

Improving Performance Of Store Management: A Case Study Of The IVVR Project At Bangladesh Power Development Board

By

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A thesis submitted to the Department of BRAC Institute of Governance and
Development in partial fulfillment of the requirements for the degree of
Masters in Procurement and Supply Management

Masters in Procurement and Supply Management
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Declaration

It is hereby declared that

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

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Subject: Submission of Supply Chain Management in Practice

Dear Sir,

This is my pleasure to submit my practicum dissertation titled “Improving Performance of Store Management: A Case Study of the IVVR Project at Bangladesh Power Development Board.” as a part of part of fulfillment of the requirement for the degree of Masters in Procurement and Supply Management at BRAC university. This practicum Dissertation outlines my learning from this study. I believe that this study will contribute to my academic and professional growth.

I have attempted my best to finish the Dissertation with the essential data and recommended proposition in a significant manner as possible.

Sincerely yours,

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Certificate

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I also certify that I have gone through the draft and final version of the dissertation and found it satisfactory for submission to the BRAC Institute of Governance and Development, BRAC University for the partial fulfillment of the requirement for the degree of Masters in Procurement and Supply Management (MPSM).

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Abstract

The Bangladesh Power Development Board (BPDB) is a state-owned organization that plays a pivotal role in the power sector of Bangladesh, responsible for generating, transmitting, and distributing electricity across the country. BPDB's mission is to ensure a stable, reliable, and sustainable energy supply to meet the growing demand for electricity. Over the years, BPDB has expanded its infrastructure, upgraded its facilities, and adopted technological innovations to support the nation's energy requirements.

Approximately 90% of BPDB's total expenditure is allocated to the procurement of equipment and materials essential for construction and maintenance. Effective storage, management, and redistribution of these materials are crucial to ensuring operational efficiency. The warehouse function plays a pivotal role in adding value to the supply chain by optimizing inventory management and reducing waste.

Given the large expenditure involved, continuous upgrades in store management practices are necessary to enhance efficiency. By adopting cutting-edge technology, BPDB can further streamline its operations, improve resource utilization, and strengthen its overall effectiveness in managing the power sector's growing demands.

A store is primarily regarded as an expenditure rather than a direct revenue-generating function. a store (or inventory/storage) represents an expense due to the costs associated with purchasing, maintaining, and managing stock. However, efficient inventory management can help minimize unnecessary costs and enhance overall financial performance.

To effectively manage inventory and forecast demand, which enhances purchasing power leverage, businesses should prioritize accurate demand forecasting, utilize inventory classification systems like ABC analysis, optimize order quantities using methods like Economic Order Quantity (EOQ), and leverage technology to track real-time inventory levels, enabling timely purchasing decisions to secure the best prices and minimize overstocking.

In today's world, warehouse management is an integral part of all businesses, ensuring efficiency in storage, distribution, and inventory control. If effectively and efficiently organized, BPDB warehouses can provide safe custody of materials, clear monitoring and

accountability, and the timely distribution of the right goods in optimal condition to all user departments. A well-managed warehouse system can also help BPDB achieve maximum profitability with minimal investment by optimizing ordering costs and reducing excess inventory carrying costs.

This study examines the store management system at the Bangladesh Power Development Board (BPDB), with a focus on the challenges and opportunities associated with the use of IVVR Software. Historically, BPDB's store management was based on manual, paper-driven processes. However, the digital transformation of Bangladesh has prompted BPDB to adopt a more modern approach, beginning with the implementation of the IVVR project in June 2000.

The research aims to evaluate the effectiveness of this transformation by collecting data from various stakeholders within BPDB, including executive engineers, storekeepers, and other personnel involved in public procurement. The study employs a mixed-method approach, utilizing both qualitative and quantitative research methods. Data was collected through a structured questionnaire, which includes both closed and open-ended questions, administered via email and WhatsApp. The findings highlight both the challenges faced by BPDB's store management system, as well as the opportunities that the IVVR Software offers in improving operational efficiency. The results are presented through tables, pie charts, and column charts using Microsoft Excel and Word. The study's findings provide valuable insights into the ongoing digitalization of BPDB's procurement and store management processes, and offer recommendations for further improvements.

Warehouse management plays a crucial role in controlling the flow of materials entering and being distributed within an organization. This study aims to offer valuable insights to BPDB policymakers by identifying areas for improvement in the existing warehouse management system. Implementing strategic enhancements can significantly boost operational efficiency, accountability, and overall performance in BPDB's supply chain operations.

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Chapter-1

Introduction

1.1 Background of the study

A warehouse is a storage facility that acts as an intermediate hub for raw materials or finished products, ensuring their safekeeping until they are needed for production or consumption. It serves as a buffer in the supply chain, facilitating efficient inventory management and timely distribution. Warehousing plays a crucial role in both private and government operations, ensuring a smooth flow of materials and goods. The Bangladesh Power Development Board (BPDB) operates warehouses as critical facilities for storing and managing inventory, including raw materials and essential equipment for power generation and distribution. These warehouses serve as buffer zones, ensuring a steady supply of materials needed for operational continuity.

Warehousing and inventory management are vital components of BPDB's supply chain, playing a crucial role in maintaining efficiency across its operations. The effectiveness of warehouse management directly influences the overall performance of BPDB's supply chain, impacting the reliability and sustainability of the country's power sector.

1.2 Objectives

The efficient management of store operations is vital for the overall performance of any organization, particularly in the energy sector where inventory plays a crucial role in ensuring continuous generation and maintain reliable power supply. This research aims to explore the challenges and opportunities in store management within the context of the Identification Verification Valuation and Report (IVVR) project at the Bangladesh Power Development Board (BPDB).

1.3 Statement of the problem

This study aims to compare BPDB's virtual store management practices with the traditional manual system while critically examining the challenges associated with IVVR software. Like any new software, IVVR faces initial implementation challenges that need to be identified and addressed early to enhance its effectiveness in store management.

Additionally, certain aspects of store management are not currently integrated into the existing software. Identifying and incorporating these missing features in future updates will unlock new opportunities for improvement. By exploring these unexplored areas, the organization can

maximize the software's potential, creating a synergistic effect that enhances overall store management efficiency. Ultimately, these advancements will elevate BPDB's store management system to new heights, adding significant value to the organization.

1.4 Justification

One of the key motivations for this research is the lack of a dedicated study evaluating the challenges and opportunities associated with IVVR software in store management, as well as identifying potential improvements to enhance its effectiveness. Within the Bangladesh Power Development Board (BPDB), store management is often perceived as a cost center rather than a value-adding function, with its contribution to the organization's wealth maximization largely overlooked by management.

