk Control (Fraud & Cash Security)	<i>Risk</i>	Sandvik, K. B., & Jumbert, M. G. (2020).

Table 2: Dimension table of CSFs derived from extensive literature review

Dimension	Literature Source
Operational	Hübner et al. (2016)
Financial	Govindan et al. (2020)
Technology	Hofmann et al. (2019)
Relationship	Vakulenko et al. (2019)
Risk	Ho et al. (2015)

3.3 Research Approach

A predominant quantitative mixed-methods approach, of expert knowledge with mathematical modeling, that's a widely accepted practice for developing frameworks more sophisticated than what's currently available in Industry 5.0 logistics studies (Sakaline et al., 2025)

Quantitative: The method used would include AHP for hierarchy structure and BWM for inconsistency extreme comparative priorities. Hence, this *Quantitative* approach will:

- Include key elements such as the reliability of deliveries, the accuracy with cash collection, the competence of the workforce, and technological integration (Zhang et al., 2021; Heaslip et al., 2020).
- In each case, AHP makes a pairwise comparison of the relative importance of each of the factors, AHP will help to determine the importance of every factor, whereas BWM prioritize factors by comparing the best and the worst against all others (Rezaei, 2015).
- Be a comparative analysis will shed light on CSF prioritization methodological continuity and the insights from this analysis will be beneficial for COD service implementation in 3PL logistics (Rezaei, 2015).
- Provide findings from this research will provide the strategic frameworks that can be adopted to ensure optimization in terms of cash collection, delivery reliability, and better customer relationships in enhancing entire performance for COD services (Gupta et al., 2021; Kovács & Spens, 2020).

3.4 Data Collection

3.4.1 Target Population

Sample: 21 well-qualified and experienced managers from Business Development Department of SteadFast Courier Ltd., where all were directly involved in COD operations throughout their whole experience in working in the logistics industry.

Rationale: Purposive sampling was necessary to ensure that domain-specific knowledge, that the expertise needed to verify the credibility of which conditions should be prioritized as CSF was included in this study (Rahman et al., 2020). Hence, this approach allowed subjective experience to be later quantified and analyzed to have insights, and implement strategies.

Table 2: Data Types with scales used

Source	Purpose
Primary	Structured survey questionnaire capturing importance ratings (Likert 1–5), AHP pairwise comparisons (1–9 scale), and BWM best-worst selections.

Secondary	Academic literature on logistics, COD operations, and MCDM techniques to refine CSFs and benchmarking.
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Survey Question Structure: Based on the survey questions (attached in the appendix section), the questionnaire was divided into four sections:

- Respondent profile (role, experience, expertise, COD involvement).
- Importance rating of 12 CSFs (5-point Likert scale).
- AHP pairwise comparisons (1–9 scale).
- BWM assessments (best-worst selection and comparison vectors).

Table 3: Scale Definition Table

Scale	Description
Likert 1–5 (CSF Importance)	1 = Not important, 2 = Slightly important, 3 = Moderate, 4 = Important, 5 = Extremely important
AHP 1–9 (Pairwise Comparisons)	1 = Equal importance, 3 = Moderate importance, 5 = Strong, 7 = Very strong, 9 = Extreme Importance, and 2,4,6,8 = Intermediate Levels
BWM 1–9 (Best-to-Others / Others-to-Worst)	1 = Equal importance, ..., 9 = Extremely important (applied to compute optimal CSF weights)

3.5 Equations, Formulas, Models, and Data Analysis Process

3.5.1 Analytic Hierarchy Process (AHP)

Step 1: Pairwise Comparison Matrix

Experts evaluated the relative importance of each dimension and CSF within its dimension using the 1–9 Saaty scale, where 1 denotes equal importance and 9 denotes extreme importance. This step ensures that subjective expert judgment is quantified for structured analysis (Govindan et al., 2021; Heaslip et al., 2020).

For a set of n criteria $C_1, C_2, \dots, C_n$, a pairwise comparison matrix $A = [a_{ij}]_{n \times n}$ is defined such that:

$$a_{ij} = \begin{cases} 1 & \text{if } i = j \\ \text{expert-assigned value on 1–9 scale} & \text{if } i \neq j \end{cases}$$

Where a_{ij} represents the relative importance of criterion i over j (Saaty, 1980).

Step 2: Normalization and Weight Vector

Pairwise matrices are to be normalized to compute local priority weights, which were then multiplied by dimension weights to obtain global priority scores (Zhang et al., 2021).

Normalize the pairwise comparison matrix to obtain the priority vector w :

$$w_i = \frac{\sum_{j=1}^n a_{ij}}{\sum_{i=1}^n \sum_{j=1}^n a_{ij}}, i = 1, 2, \dots, n$$

Step 3: Consistency Check

The Consistency Index (CI) and Consistency Ratio (CR) were calculated to verify the reliability of expert judgments. Only matrices with $CR < 0.10$ were accepted (Saaty, 1980; Govindan et al., 2021).

Compute Consistency Index (CI):

$$CI = \frac{\lambda_{\max} - n}{n - 1}$$

Where $\lambda_{\max}$ is the largest eigenvalue of matrix A .

Consistency Ratio (CR):

$$CR = \frac{CI}{RI}$$

- RI is the Random Index for n criteria.
- $CR < 0.10$ indicates acceptable consistency.

Step 4: Global Weights of CSFs

This step produces final, dimension-adjusted rankings for all 12 CSFs, integrating both hierarchical importance and intra-dimensional contributions (Zhang et al., 2021). For each CSF j under dimension i :

$$W_j^{\text{global}} = W_i^{\text{dimension}} \times w_j^{\text{local}}$$

Where:

- $W_i^{\text{dimension}}$ = weight of the dimension from pairwise comparisons
- w_j^{local} = local weight of CSF j within dimension i

3.5.2 Best-Worst Method (BWM)

Step 1: Best and Worst Selection

Here, experts individually identified the most important (Best) and least important (Worst) CSFs from the full set of all the factors to identify the best and worst impacting factors, respectively. (Rezaei, 2015).

Let $C = \{C_1, C_2, \dots, C_n\}$ be the set of CSFs. Experts select:

- C_B = Best (most important) criterion and C_W = Worst (least important) criterion.