At times, BPDB's top leadership has expressed dissatisfaction with store management performance, prompting internal audits to diagnose underlying issues. However, despite these interventions, store management efficiency has continued to decline over time. This study seeks to bridge this gap by offering insights and strategic recommendations for BPDB policymakers, aiming to improve the efficiency and effectiveness of store management practices.

1.5 Methodology

This study will utilize questionnaires and interviews as the primary data collection methods. The questionnaire will be designed to gather insights from officers and staff who are directly or indirectly involved in procurement and store management. Its primary focus will be on identifying the challenges and opportunities related to the IVVR store management software, providing a comprehensive understanding of its effectiveness and areas for improvement.

To enhance the effectiveness of the questionnaire, a pretest will be conducted, incorporating feedback from practitioners to refine and improve its clarity and relevance. Before distributing the questionnaire, the research objectives will be briefly explained to the respondents to ensure they have a clear understanding of the study's purpose. After the initial discussion, practitioners will be invited to participate by completing the questionnaire.

Finally, a comprehensive report will be prepared following the guidelines of the Institute of Governance Studies, BRAC University, under the supervision of the designated faculty advisor.

1.6 Limitations of the Research

The scope and methodology of this study present certain limitations that may impact the overall research quality. Although the Bangladesh Power Development Board (BPDB) operates both central and regional warehouses across the country, this study focuses on only two to three locations, which may not fully capture the broader operational landscape. While areas for improvement have been identified and recommendations have been provided accordingly, the study's scope remains limited.

Additionally, the interviews were conducted solely within BPDB, excluding other key stakeholders such as developers and suppliers, who play a crucial role in the procurement process. Furthermore, employees selected for key informant interviews (KIIs) were chosen based on the researcher's convenience rather than a systematic selection process, potentially affecting the diversity of perspectives.

Another limitation is the varying levels of knowledge and experience among questionnaire respondents in the field of procurement. This disparity may influence the consistency and reliability of the findings. During personal interviews, respondents were asked to share their views based on personal perceptions, which naturally vary among individuals and could introduce bias. Moreover, some participants were unable to allocate sufficient time for the interviews due to their professional commitments, limiting the depth of responses.

Time constraints for completing the research also posed a challenge, potentially affecting the comprehensiveness of the study. Additionally, the sample size was limited to only 64 employees. Expanding the sample size could have yielded more representative and generalizable results.

1.7 Chapter Outline

This research is structured into six chapters, each addressing different aspects of the study.

The first chapter, Introduction, provides an overview of the Bangladesh Power Development Board (BPDB) and its store management system. It outlines the scope of the research, its objectives, and the justification for conducting the study. Additionally, this chapter presents the problem statement, details the methodologies to be employed, and discusses any potential limitations of the research.

The second chapter, Organizational Orientation, provides an overview of BPDB, including its background, management structure, organizational framework, and mission and vision. This chapter offers a comprehensive understanding of the organization's operational framework and strategic direction.

The third chapter, Research Methodology, provides a detailed explanation of the research design, including the selection criteria for interviewees, the framework of the questionnaire, and the methods for ensuring valid data interpretation through triangulation. This chapter outlines the systematic approach used to collect and analyze data for the study.

The fourth chapter, Literature Review, presents a generalized concept of store management, serving as the foundational framework for this research. This chapter explores existing theories, practices, and studies relevant to store management, providing the necessary context for conducting the study.

The fifth chapter, Analysis of Results, focuses on data interpretation using appropriate analytical methods. It presents findings on the current performance of store management and explores potential strategies for improvement. This chapter provides a comprehensive assessment of the collected data to identify key challenges and opportunities.

The sixth and final chapter, Conclusion and Recommendations, outlines strategic guidelines to enhance the efficiency and effectiveness of store management. Additionally, it discusses the limitations and assumptions of the study and highlights the scope for further research in this area.

Chapter -2

Organizational Context

2.1 History

The electricity supply industry in South Asia originated in the 1890s with the commissioning of the first power station. Over the next two decades, several small, isolated power stations were established, primarily serving localized distribution networks in major urban areas.

A significant milestone in structuring a legal framework for the industry came with the enactment of the Indian Electricity Act of 1910. This legislation marked a major step in regulating the sector, which at the time operated under an outdated model of privately owned, isolated distribution networks reliant on small-scale generation stations.

The Indian Electricity Act of 1910 aimed to establish a formal regulatory framework for electricity supply, focusing on defining the rights and obligations of both suppliers and consumers. However, it largely reflected the industry's structure at the time, which was based on small-scale, independent operations rather than a unified, national network. The Act was instrumental in shaping the legal and operational landscape of the electricity supply industry in South Asia for many years.

British Era:

During the British era, electricity was seen as a privilege reserved for the affluent Area. Approximately 125 years ago, in East Bengal, which is now Bangladesh, King Bhawal became notable for being the first to use electricity in the Gazipur District. In the 19th century, he imported a generator from a developed country to provide electricity for the Bhawal State. The local people of Bhawal State, far removed from modern technology, were not only amazed for royalty and luxuriousness but also began to envision the widespread use of electricity.

In 1901, a generator was installed at the residence of Nawab Ahsanullah in Dhaka. Mr. Volten, a British citizen, was the first to press the switch to supply electricity to Ahsan Manzil at 07 December 1901. The Octavius Steel Company, financed by Nawab Ahsanullah, gradually provided power to VIP streets and important buildings surrounding Ahsan Manzil. However, the power supply was limited to the aristocratic areas due to the company's capacity.

In 1919, the British company DEVCO began its limited commercial operations in power distribution in Dhaka. By 1933, the company established a 6.00 MW power plant, the Dhanmandi Power House, in Paribagh, Dhaka. The main consumers of this electricity were

wealthy families from affluent areas, making power a symbol of aristocracy.

After the British colonial rulers departed in 1947, power generation and distribution in this region were managed by a handful of private companies. Electricity was supplied to 17 provincial districts in a limited capacity, primarily at night. The generation voltage was typically 400 volts, with the exception of Dhaka City, which received power from two 1500 kW generators operating at 6600 volts, the highest supply voltage at the time. There were no long-distance transmission lines and some industries—such as tea, sugar, textiles, and railway workshops—also generated their own power. Prominent facilities included the Dhakeswari Cotton Mills, Pahartali Railway Workshop, Saidpur Railway Workshop, and several sugar mills. The country's total power generation capacity was just 21 MW, with utility companies supplying only 7 MW, and no transmission system in place. Initially, electricity was available only to a privileged few living in district and sub-divisional headquarters.