Step 2: Best-to-Others (BO) Vector

Best-to-Others (BO): Importance of the Best CSF relative to all others.

$$A_B = (a_{B1}, a_{B2}, \dots, a_{Bn}), a_{Bj} \in \{1, 2, \dots, 9\}$$

Where a_{Bj} indicates the relative importance of C_B compared to C_j

Step 3: Others-to-Worst (OW) Vector

Others-to-Worst (OW): Importance of all CSFs relative to the Worst CSF.

$$A_W = (a_{1W}, a_{2W}, \dots, a_{nW}), a_{jW} \in \{1, 2, \dots, 9\}$$

Where a_{jW} indicates the relative importance of C_j compared to C_W

Step 4: Optimization Model for Consistent Weights

Optimization: A constrained optimization model solved for the weight vector that minimized maximum deviation ξ between the comparisons and assigned weights (Rezaei, 2015). The deterministic BWM model minimizes the maximum absolute deviation ξ :

$$\min \xi$$

Subject to:

$$|w_B/w_j - a_{Bj}| \leq \xi, j = 1, 2, \dots, n$$

$$|w_j/w_W - a_{jW}| \leq \xi, j = 1, 2, \dots, n$$

$$\sum_{j=1}^n w_j = 1, w_j \geq 0$$

Where:

- w_j = weight of CSF j
- w_B = weight of best CSF
- w_W = weight of worst CSF

Aggregation across experts: Individual expert weights were averaged to obtain group-level CSF weights, producing a consolidated and consistent ranking.

$$\bar{w}_j = \frac{1}{E} \sum_{e=1}^E w_j^{(e)}$$

- E = number of experts
- $\bar{w}_j$ = group-level CSF weight

3.5.3 Comparative and Robustness Analysis

Spearman Rank Correlation

$$\rho = 1 - \frac{6 \sum_{i=1}^n d_i^2}{n(n^2 - 1)}$$

Where d_i = difference in rank for CSF i between AHP and BWM.

Kendall's Tau

$$\tau = \frac{C - D}{0.5n(n - 1)}$$

- C = number of concordant pairs
- D = number of discordant pairs
- n = number of CSFs

Statistical Validation:

- Spearman Rank Correlation (ρ): Quantified monotonic relationships between AHP and BWM rankings (Heaslip et al., 2020).
- Kendall's Tau (τ): Evaluated concordance in pairwise CSF ordering (Rezaei, 2015).

3.5.4 Descriptive Statistics

For descriptive statistics of survey responses:

$$\text{Mean}_j = \frac{\sum_{i=1}^N x_{ij}}{N}$$

$$\text{SD}_j = \sqrt{\frac{\sum_{i=1}^N (x_{ij} - \text{Mean}_j)^2}{N - 1}}$$

- x_{ij} = Likert score for CSF j by expert i
- N = number of experts

3.6 Data Analysis Process

The survey data from 21 experts were first collected and entered into Excel. The data were then imported into Python for processing. Initially, descriptive statistics: including mean, median, standard deviation, and reliability (Cronbach's alpha) were computed using *Pandas* and *NumPy* to summarize the importance ratings of the critical success factors (CSFs). Next, the Analytic Hierarchy Process (AHP) was implemented from scratch: pairwise comparison matrices were constructed for each respondent and dimension, eigenvalue decomposition was used to calculate local and global weights, and consistency ratios were assessed and aggregated through geometric mean. Afterwards the Best-Worst Method (BWM) was applied using linear programming via *SciPy* to compute optimized weights, followed by aggregation, bootstrap resampling, and leave-one-out stability analysis. In addition, the AHP and BWM rankings comparisons were done with Spearman and Kendall correlation tests. Lastly, all results were visualized with *Matplotlib* and *Seaborn* and Python generated actual images were illustrated and used in the report for credibility.

Chapter 4: Results and Analysis

4.1 Overview of the Empirical Analysis

The empirical findings of the study regarding CSFs influencing COD service performance in 3PL in Bangladesh are discussed in this chapter. The assessment combines descriptive statistics, reliability testing and two MCDM techniques, Analytic Hierarchy Process (AHP) and Best-Worst Method (BWM). The dataset consists of 21 subject matter expert responses from SteadFast Courier Ltd. Based on the analysis, it was organized in terms of four stages to develop sequentially:

- Descriptive and reliability analysis.
- AHP-based prioritization and consistency validation.
- BWM-based optimization and weight derivation.
- Comparison and stability analysis of AHP vs. BWM.

4.2 Reliability and Descriptive Analysis

Table 4: Reliability Assessment (Cronbach's Alpha)

Measure	Value
Cronbach's Alpha	0.67 (2dp)

The obtained value of 0.67 (2dp) indicates acceptable reliability for exploratory research.

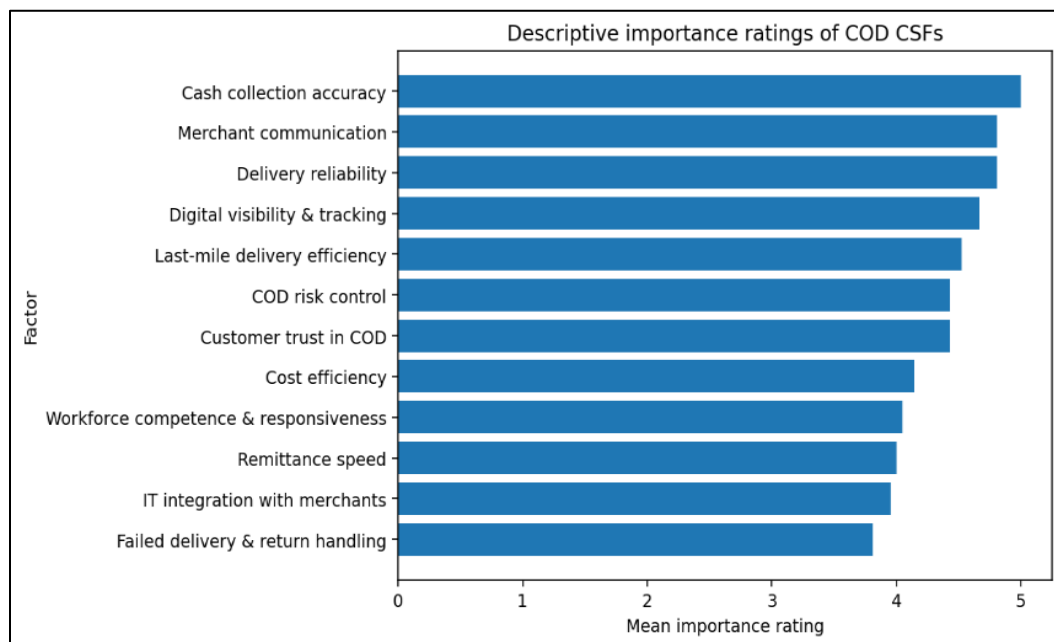
Table 5: Descriptive Statistics of Critical Success Factors

CSF	Factor	Mean	Standard Deviation	Median
C5	Cash Collection Accuracy	5.000	0.000	5.0
C1	Delivery Reliability	4.810	0.402	5.0
C11	Merchant Communication	4.810	0.402	5.0
C8	Digital Visibility & Tracking	4.667	0.577	5.0
C2	Last-Mile Delivery Efficiency	4.524	0.680	5.0

The descriptive analysis shows a high level of agreement among experts on the importance of COD-related CSFs. Cash Collection Accuracy (C5) achieved a perfect mean score (5.000) with

zero variation, highlighting its critical role in COD systems where financial precision directly affects trust and operational sustainability. Similarly, Delivery Reliability (C1) and Merchant Communication (C11) recorded high mean values with low dispersion, indicating that both operational execution and coordination efficiency are central to COD performance. Technological and operational enablers, such as Digital Visibility (C8) and Last-Mile Efficiency (C2), also received high ratings, though with slightly greater variability, reflecting differences in infrastructure and technology adoption. Overall, the results indicate that experts prioritize financial accuracy, delivery performance, and coordination effectiveness.

Figure 1: Mean Importance Scores of CSFs (Python Visual)



4.3 AHP-Based Analysis

4.3.1 Dimension-Level Prioritization: The AHP method was first applied at the dimension level to determine the relative importance of the five CSF categories.

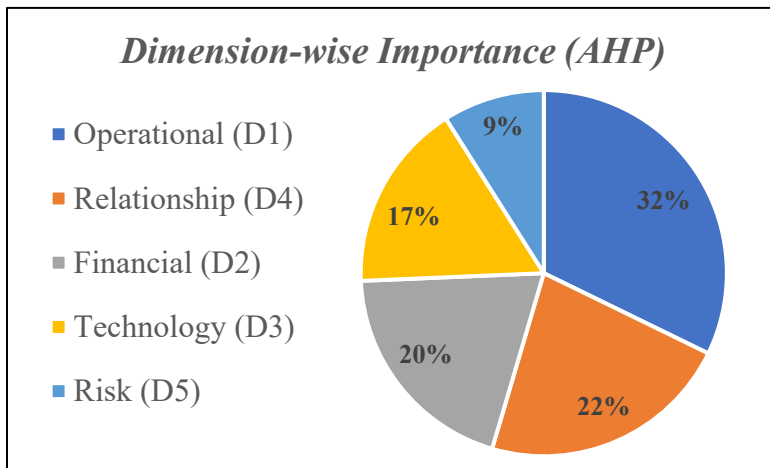
Table 6: AHP Dimension Weights

Dimension	Weight	Lambda Max	Consistency Index	Consistency Ratio
Operational (D1)	0.322249	5.126907	0.031727	0.02833

Relationship (D4)	0.223309	5.126907	0.031727	0.02833
Financial (D2)	0.197721	5.126907	0.031727	0.02833
Technology (D3)	0.166849	5.126907	0.031727	0.02833
Risk (D5)	0.089872	5.126907	0.031727	0.02833

The AHP results indicate that the Operational dimension (0.322) is the most influential, confirming that COD performance is primarily driven by execution quality, particularly delivery reliability and last-mile efficiency. The Relationship dimension (0.223) ranks second, highlighting the importance of coordination and trust among logistics providers and merchants in managing COD complexities. The Financial dimension (0.198) remains critical due to the cash-intensive nature of COD, though it is perceived as dependent on effective operations and coordination. The Technology dimension (0.167) plays a supportive role as an enabler of visibility and integration, while the Risk dimension (0.090) receives the lowest priority, suggesting it is relatively controlled within existing systems.

Figure 2: Dimension-Level Weight Distribution (AHP) (MS Power BI Visual)



4.3.2 Global Weights and Ranking of CSFs (AHP)

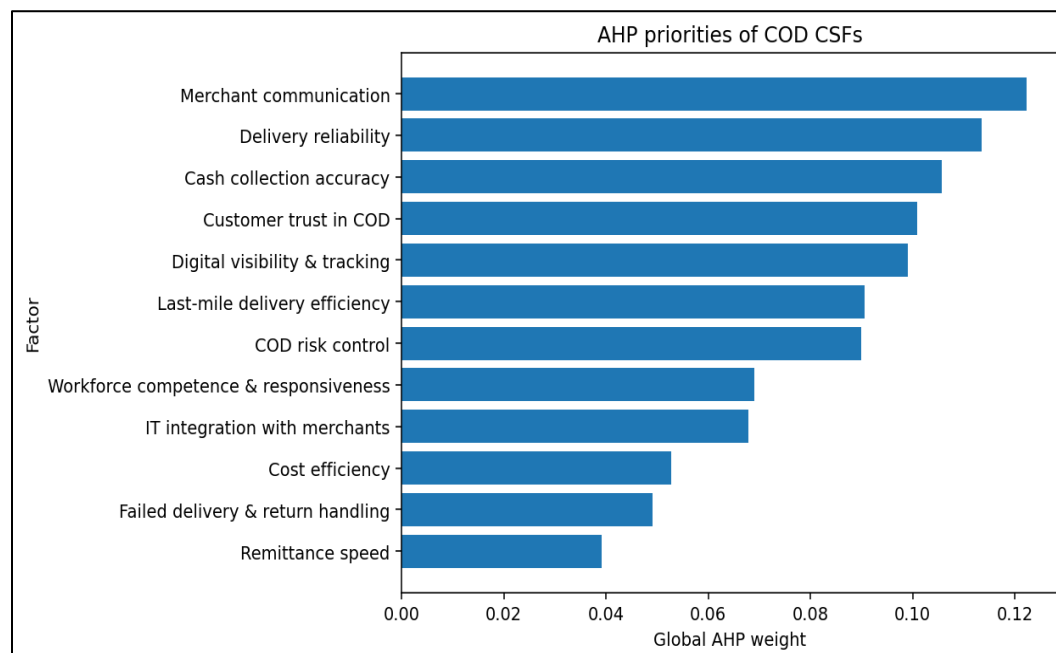
Table 7: Global Weights and Ranking of CSFs (AHP)