The distribution networks in these cities operated independently and were powered by coal-fired steam power plants or diesel generators. In 1948, the Electricity Directorate was formed to plan and enhance the power supply system. By 1959, the establishment of the Water and Power Development Authority (WAPDA) marked a significant step forward in the power sector. In 1960, the Electricity Directorate was merged with WAPDA to provide greater autonomy and accelerate the development of this essential infrastructure. This period saw the construction of higher-capacity plants, including those in Siddhirganj, Chittagong, and Khulna. The Ordinance effectively authorized the government to take over all generation, transmission, and distribution facilities from the private sector, establishing a complete government monopoly in the power sector. Between 1960 and 1970, the generation capacity of then East Pakistan increased from 88 MW to 475 MW, primarily driven by natural gas and oil-fired steam power plants, along with hydropower stations.

The completion of the Kaptai Dam and the commissioning of the Dhaka-Chittagong 132 kV transmission line in 1962 marked significant milestones in the country's power development.

After Bangladesh gained independence in 1972 following a brutal War of Liberation, the Bangladesh Power Development Board (BPDB) was established as a public sector entity to strengthen the power sector. To expand electricity access in rural areas, the Rural Electrification Board (REB) was formed in 1977 and became operational in 1978 as a statutory body under the Ministry of Power, Energy, and Mineral Resources. Governed by the Rural

Electrification Board Act, 2013, its mission is to provide uninterrupted, affordable, and reliable electricity to rural households across Bangladesh, through 80 Pally Biddut Samity (PBSs).

By 2008, the REB had significantly increased rural electricity access, raising the number of subscribers from 7.4 million to 36 million, and achieving 100% electrification. The REB is now engaged in supplying electricity to about 80% of rural areas in Bangladesh, earning a reputation for quality service, transparency, and efficiency. Its ongoing efforts aim to maintain sustainable, high-quality electricity for rural communities.

DPDC (Dhaka Power Distribution Company) was granted a business license on October 25, 2005 and began operations on May 14, 2007. The company officially commenced commercial operations on July 1, 2008, after taking over all assets and liabilities from DESA (Dhaka Electric Supply Authority). Initially, DPDC started with 655,908 subscribers and, as of September 30, 2024, the number of subscribers has grown to 1,810,419 which primarily manage and expand the distribution system in and around Dhaka, with the goal of improving customer service.

On October 1, 2003, the Western Zone of BPDB in 21 districts and 21 upazilas of Khulna, Barisal, and Greater Faridpur divisions, excluding the areas covered by the Rural Electrification Board, was transferred to WZPDCO (Western Zone Power Distribution Company Limited). WZPDCO began its independent operations on April 1, 2005, total number of customers has grown to 16,80,708 at October 24.

Northern Electricity Supply Company (NESCO) Limited began its commercial operations on October 1, 2016, after taking over all the assets and liabilities from the Bangladesh Power Development Board (BPDB). NESCO is an institution of BPDB and provides reliable and affordable electricity to consumers in 39 upazilas, cities, and urban areas across 16 districts in the Rajshahi and Rangpur divisions of northern Bangladesh. The company operates through 55 sales and distribution departments/power supply units. As of June 24, the total number of consumers served by NESCO is 1,915,400.

2.2 Present Structure of Power Sector

Generally, the power system is broadly categorized into three main components: generation, transmission, and distribution. Each of these components involves different organizations and

functions, playing a crucial role in delivering electricity from power plants to consumers. Here's a brief overview of each component and the associated organizations:

Generation:

This is the first stage where electricity is produced. It includes various energy sources such as fossil fuels, nuclear, hydroelectric, wind, and solar power. Power Generation Organization hybrid structure like public, Public owned Company or Private company that own and operate power plants.

- a) Bangladesh Power Development Board (BPDB)
- b) Rural Power Company Limited (RPCL)
- c) North West Power Generation Company Ltd. (NWPGL)
- d) Electricity Generation Company of Bangladesh (EGCB)
- e) Joint Venture Company like RPCL-NORINCO Intl. Power Limited (RNPL)
- f) Ashuganj Power Station Company Ltd. (APSCL)
- g) Independent Power Producers (IPPs)
- h) Import Power from India, Nepal

Transmission:

Power Grid: Strengthening Bangladesh's Electricity Transmission Network

Since its establishment in 1996, Power Grid has been expanding Bangladesh's electricity transmission network to ensure the efficient management of the national power grid. To achieve this objective, the company undertakes comprehensive planning, feasibility studies, research, and the design of substations and transmission lines. Additionally, it is responsible for the construction, operation, and maintenance of transmission lines, grid substations, and the National Load Dispatch Center (NLDC).

Power Grid also maintains a robust internal communication network utilizing optical fiber technology. Currently, it operates transmission lines at 400 kV, 230 kV, and 132 kV across the country. The company manages multiple grid substations, including 400/230 kV, 400/132 kV, 230/132 kV, 230/33 kV, and 132/33 kV facilities. Furthermore, Power Grid has established a

cross-border connection with India via a 1000 MW 400 kV HVDC Back-to-Back station, equipped with two blocks.

In alignment with the government's Master Plan and Vision 2041, Power Grid is steadily strengthening the national grid network to support the country's growing energy needs and ensure a reliable power supply for the future.

Distribution:

Electricity Distribution: Delivering Power to End-Users

The final stage of the electrical power system is electricity distribution, which involves delivering electricity from substations to end-users such as residential homes, commercial establishments, and industrial facilities. This process ensures that power is supplied safely, efficiently, and reliably to consumers.

Key Features of Electricity Distribution

1. Lower Voltage Levels:

Unlike high-voltage transmission systems, which transport electricity over long distances, distribution systems operate at lower voltages, typically ranging from 4 kV to 33 kV. Before electricity reaches end-users, the voltage is further stepped down to 230V (single-phase) or 400V (three-phase) using distribution transformers.

2. Substations and Distribution Transformers:

Electricity from high-voltage transmission lines enters a substation, where transformers reduce the voltage to levels suitable for distribution. From there, distribution transformers further step down the voltage to levels appropriate for consumer use.

3. Distribution Networks:

Distribution networks consist of:

- o **Primary Distribution Lines:** These operate at medium voltage (e.g., 11kV, 33kV) and connect substations to local areas.
- o **Secondary Distribution Lines:** These carry lower voltages (e.g., 230V, 400V) and directly supply electricity to homes and businesses.