AHP Rank	Code	Factor	Dimension	Dimension Weight	Local Weight	Global Weight AHP
1	C11	Merchant communication	D4	0.223309	0.547825	0.122334

2	C1	Delivery reliability	D1	0.322249	0.352384	0.113555
3	C5	Cash collection accuracy	D2	0.197721	0.534832	0.105748
4	C10	Customer trust in COD	D4	0.223309	0.452175	0.100975
5	C8	Digital visibility & tracking	D3	0.166849	0.593289	0.098989
6	C2	Last-mile delivery efficiency	D1	0.322249	0.28112	0.090591

Merchant Communication (C11) stands out as the single most important factor, a context-specific finding reflecting: 1) Reliance on coordination between logistics provider and merchants. 2) Different levels of complexity in COD operations in Bangladesh. A close second is Delivery Reliability (C1) and Cash Collection Accuracy (C5), underscoring the importance of: 1) Operational excellence. 2) Financial accuracy. Customer Trust (C10) is holding a high rank in the industry indicating its cruciality in keeping COD adoption going. Mediating the relationship of technology-related quantity factors, especially Digital Visibility (C8), have a mid-level importance which indicates that they are performance enablers rather than determinants.

Figure 3: AHP Global Weight Distribution (Python Visual)



4.3.3 Consistency Validation

Table 8: AHP Consistency Ratios

Level	CR Value
Dimensions	0.0283
Operational	0.0108
Financial	0.0045

All Consistency Ratio (CR) values are below 0.10, indicating strong logical consistency in expert judgments. This confirms that the pairwise comparisons are stable and reliable, ensuring the validity of the derived weights and rankings. Consequently, the AHP results can statistically be considered robust and suitable for further analysis and comparison with BWM.

4.4 BWM-Based Analysis

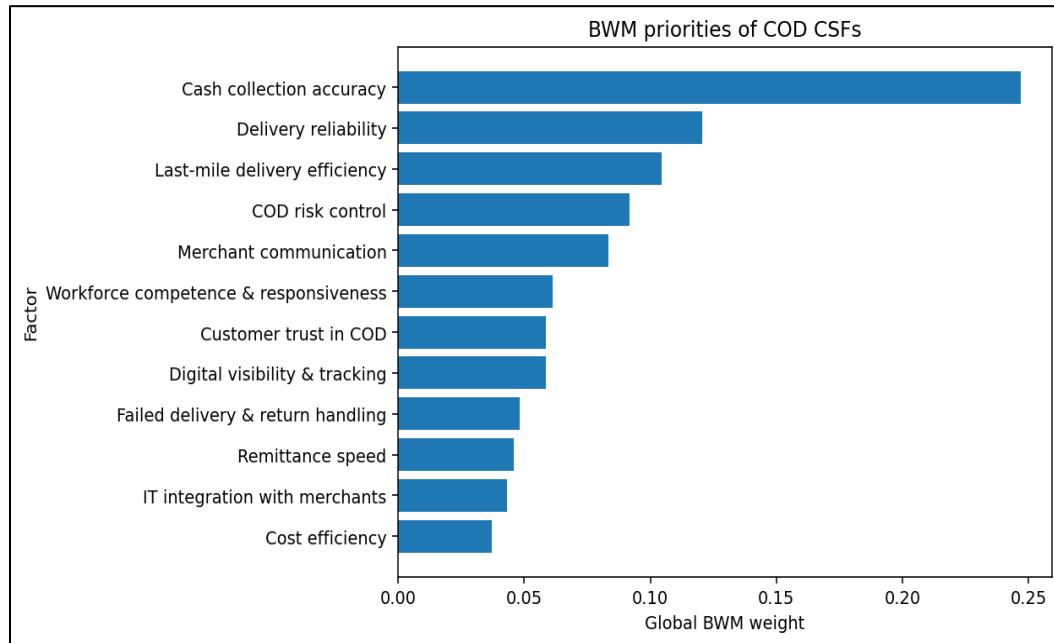
4.4.1 Global Weights and Ranking of CSFs (BWM)

Table 9: Global Weights and Ranking

BWM Rank	Code	Factor	Dimension	Global Weight BWM
1	C5	Cash collection accuracy	Financial	0.246986
2	C1	Delivery reliability	Operational	0.12072
3	C2	Last-mile delivery efficiency	Operational	0.104588
4	C12	COD risk control	Risk	0.091688
5	C11	Merchant communication	Relationship	0.083504
6	C4	Workforce competence & responsiveness	Operational	0.061143

The BWM results shows a more concentrated prioritization pattern, with evident differences. As, the Cash Collection Accuracy (C5) dominates significantly (24.70%), indicating: 1) The financial backbone of COD systems. 2) High sensitivity to cash-related errors. The Delivery Reliability (C1) remains consistently critical, confirming robustness across methods. For COD Risk Control (C12) ranks higher compared to AHP, emphasizing: 1) Fraud risks. 2) Security challenges in cash handling. Additionally, the Merchant Communication (C11) drops in rank, indicating that BWM prioritizes hard operational and financial metrics over relational aspects.

Figure 4: BWM Global Weight Distribution (Python Visual)



4.4.2 Consistency Validation

The BWM consistency index ξ_i (ξ^*) range from a minimum of 0.101580 to a maximum of 0.155786. As, values in this range are typically low enough to yield a Consistency Ratio (CR) well below the standard 0.10 (10%) threshold, they are indicating:

- High reliability of pairwise comparisons.
- Strong internal consistency.
- Robustness of optimization-based results.

4.5 Comparative Analysis of AHP and BWM

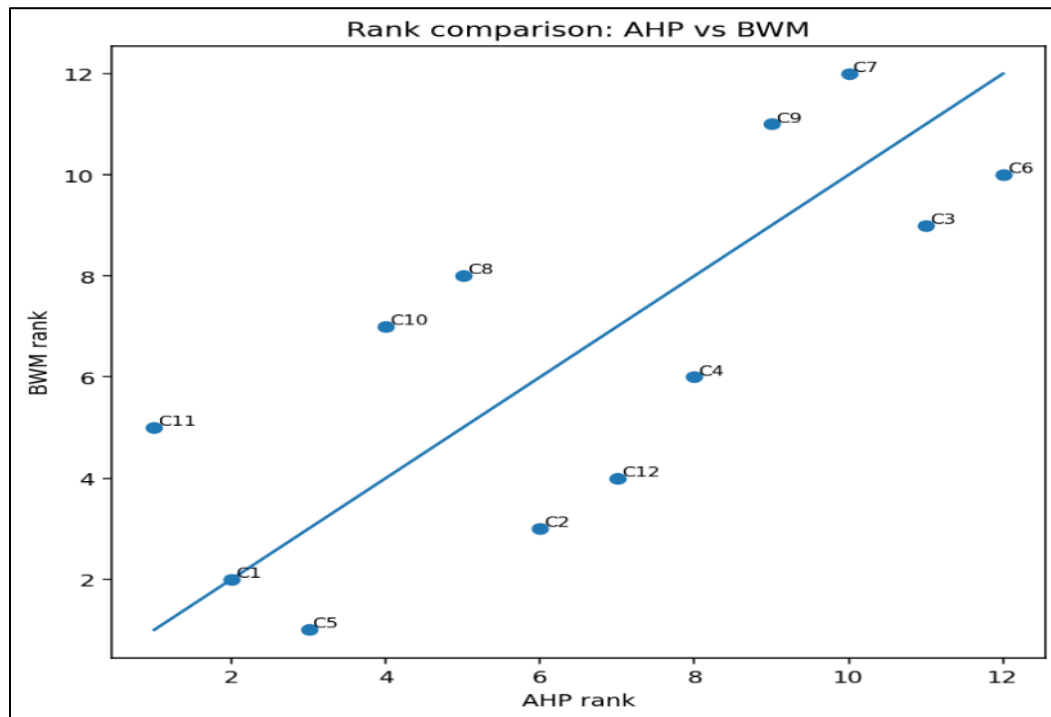
4.5.1 Ranking Comparison

Table 10: AHP vs BWM Ranking Comparison

CSF	AHP Rank	BWM Rank	Difference
Merchant Communication (C11)	1	5	+4
Delivery Reliability (C1)	2	2	0
Cash Collection Accuracy (C5)	3	1	-2

Customer Trust (C10)	4	7	+3
COD Risk Control (C12)	12	4	-8

Figure 5: AHP vs BWM Ranking Comparison (Python Visual)



Interpretations of AHP vs BWM Ranking Comparison: The comparison reveals both convergence and divergence.

- Strong agreement on delivery reliability.
- BWM prioritizes financial and risk factors more strongly.
- AHP emphasizes relationship-oriented factors more prominently.

4.5.2 Correlation Analysis

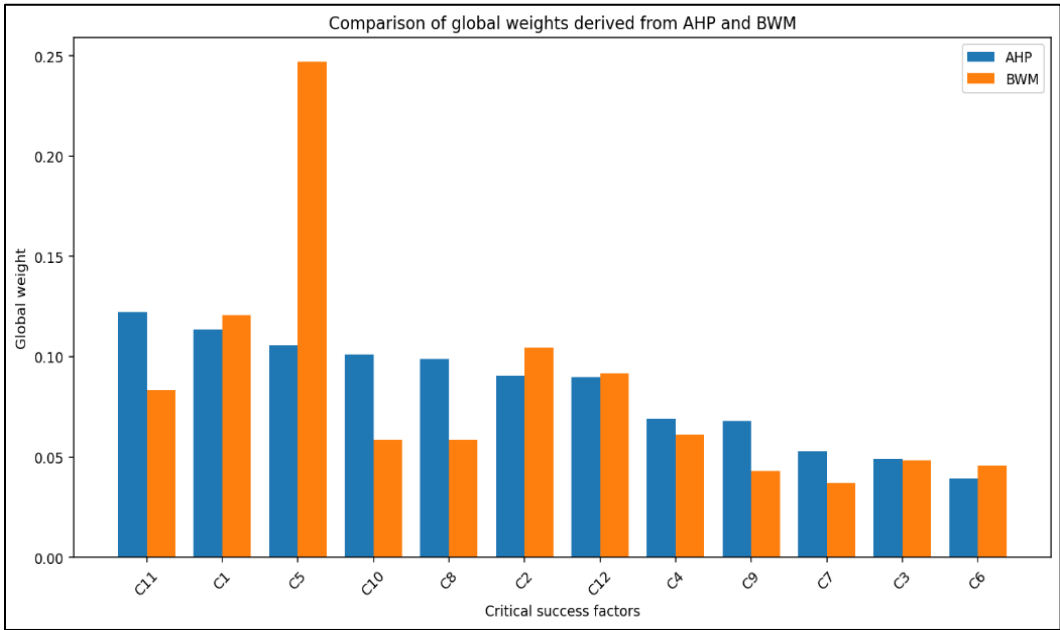
- Spearman's Rank Correlation (ρ): 0.7343 ($p = 0.0065$)
- Kendall's Tau (τ): 0.5455 ($p = 0.0138$)

The correlation analysis reveals a strong and statistically significant positive relationship between the AHP and BWM rankings, as indicated by the Spearman's and Kendall's coefficients. This

confirms that both methods produce highly consistent prioritization patterns, despite their methodological differences. From an analytical perspective, the strong correlation validates the robustness of the results, suggesting that the identified CSFs and their relative importance are stable across different MCDM approaches. Practically, this implies that decision-makers can rely on the findings with confidence, as the prioritization is not dependent on a single technique. Overall, the correlation results strengthen the credibility and generalizability of the study’s outcomes.