- o **Underground and Overhead Lines:** Distribution lines may be overhead, supported by poles, or underground, depending on infrastructure and safety considerations.

4. **Components of a Distribution System:**

A typical distribution system includes:

- o **Feeder Lines:** Carry electricity from substations to distribution transformers.
- o **Service Drop Lines:** Connect transformers to individual consumers.
- o **Meters:** Installed at consumer premises to measure energy consumption.

5. **Reliability and Quality Control:**

Modern distribution systems incorporate automation, smart grids, and advanced monitoring technologies to ensure stable voltage levels, prevent outages, and optimize efficiency. Utilities implement protective devices, such as circuit breakers and fuses, to safeguard the network from faults.

6. **Types of Distribution Systems:**

- o **Radial System:** A simple structure where power flows in one direction from the substation to consumers.
- o **Ring System:** Provides multiple pathways for electricity, enhancing reliability.
- o **Networked System:** Found in urban areas, allowing multiple interconnections for increased stability.

Electricity Distribution Organizations in Bangladesh

Bangladesh achieved 100% electricity coverage in 2021 through the efforts of multiple government utility organizations and companies responsible for power generation, transmission, and distribution. These organizations operate under the Power Division of the Ministry of Power, Energy, and Mineral Resources (MPEMR).

Here is a list of key electricity distribution and transmission organizations in Bangladesh, along with their roles and functions:

Bangladesh Power Development Board (BPDB)

- Established: 1972
- Role: BPDB is the primary government agency responsible for power generation, transmission, and distribution in urban and semi-urban areas.

- Responsibilities:
 - o Owns and operates power plants.
 - o Supplies electricity to major cities except for Dhaka and some other specific regions.
 - o Manages power distribution in areas where other entities do not operate.
 - o Works on renewable energy expansion projects.

Rural Electrification Board (REB)

- Established: 1977
- Role: The REB oversees rural electrification through Palli Bidyut Samity (PBS), which are rural electricity cooperatives.
- Responsibilities:
 - o Implements electrification projects in rural areas.
 - o Works towards expanding electricity access to remote villages.
 - o Operates more than 81 Palli Bidyut Samities (PBSs) across the country.
 - o Focuses on sustainable and affordable electricity solutions for rural populations.

Dhaka Power Distribution Company Limited (DPDC)

- Established: 2005
- Role: DPDC is responsible for electricity distribution in Dhaka city (South) and Narayanganj.
- Responsibilities:
 - o Supplies power to southern and central Dhaka, as well as Narayanganj.
 - o Implements modernized distribution systems like smart grids and underground cabling.
 - o Works to reduce system losses and improve service reliability.

Dhaka Electric Supply Company Limited (DESCO)

- Established: 1996
- Role: DESCO supplies electricity to northern parts of Dhaka city and parts of Gazipur.
- Responsibilities:

- o Focuses on modernizing and digitalizing power distribution in urban areas.
- o Implements prepaid metering and smart grid technology.
- o Enhances efficiency and customer service in electricity supply.

Northern Electricity Supply Company Limited (NESCO)

- Established: 2016
- Role: NESCO is responsible for power distribution in the northern districts of Bangladesh.
- Responsibilities:
 - o Supplies electricity to Rajshahi, Rangpur, and other northern regions.
 - o Focuses on reducing power distribution losses.
 - o Develops automation and smart distribution networks.

West Zone Power Distribution Company Limited (WZPDCL)

- Established: 2002
- Role: WZPDCL manages electricity distribution in southwestern Bangladesh.
- Responsibilities:
 - o Distributes electricity in Khulna, Barishal, and surrounding districts.
 - o Implements smart metering systems.
 - o Works towards improving system reliability and reducing technical losses.

Current Structure of the Power Sector in Bangladesh can be shown as follows

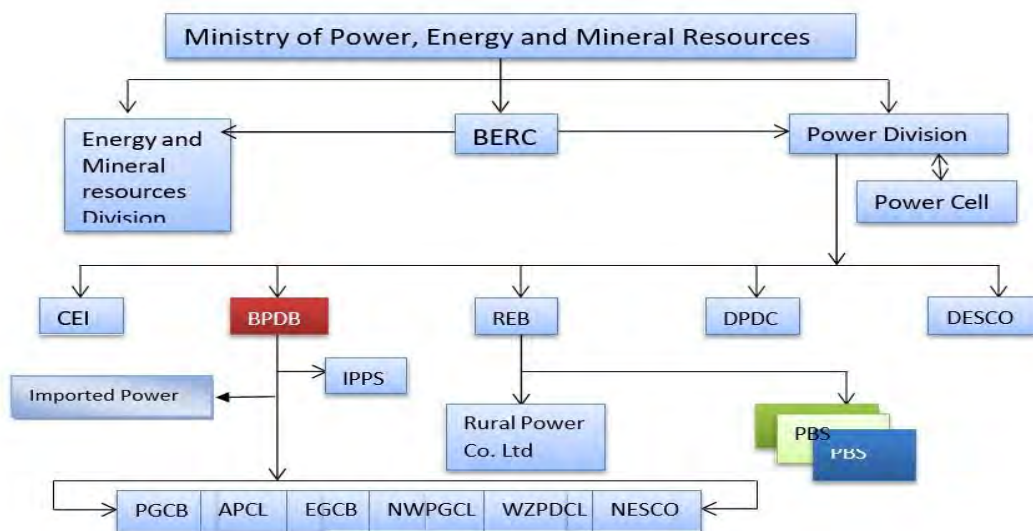


Figure 2.1 The present structure of Power sector

2.3 Function Of BPDB

The Bangladesh Power Development Board (BPDB) plays a crucial role in the country's power sector, overseeing power generation, acting as a key intermediary in electricity trade, and managing distribution in selected regions. Its core functions include:

1. Power Generation

BPDB is responsible for electricity generation through various types of power plants, including:

- Thermal Power Plants (Gas, Coal, and Oil-based)
- Hydropower Plants (e.g., Kaptai Hydroelectric Plant)
- Renewable Energy Projects (Solar, Wind, and Biomass)
- Public-Private Partnerships (PPPs) in generation projects
- Import Power from cross border.

2. Power Trading Model: BPDB as a Single Buyer and Seller

In Bangladesh's power sector, BPDB operates under a single buyer model, where:

- BPDB purchases electricity from different sources, including Independent Power Producers (IPPs), Quick Rental Power Plants (QRPPs), and renewable energy projects.
- BPDB sells the electricity to distribution companies such as DPDC, DESCO, NESCO, WZPDCL, and REB for further supply to consumers.
- This model helps regulate electricity prices and ensure supply reliability across the country.