4.5.3 Comparative Weight Distribution (AHP vs BWM)

Figure 6: Comparative Weight Distribution (AHP vs BWM) (Python Visual)



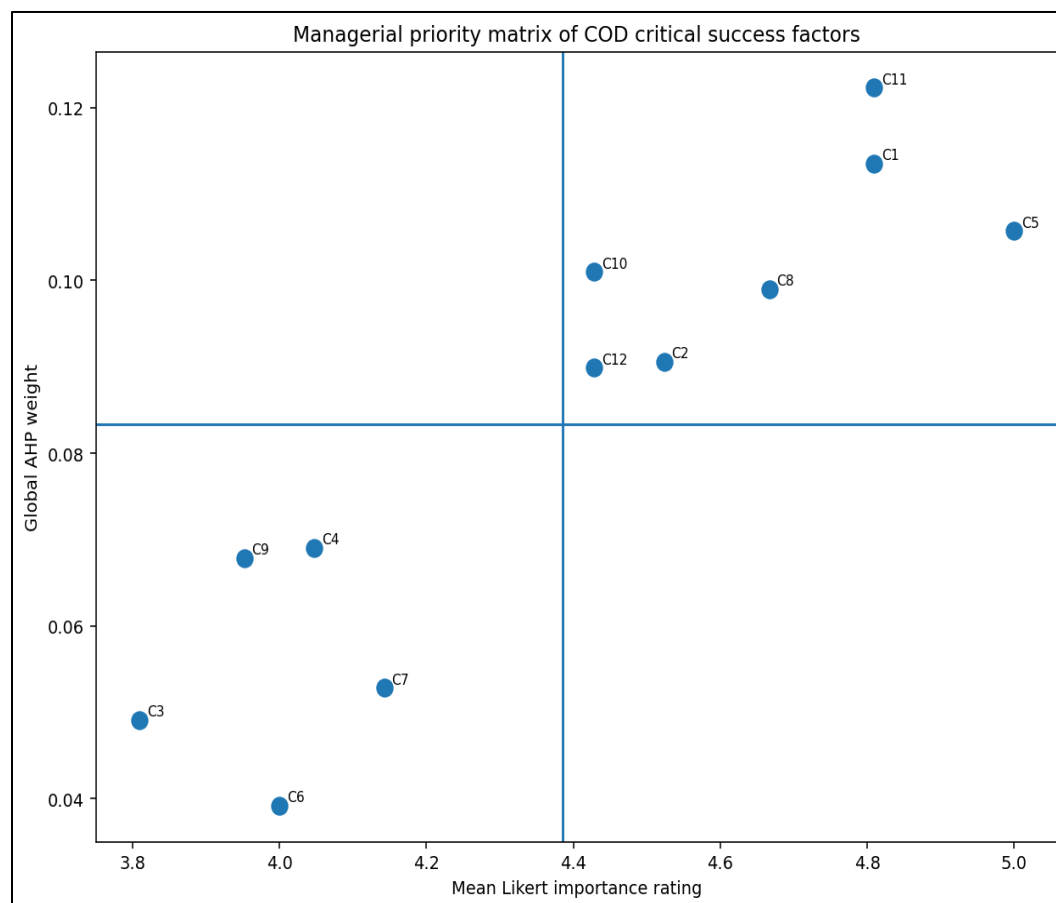
4.6 Synthesis of Key Findings for Actionable Insights and Strategies

Table 11: Overall findings from the analysis

Key Finding	Observations	Explanation
Financial Integrity as the Core Driver	Cash Collection Accuracy dominates BWM results.	Highlights the high financial sensitivity of COD systems. This emphasizes the need for robust cash-handling protocols and timely remittances.

Operational Excellence as a Consistent Requirement	Delivery Reliability is consistently top-ranked.	Confirms that execution quality is critical. Timely and accurate deliveries are essential for service performance.
Context-Specific Importance of Communication	Merchant Communication ranks highest in AHP.	Reflects coordination challenges in Bangladesh. Effective merchant and customer communication is crucial to minimize errors and failures.
Emerging Importance of Risk Management	Highlighted strongly in BWM.	Indicates growing concerns regarding fraud and cash security. The necessitates proactive risk mitigation measures.
Technology as an Enabler	Digital Tracking and IT Integration play supporting roles.	While not primary drivers, technology supports transparency, monitoring, and operational efficiency.

Figure 7: Managerial Priority Matrix of cash-on-delivery (COD) CSFs (Python Visual)



This study critically examines the Critical Success Factors (CSFs) that influence Cash-on-Delivery (COD) services within Third-Party Logistics (3PL) in Bangladesh, with the aim of enhancing operational efficiency and service quality. Through the application of Analytic Hierarchy Process (AHP) and Best-Worst Method (BWM), this research provides a comprehensive analysis of the key drivers that impact COD service delivery.

The findings reveal that operational excellence remains the cornerstone of COD service performance, with Delivery Reliability (C1) and Last-Mile Delivery Efficiency (C2) emerging as the most critical factors. These operational elements are closely followed by Financial Accuracy (C5), emphasizing the importance of precise cash collection systems. Merchant Communication (C11) also plays a significant role, particularly in coordinating with e-commerce merchants, which is essential for minimizing delays and errors in COD operations.

Notably, Risk Management (C12) is growing in importance due to concerns over fraud and cash security. This indicates a need for logistics providers to develop robust mechanisms to safeguard cash transactions and enhance security protocols. Meanwhile, technological factors such as Digital Tracking (C8) and IT Integration (C9), while important, serve primarily as enablers of operational transparency and efficiency rather than primary drivers of COD performance.

The comparative analysis between AHP and BWM revealed a strong correlation (Spearman's $\rho = 0.7343$) between the rankings derived from both methods, validating the consistency and robustness of the results. This convergence suggests that the identified CSFs are not dependent on a single decision-making technique, reinforcing the generalizability and applicability of the findings.

Chapter 5: Recommendations and Conclusion

5.1 Recommendations

5.1.1 Strengthen Operational Capabilities:

Action: Include last-mile optimization of delivery in the list of priorities (implementation of AI-based optimal route planning solutions and dynamic scheduling systems). Such tools may assist in minimizing the delivery delays, enhancement of efficiency and optimization of the delivery routes, especially in busy cities like Dhaka.

Justification: The CSFs that ranked first, which are delivery reliability and last-mile efficiency, will result in better customer satisfaction and improved service reliability positively due to the improvement of these operational processes.

Anticipated Effects: Customer complaints and returns will be minimized through better deliveries on time, damage and refund costs would be lower, positive scrutiny of the customers. Hence, a crucial to keep merchant satisfaction high.

5.1.2 Enhance Financial Management Systems:

Action Plan: Strengthen the current cash handling procedures by incorporating more automated payment reconciliation tools, which will help guarantee that the cash is collected in good time, minimize mistakes and improve financial processes.

Rationale: Since the accuracy of cash collection is also one of the determinants of the success of COD services, these systems will ensure that the discrepancies related to payment processing will be eliminated, minimizing the operational risks and avoiding disputes with merchants.

Projected Change: More accurate collection of cash will lead to improved trust between service providers and merchants as well as customers and will lead to longer relations and less friction in the process of COD. The “cash rolling” tendency of delivery riders to keep cash in their position for longer (so, that they can exploit it for their own purpose, elsewhere), and faster remittance speed of service revenue.

5.1.3 Enhance Merchant Communication and Onboarding Experience:

Action: Develop offensive merchant support services focusing on improving communication with e-commerce partners, offering proactive troubleshooting and making sure that merchants are familiar with logistics processes, in particular, COD transactions.

Rationale: The importance of merchant communication has become one of the best rated aspects of AHP that indicates the essence of enhancing a smooth stream of operations and minimizing compulsions or delays in the COD procedures.

Projected work: With an excellent communication process, the faster onboarding, the greater compliance with the expectations of the merchants, and the fewer logistical errors are anticipated, all of the mentioned can enhance the productivity of the services and customer satisfaction.

5.1.4 Develop a Robust Risk Management Framework:

Action: Select elaborate fraud detection and prevention mechanisms, such as sophisticated transaction monitoring, ID authentication mechanisms, and secure protocols of sending and receiving payment in order to reduce risks related to cash in COD operations.

Rationale: Since the COD risk control priority (fraud and cash security) is gaining importance, the creation of such a framework is crucial to the safe handling of cash and its protection of transactions.

Projected Effect: The reinforcement of risk controls will significantly reduce the possible financial loss as well as increase customer and merchant confidence in an organization, thereby increasing the credibility of COD services.

5.1.5 Target Data-Driven Decision Making:

Action: Incorporate data analytics into the decision-making at all levels, logistics operational metrics, for warehouse and hub performances, the analysis of customer feedback, for the business development department (specially in Activation and Post Sales wing), and optimization of routes. Consider operational data regularly to realize bottlenecks and areas of improvement.

Rationalization: Data analytics use as technology will enable the 3PL providers to take better decisions that will in turn lead to efficient and customer satisfaction relating to the services offered.

Projected Impact: There will be increased smartness in operations, better operational decision making and eventual increased services in overall operational levels within the operations of COD.

5.2 Conclusion

The study entails a detailed discussion of the Critical Success Factor (CSFs) that influence Cash-on-Delivery (COD) services in Third-Party Logistics (3PL), in this case, in Bangladesh settings. The Analytic Hierarchy Process (AHP) and Best-Worst Method (BWM) the study has named operational reliability and financial accuracy as the most critical drivers of COD service success. Communication and risk management are also playing critical role in ensuring flawless operations. The rationale behind the recommendations offered is the empirical evidence gathered by conducting the surveys with experts and the use of the refined MCDM methods. Logistics providers can also make COD services to be more efficient, reliable and secure by increasing their operational capacity, raising financial management systems and augmenting risk management frameworks.

To sum up, the results of the present research do not only add to the scholarly body of the literature on the topic of logistics performance, but also offer practical recommendations to the industry owners. When these recommendations are executed successfully, there will be better and more efficient COD services, improved customer confidence, and more competitive 3PL in Bangladesh, which will eventually contribute to the further changes in the e-commerce sector.

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Appendix: A

Survey Questionnaire:

Section A: Respondent's Profile

Question	Options
A1. Current role	☐ Team Leader (KAM) ☐ Supervisor KAM (Business Development) ☐ Senior Executive (Business Development) ☐ Assistant Manager (Business Development) ☐ Manager (Business Development) ☐ Others: _____
A2. Years of experience	☐ <1 ☐ 2 to 3 ☐ 4 to 5 ☐ more than 5
A3. Area of expertise	☐ Post Sale Services (KAM Operations) ☐ Activation ☐ Sales ☐ Lead ☐ Operations Department ☐ Billing and Finance ☐ All above ☐ Others: _____
A4. Involvement in COD operations	☐ Very low ☐ Low ☐ Moderate ☐ High ☐ Very high

Section B: Importance Rating of CSFs

Rating System/Scale:

1 = Not important | 2 = Slightly important | 3 = Moderate | 4 = Important | 5 = Extremely Important

Code	Factor	Dimension	1	2	3	4	5
CSF 1	Delivery reliability	<i>Operational</i>	☐	☐	☐	☐	☐
CSF 2	Last-mile delivery efficiency	<i>Operational</i>	☐	☐	☐	☐	☐
CSF 3	Failed delivery & return handling	<i>Operational</i>	☐	☐	☐	☐	☐
CSF 4	Workforce competence & responsiveness	<i>Operational</i>	☐	☐	☐	☐	☐
CSF 5	Cash collection accuracy	<u>Financial</u>	☐	☐	☐	☐	☐
CSF 6	Remittance speed	<u>Financial</u>	☐	☐	☐	☐	☐
CSF 7	Cost efficiency	<u>Financial</u>	☐	☐	☐	☐	☐
CSF 8	Digital visibility & tracking	<i>Technology</i>	☐	☐	☐	☐	☐

CSF 9	IT integration with merchants	<i>Technology</i>	☐	☐	☐	☐	☐
CSF 10	Customer trust in COD	<u>Relationship</u>	☐	☐	☐	☐	☐
CSF 11	Merchant communication	<u>Relationship</u>	☐	☐	☐	☐	☐
CSF 12	COD risk control (fraud & cash security)	<i>Risk</i>	☐	☐	☐	☐	☐

Section C: AHP Pairwise Comparisons

Scale from (1 to 9) for parts C1, C2, C3, C4, and C5

1 = Equal importance

3 = Moderate importance

5 = Strong importance

7 = Very strong

9 = Extreme

(2,4,6,8 = intermediate)

C1. Compare Dimensions

Pair	Which is more important?	Scale (1–9)
Operational Vs. Financial	☐ Left ☐ Equal ☐ Right	
Operational Vs. Technological	☐ Left ☐ Equal ☐ Right	
Operational Vs. Relationship	☐ Left ☐ Equal ☐ Right	
Operational Vs. Risk	☐ Left ☐ Equal ☐ Right	
Financial Vs. Technological	☐ Left ☐ Equal ☐ Right	
Financial Vs. Relationship	☐ Left ☐ Equal ☐ Right	
Financial Vs. Risk	☐ Left ☐ Equal ☐ Right	
Technological Vs. Relationship	☐ Left ☐ Equal ☐ Right	
Technological Vs. Risk	☐ Left ☐ Equal ☐ Right	
Relationship Vs. Risk	☐ Left ☐ Equal ☐ Right	