3. Power Distribution in Urban Areas Outside Dhaka

BPDB also directly distributes electricity in certain urban areas outside the capital city, Dhaka, through four distribution zones:

- Central Zone (Mymensingh Region)
- Southern Zone (Chattogram Region)
- Comilla Zone

- Sylhet Zone

Through these functions, BPDB ensures stable power generation, efficient energy trade, and reliable electricity distribution across Bangladesh, contributing to the country's energy security and economic growth.

2.4 Board Management

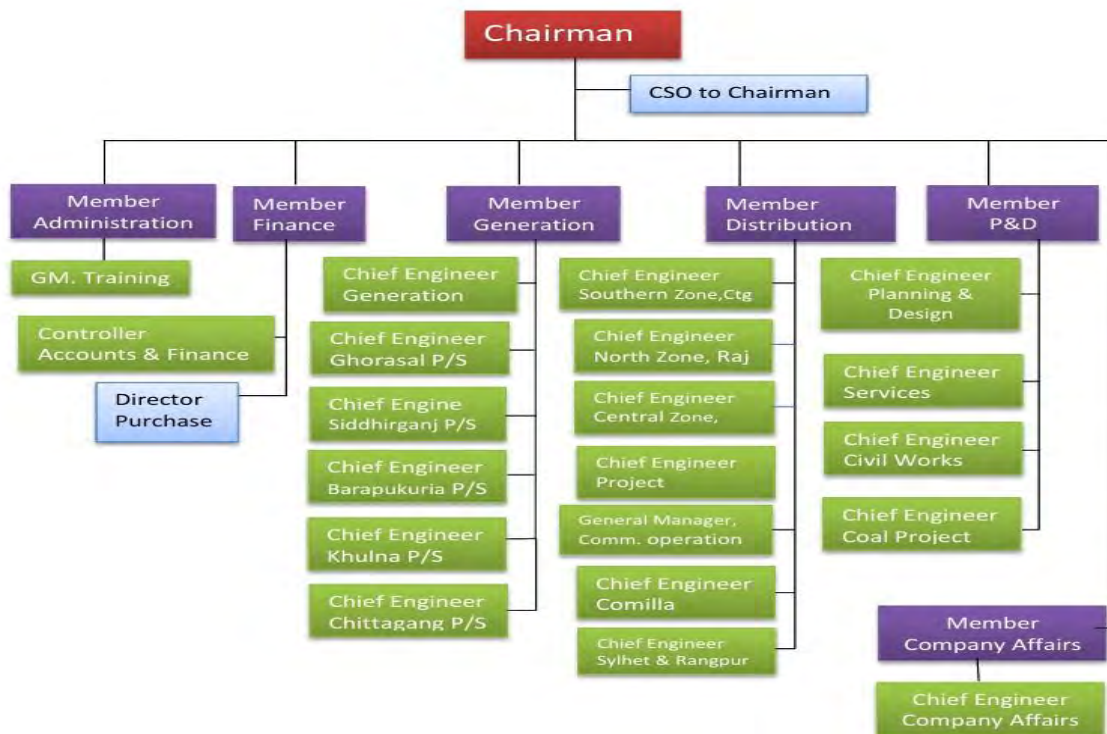


Figure 2.2 Board Management of BPDB

2.5 Store Management in BPDB:

Bangladesh Power Development Board has central office in Dhaka and local office are situated different location in Bangladesh. Bangladesh Power Development Board has three type of procurement which are central procurement, decentralized procurement and hybrid Procurement. So, Store management are link with type of procurement. When Central purchase are happened, the consignment will be delivered in central office. when decentralized procurement is happened in are store goods in local store which is near local procurement office.

Store management in BPDB has a long history, dating back to its early establishment. Initially, store management operated through a fully manual system, relying on paper-based processes.

However, with the wave of digital transformation in Bangladesh, BPDB's store management gradually transitioned to a more modern approach.

The digitalization of store management in BPDB began with the IVVR project, which commenced in June 2000. This marked the beginning of a structured effort to enhance efficiency and reduce dependency on manual processes.

2.6 BPDB's IVVR Project: Fixed Assets and Stores Management

The Bangladesh Power Development Board (BPDB) successfully completed Phase I of the Identification, Verification, Valuation, and Recording (IVVR) Project, which commenced in June 2000 and concluded on December 31, 2004. This initiative aimed to systematically document and assess BPDB's fixed assets and inventory.

Recognizing the significance of maintaining accurate and up-to-date asset records, BPDB emphasized the necessity of revaluing fixed assets and conducting physical verification of stores after a span of 14 years. In response, the Board launched the IVVR Project Phase II, ensuring the continued improvement of asset management and financial transparency within the organization.

2.7 Project Scope and Structure

To meet BPDB's requirements, the project work for IVVR Phase II has been structured into five distinct packages:

Package A: Physical Verification, Valuation, and Recording of Fixed Assets and Stores

This package encompasses the thorough physical verification, valuation, and documentation of BPDB's fixed assets and stores across all its offices in Bangladesh. Due to the extensive scope of the task, Package A is subdivided into seven lots to facilitate the valuation and verification process across 358-unit offices. BPDB's fixed assets are classified into 19 distinct categories. This package aims to accurately calculate and finalize the values of fixed assets and stores, thereby contributing to a significant improvement in BPDB's financial position.

Package B: Codification of Fixed Assets and Stores and Preparation of Manuals

This package involves systematically classifying all fixed assets and store items into major, sub-major, and minor groups. Each item is assigned a unique identification code, which is then recorded in a centralized database. This codification process enables quick identification and retrieval of items, ensuring better visibility of availability across specific store units and the entire inventory network, ultimately improving operational efficiency.

Package C: Digitalization of Fixed Assets and Store Accounting System

This package involved the development of a web-based, online, and centralized fixed asset management and store accounting software by consultant firms. The system seamlessly integrates all fixed asset and store management functions, enabling real-time tracking, reporting, and efficient management of assets and inventory across all BPDB units.

Package D: Operational Service & Maintenance of Fixed Assets and Store Management System, and Support for Online Store Software Implementation

This package is dedicated to the operational service and maintenance of the fixed asset and store management system. Vendors provide these services for a three-year period from the contract commencement date. To ensure the system's seamless operation, a 24/7 helpdesk has been established, offering support via phone and email for issue resolution and user assistance. Currently, the IVVR software operates with dedicated modules for fixed assets and stores, backed by a centralized data center that enables continuous access for BPDB's 358 unit offices.