C2. Operational Capability

Pair	Which is more important?	Scale (1–9)
Delivery reliability (CSF1) Vs. Last-mile delivery efficiency (CSF2)	☐ CSF1 ☐ Equal ☐ CSF2	
Delivery reliability (CSF1) Vs. Failed delivery & return handling (CSF3)	☐ CSF1 ☐ Equal ☐ CSF3	
Delivery reliability (CSF1) Vs. Workforce competence & responsiveness (CSF4)	☐ CSF1 ☐ Equal ☐ CSF4	

Last-mile delivery efficiency (CSF2) Vs. Failed delivery & return handling (CSF3)	☐ CSF2 ☐ Equal ☐ CSF3	
Last-mile delivery efficiency (CSF2) Vs. Workforce competence & responsiveness (CSF4)	☐ CSF2 ☐ Equal ☐ CSF4	
Failed delivery & return handling (CSF3) Vs. Workforce competence & responsiveness (CSF4)	☐ CSF3 ☐ Equal ☐ CSF4	

C3. Financial Capability

Pair	Choice	Scale (1–9)
Cash collection accuracy (CSF5) Vs. Remittance speed (CSF6)	☐ CSF5 ☐ Equal ☐ CSF6	
Cash collection accuracy (CSF5) Vs. Cost efficiency (CSF7)	☐ CSF5 ☐ Equal ☐ CSF7	
Remittance speed (CSF6) Vs. Cost efficiency (CSF7)	☐ CSF6 ☐ Equal ☐ CSF7	

C4. Technology

Pair	Choice	Scale (1–9)
Digital visibility & tracking (CSF8) Vs. IT integration with merchants (CSF9)	☐ CSF8 ☐ Equal ☐ CSF9	

C5. Relationship

Pair	Choice	Scale (1–9)
Customer trust in COD (CSF10) Vs. Merchant communication (CSF11)	☐ CSF10 ☐ Equal ☐ CSF11	

Section D: BWM (Best-Worst Method)

D1. Select Best and Worst Factors (among the 12 above) according to your judgement.

	Answer
Most important (Best) factor:	
Least important (Worst) factor:	

Your Name: _____

Your Mobile: _____

Your Signature: _____

D2. Best-to-Others Comparison

**Rate how strongly the BEST factor (you chose) is preferred over others.
Score (1–9)**

Factor	Score
Delivery reliability	
Last-mile delivery efficiency	
Failed delivery & return handling	
Workforce competence & responsiveness	
Cash collection accuracy	
Remittance speed	
Cost efficiency	
Digital visibility & tracking	
IT integration with merchants	
Customer trust in COD	
Merchant communication	
COD risk control (fraud & cash security)	

D3. Others-to-Worst Comparison

**Rate how strongly each factor is preferred over the WORST factor (you chose).
Score (1–9)**

Factor	Score
Delivery reliability	
Last-mile delivery efficiency	
Failed delivery & return handling	
Workforce competence & responsiveness	
Cash collection accuracy	
Remittance speed	
Cost efficiency	
Digital visibility & tracking	
IT integration with merchants	
Customer trust in COD	
Merchant communication	
COD risk control (fraud & cash security)	

Appendix: B

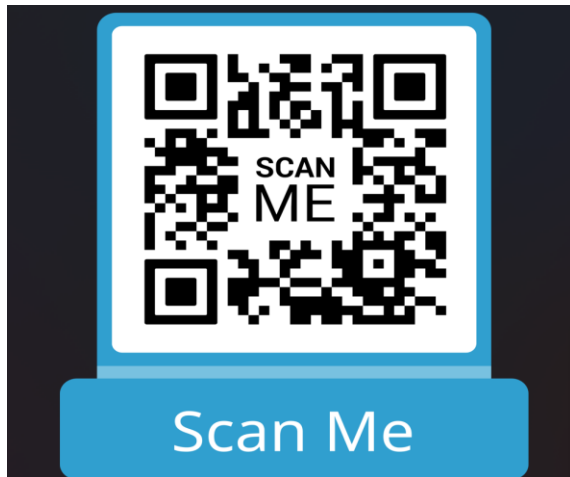
Copy of company-provided internship confirmation/acceptance letter (attached).



Appendix: C

Hyperlink for the Google Colab studio:

<https://colab.research.google.com/drive/1Hwb-Zk0TbG1AVnMfhQrM0illp5CihWQ?usp=sharing>



The above link and QR code are accessible upon one click, and anyone with the link can view and comment on the Python file. The python codes are many pages long and the charts are too big to be attached in the appendix. Additionally, the tables are many in numbers the author has decided to put a hyperlink for the sake of sustainability, sustainable consumption, and proper utilizations of scarce resources (as this “Internship Report” is to be printed later on). Hence, to avoid waste this endeavor was implemented.

Appendix: D



INTERNSHIP PROPOSAL FORM

Name:	Naimul Islam Jishan
ID:	221011194
Department:	BBA
Supervisor's Name (Faculty):	Shawkat Tanveer Rahman
Organization Name:	StaedFast Courier Ltd.
Internship Title:	Evaluating Critical Success Factors of Cash-on-Delivery (COD) Services in Third-Party Logistics: A Bangladesh based MCDM study.

April 19, 2026

Student's signature & date

Supervisor's signature & date

Appendix: E

Naimul Islam Jishan_221011194.pdf			
ORIGINALITY REPORT			
10%	8%	4%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS
PRIMARY SOURCES			
1	global.oup.com Internet Source	2%	
2	www.mdpi.com Internet Source	1%	
3	Submitted to King Fahd University for Petroleum & Minerals Student Paper	<1%	
4	ir.knust.edu.gh Internet Source	<1%	
5	real.mtak.hu Internet Source	<1%	
6	www.ijceas.com Internet Source	<1%	
7	Torabi, S. Ali, Ramin Giahi, and Navid Sahebjamnia. "An enhanced risk assessment framework for business continuity management systems", Safety Science, 2016. Publication	<1%	
8	civilejournal.org Internet Source	<1%	
9	Submitted to University of Canberra Student Paper	<1%	
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