Package E: Project Administration

This package encompasses the overall administration of the project, ensuring that all activities are coordinated effectively, resources are allocated efficiently, and project milestones are met in a timely manner.

Project Impact

The implementation of the IVR Project Phase II, with its structured approach and innovative use of technology, has significantly enhanced BPDB's asset management capabilities. The

introduction of unique coding for assets and stores, along with the development of a centralized, web-based management system, has streamlined BPDB's operational processes, improved the accuracy of financial reporting, and facilitated better decision-making. By continuously supporting the system through operational maintenance and helpdesk services, BPDB ensures the sustainability and effectiveness of its asset management practices.

CHAPTER-3

Research Methodology

3.1 Introduction

Research is fundamentally about collecting information that provides insights into a subject, helping us make informed decisions. In other words, it is a systematic way of gathering data or information, which is then organized coherently for analysis and application.

A basic research method follows a structured approach to asking questions. Typically, research begins with a specific objective or inquiry. The questions are then formulated and addressed using a systematic framework, known as a methodology. Understanding research methodology is essential, as it enables researchers to apply the appropriate methods to different projects, ensuring accuracy and reliability in their findings.

3.2 Research Methodologies

A questionnaire is a structured set of questions designed to gather information from respondents. It is a widely used tool for conducting surveys, particularly in academic research. This method is considered reliable, easy to administer, and well-accepted for research purposes.

A questionnaire survey is primarily used to collect primary data from stakeholders. In addition to primary data, secondary data is gathered from sources such as newspapers, work progress reports, online databases, and articles related to public procurement. This research applies both qualitative and quantitative methods to ensure a comprehensive analysis

The questionnaire utilized in this study is presented in Annexure A. It consists of two parts:

- **Part A** gathers respondents' profile information, including name, designation, organization name, length of service, experience in public procurement, age, and educational qualifications.
- **Part B** focuses on the challenges and opportunities of IVVR Software. It includes ten closed-ended questions and one open-ended question to identify the challenges faced by IVVR Software. Additionally, it contains thirteen closed-ended questions and one open-ended question to explore the opportunities associated with IVVR Software.

A **Likert scale** is used to measure respondents' perceptions, with the following scale:

- 1 – Strongly Disagree
- 2 – Disagree
- 3 – Neither Agree nor Disagree

4 – Agree

5 – Strongly Agree

3.3 Research area

This research focuses on the store management sector of the Bangladesh Power Development Board (BPDB). The primary target population consists of store officials, ranging from executive engineers to storekeepers. While BPDB has a large workforce, this study specifically selects individuals involved in store management.

BPDB operates across multiple districts with diverse store locations. To collect data, the questionnaire was distributed via email, and respondents submitted their answers through email or WhatsApp.

3.4 Research period

This research was conducted during the Spring 2024 semester (September 2024 to February 2025) as a part of the MPSM course at Brac University.

3.5 Population

The populations of this research are the people who are directly and indirectly engaged with Store Management and procuring activities of Bangladesh Power Development Board.

3.6 Sample Size

A total of sixty-three respondents participated in this study. These respondents hold various roles in the procurement process, including procuring entity members, tender evaluation committee members, approving authorities, tenderers, and others. All participants were selected randomly.

The respondents include Executive Engineers, Sub-Divisional Engineers, Assistant Engineers, and Sub-Assistant Engineers from different procuring entities within the Bangladesh Power

Development Board (BPDB). They represent a diverse range of ages and educational backgrounds, ensuring a comprehensive perspective on the research topic.

3.7 Instrument for data processing and presentation

Both open-ended and closed-ended questions are used in the questionnaire for this study. The collected data is processed using Microsoft Excel, while graphical representations, including tables, pie charts, and column charts, are created using Microsoft Word and Microsoft Excel to present the findings effectively.

3.8 Ethical issue

In this questionnaire survey, the researcher ensured that providing the respondent's name and signature was optional. Additionally, respondents were assured that their responses would remain confidential and would be used solely for academic purposes.

Participants answered the questionnaire willingly, without any force or external influence during the survey process.

Chapter: 4

Literature Review

4.1 Introduction

Store management plays a pivotal role in the Organization, bridging the gap between operational efficiency and customer satisfaction. With the dynamic nature of consumer preferences and the increasing reliance on technology, effective store management has become essential for maintaining competitiveness in the marketplace.

The literature on store management explores a diverse range of topics, including inventory control, customer relationship management, layout optimization, employee productivity, and the integration of technology into daily operations. This body of research provides valuable insights into strategies that contribute to successfully implementation new dimension of store management software and sheds light on emerging challenges in the field.

The objective of this literature review is to analyze existing studies on store management, identify common themes and gaps in the research, and provide a foundation for further investigation. By examining past research, this review aims to contribute to a deeper understanding of best practices in store management and offer insights that can guide future developments in the industry.

This section of the thesis aims to develop a foundational theoretical framework for warehousing systems while examining recent advancements in management concepts. It seeks to explore the availability of theoretical benefits and cutting-edge innovations and investigate how integrating contemporary practices with advanced methodologies can improve the efficiency of BPDB's warehouses and provide tangible added value to BPDB.

4.2 Procurement

Procurement is the process of acquiring goods, services, or works from external sources, typically through a systematic process to ensure the best value, quality, and compliance with organizational or regulatory requirements. It involves identifying needs, selecting suppliers, negotiating contracts, managing the delivery of purchased items or services, inventory control and stores, and disposals and other related functions. Organization are not out sourcing all part of it need. They are sourcing none critical items which are not core of their business. Organization can procure three type which are central and decentral and hybrid procurement.

centralized procurement" means a single department manages all purchasing activities for an organization, while "decentralized procurement" allows different departments to make their own buying decisions, and "hybrid procurement" combines elements of both, allowing a central team to oversee strategic sourcing while giving departments flexibility for smaller purchases

4.3 Procurement Process

The procurement process is the set of steps and procedures businesses use to obtain goods or services. Procurement processes are essential to businesses because they can have a direct impact on profit, spending and saving. The statement "the profit is in buying, not selling, highlights the importance of obtaining products at a favorable price during the sourcing process. It suggests that securing products at a low cost provides greater potential for profit when those products are eventually sold.

In many business models, the price at which you acquire goods or products plays a significant role in determining your profit margin. If you can negotiate a lower purchase price or find a reliable source that offers competitive prices, it can positively impact your overall profitability. When you buy products at a lower cost, you have more flexibility in setting your selling price. This allows you to either offer competitive prices to attract customers or maintain higher profit margins compared to competitors who may have acquired the same products at a higher cost. Furthermore, buying products at a lower price can also provide opportunities for various pricing strategies, such as offering discounts or running promotions, while still maintaining a satisfactory profit margin.

Lower purchase cost: By negotiating favorable deals, sourcing products at a lower cost allows for higher profit margins when selling those products. When you acquire products at a lower price, you have more flexibility in setting competitive prices while still maintaining a healthy profit.

Competitive advantage: Obtaining products at a lower cost gives you a competitive advantage in the market. It allows you to offer more attractive prices to customers while still making a profit, which can help you win over customers and gain market share.

Increased flexibility: Buying products at a low cost provides flexibility in pricing strategies. You can choose to lower prices to attract customers during promotional periods, offer discounts, or run sales campaigns without compromising your profitability. This flexibility helps generate more sales and customer loyalty.

Mitigating risks: By focusing on purchasing, you can mitigate risks associated with uncertain demand or market fluctuations. If you've acquired products at a favorable cost, you have more room to adjust prices and respond to market changes without experiencing significant losses.

Scalability: With a profitable sourcing strategy, you can scale your business more effectively. When you consistently secure products at a lower cost, you can expand your inventory, reach a larger customer base, and potentially increase overall sales and profits.

Ultimately, the profit in product sourcing comes from a combination of strategic buying and effective selling practices. Businesses frequently assess the procurement processes to adjust and changes necessary for success in achieving business objectives. A primary goal of the procurement process is to achieve maximum efficiency and value when securing goods and services for the business. The purchasing process follows a similar step-by-step approach across organizations, regardless of their size or industry. However, purchasing departments are often understaffed, with their resources primarily focused on managing day-to-day operational activities. This leaves limited capacity for developing and implementing strategic and tactical initiatives. In many cases, organizations lack true procurement expertise and the specialized skills necessary to optimize the purchasing function. Procurement Step vary depend on size and type of Organization. According to CIPS guideline Procurement cycle have 13 steps.



Figure: CIPS Procurement cycle

The purchasing process begins when an employee identifies the need for an item or service. In most cases, this occurs when the stock level of an item is low or depleted. The employee notifies the appropriate person of the need for the item. The designated person then submits a requisition detailing the required item with required quantity to their immediate supervisor, who reviews and forward to higher authority or approves it based on predefined authority levels.

The approval level is determined by the cost, volume, and urgency of the item or service. For instance, non-critical items like office stationery for individual use may not require approval, whereas a power plant motor needed for maintenance would require authorization from a higher authority. For non-stocked or out-of-stock items, the relevant department, such as the Purchasing or Procurement team, initiates the procurement process. The Procurement Department typically handles three types of procurement: central procurement, decentralized procurement, and hybrid procurement. The choice of approach depends on factors such as risk, supply chain considerations, and the financial involvement of the items. Procurement department develop specification with cross functional department including consignee or end user. it provides a clear and detailed outline of the required goods or services, allowing for accurate comparison between suppliers, ensuring the purchased product meets exact needs, and minimizing the risk of misunderstandings or disputes during the procurement process. Tender documents, quotations, or proposals for large procurements are circulated through newspapers or online platforms. However, for smaller procurements, the documents are sent directly to specific vendors. "Tenderers are required to submit the fully completed tender document along with all necessary supporting documents. Upon receiving quotations, one or more suppliers will be selected based on specific requirements to deliver the goods or services. A purchase order (PO) will then be sent to the chosen supplier(s), requesting the delivery of the goods or services. The PO serves as the first legally binding document issued by the Organization to its supplier, constituting a legal agreement to accept the delivered goods or services and to make payment as agreed. Typically, suppliers provide an acknowledgment of the PO to confirm acceptance of the order and the delivery terms.

Based on the agreed timeline, the supplier will deliver the goods or services, which will be documented through a Goods Receipt Note (GRN). In some cases, the delivery may be partial, depending on specific requirements. The delivered goods will then undergo an inward quality check and acceptance process. Accepted goods will be stored, recorded in the inventory system,

and subsequently issued to the requestor. If any goods are rejected for any reason, they will be returned to the supplier for replacement.

Upon acceptance of the goods, the supplier will issue an invoice, serving as a payment request for the delivered goods or services. Similar to deliveries, invoices may also correspond to partial deliveries. A three-point matching process—verifying the Purchase Order (PO), Goods Receipt Note (GRN), and Invoice—ensures the accuracy and integrity of the transaction. The transaction is then recorded in the Accounts Payable (AP) system as a payable entry. After obtaining the necessary financial approvals, payment is made to the supplier through the agreed method, and the AP entry is updated with the payment details.

4.4 Types of Warehouses

The term warehousing is used to describe the storage of goods. Such as raw materials, parts or finished products which will then be sold or distributed through an organization.

The terms, warehouse, distribution centre and fulfilment centre are often used interchangeably and do have a lot in common. However, the differences can be seen below:

- **A warehouse** provides only storage and store management, often for an associated factory. It can be used to store anything including liquids, electronic piece parts, large items of capital plant, precious metals, gemstones, packaging, raw materials, and household items.
- **A distribution center** provides storage but also offers value-added services. Such as completing customer orders and offers more comprehensive transport and distribution facilities. The orders tend to be business to business orders (B2B) often for retail outlets. Distribution centers can be seen as holding centers between the manufacturer and the retailer.
- **A fulfilment center** is like a distribution center but has developed much more recently from the growth in the online, e-commerce market. It is specifically geared to short term storage to satisfy business to consumer orders (B2C). It requires a very quick turnaround and to operate at this level of expertise, is often outsourced to a third party.

Local Warehouses: These warehouses mainly for the purpose of responding to the customer demand. Frequently, single items are picked, and the same item is shipped to the customer every day.

Value-added service warehouses: Key product customization activities takes place like packaging, labeling, marking, pricing, and returns processing.

There is also one more classification of warehouses according to which geographical area they cater to:

Centralized warehouse:

Centralization generally refers to the allocation of the warehousing services to one particular business unit which provides services to the whole firm. The decisions are made at the central location for the entire network. The main characteristics of a centralized approach are control, efficiency and good economy.

Benefits:

- Improvement in productivity through balancing
- Increase in available knowledge
- Bundling of product flows
- Combined use of production flows
- Control on the system
- Uniformity in the processes
- Improved efficiency

Limitations:

- Customer desire of self-pickup cannot be provided
- Problem of concentration of customers in only certain markets and inhomogeneous customer structure
- Long internal transport paths in large central warehouses and higher costs for the
- Slow process of decision making, less flexibility
- High initial costs
- Bureaucracy in the system

- Inflexibility
- Dependent systems

De-centralized warehouse:

Decentralization approach gives the individual business units autonomy and independency over their own resources without any major considerations over the remaining units unless there is a necessity for the overall organization policy. In this approach each facility identifies its most effective strategy without considering the impact on the remaining facilities in the network and this leads to the local optimization. The main characteristics of the decentralized approach are empowerment of individual business units, flexibility, and service orientation. They provide as good service as the centralized warehouses in terms of customer service level.

Benefits:

- Rapid adjustment to the changes
- Flexibility
- Quality
- Innovation
- Low startup costs
- Customization and catering to individual needs is possible
- Increase in responsiveness
- Improvement in reliability

Limitations:

- Lack of centralized control
- Duplication of resources
- Extensive use of effort and expertise
- Increase in costs

4.5 Factors influencing locations of storage

There are many different factors that must be consider when assessing store location and warehouse section. There are many factors which need to consider during which some of it are discuss below-

Cost of Location

In many countries, the cost of land, buildings, and labor is relatively low. Additionally, government and local authorities often provide incentives to attract businesses to these areas. These factors make certain locations financially attractive for setting up operations.

However, selecting land in such areas may lead to higher transportation costs, especially if the supply chain and distribution networks are not well-developed. Businesses must carefully evaluate whether the savings on land and labor outweigh the increased expenses in logistics and transportation.

Available of suitable staff:

Every organization run with help of skill stuff. Senior stuff may not move new area and new location cannot attract skill staff to move. New Location need to attract skill official to run smoothly.

Nature of product stored:

For emergency items, storage should be close to the consumption center to ensure quick availability. If a product has a short shelf life, such as one day, locating production or storage at a long distance may not be feasible due to time-sensitive delivery requirements. Additionally, if the product requires special handling, its location and transportation must be carefully planned to meet specific storage and logistical needs. This includes temperature control, packaging, and compliance with safety regulations.

Access to transport infrastructure:

Accessibility is a key factor in selecting a location. If inland facilities such as ports, rail terminals, or distribution hubs are available, they can streamline logistics and reduce overall transportation costs. Efficient inland infrastructure helps expedite the movement of goods, minimizing delays and lowering costs associated with unloading and distribution.

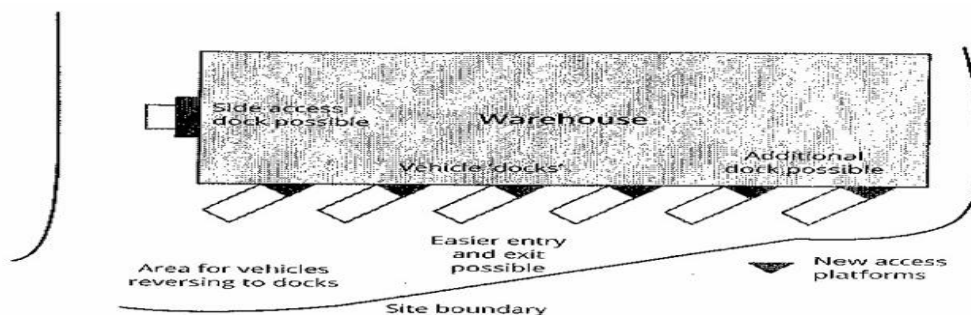
Selecting a store location involves multiple factors, including accessibility, cost, customer demand, infrastructure, and supply chain efficiency. Each store operates in a unique environment, requiring a tailored approach to meet specific business and logistical needs. As a result, location decisions must be made based on a careful evaluation of these factors to ensure optimal performance and sustainability.

Store and Warehouse Design:

Organization are widely varying the design of stories and warehouse. The cost and location also factor of selecting location of organization. Effectiveness and efficiency also factor to consider design of store and ware house which improve organization performance and low cost.

Single floor design vs Multi floor design-Single floor are low cost concept where lifts, stair are not necessary but cannot use vertical height for storing goods. This is applicable low land cost area.

Getting Goods in and out- Efficient warehouse design must accommodate varying delivery and dispatch volumes, ensuring flexibility through the use of 'dual use' and 'sole use' docks. Proper planning minimizes vehicle queuing, optimizing space utilization and reducing waiting times for goods-in and goods-out processes. Effective bay design enhances maneuverability and provides adequate access for loading and unloading equipment. A well-structured dock system aligns vehicle platforms with warehouse floors, while side-access vehicles require additional equipment considerations. Additionally, door design should balance warehouse protection with accessibility for efficient operations.



What items must be available for immediate use or supply?

Determining which items must be available for immediate use or supply requires organizations to assess the necessity of holding stock. Business-to-business (B2B) suppliers offer rapid delivery options, reducing the need for storage. The cost of waiting for stock must be balanced against storage expenses, particularly for perishable or infrequently used items.

Many organizations are optimizing storage by implementing order accumulation bays and cross-docking, minimizing storage needs while ensuring efficient goods movement. The necessity for stocking items varies based on frequency of use—frequently accessed items should be positioned for easy retrieval, while less commonly used items can be stored further away. Strategic placement of high-use stock in warehouses and stockyards can enhance operational efficiency and reduce labor costs.

Flow, space utilization and flexibility

Efficient flow within a store, stockyard, or warehouse ensures smooth receipt, storage, retrieval, and dispatch of goods. Effective flow management reduces bottlenecks and incorporates surge capacity to handle increased demand while minimizing congestion through structured movement patterns, often using a one-way system.

Natural flow can be observed in public spaces, such as supermarkets, where movement follows predictable routes. In warehouse settings, zoning and positioning impact flow efficiency, with clear signage and location mapping reducing search times. Stock identification systems, utilizing labels, colors, or symbols, streamline retrieval and tracking.

To maintain efficiency, inbound stock processing should not disrupt picking and packing activities. Proper flow management prevents unnecessary delays, ensuring seamless operations and reducing labor inefficiencies.

4.6 Warehousing Costs

Warehousing Costs

Warehousing costs encompass all expenses related to storing and managing inventory within a warehouse facility. These costs can be categorized into several key areas:

Fixed Costs

These are costs that remain constant regardless of warehouse activity levels:

- **Rent or Mortgage** – Lease payments or ownership costs of the facility.
- **Depreciation** – Gradual reduction in the value of warehouse infrastructure and equipment.
- **Insurance** – Coverage for inventory, property, and liability risks.
- **Taxes** – Property taxes and other regulatory fees associated with the warehouse.

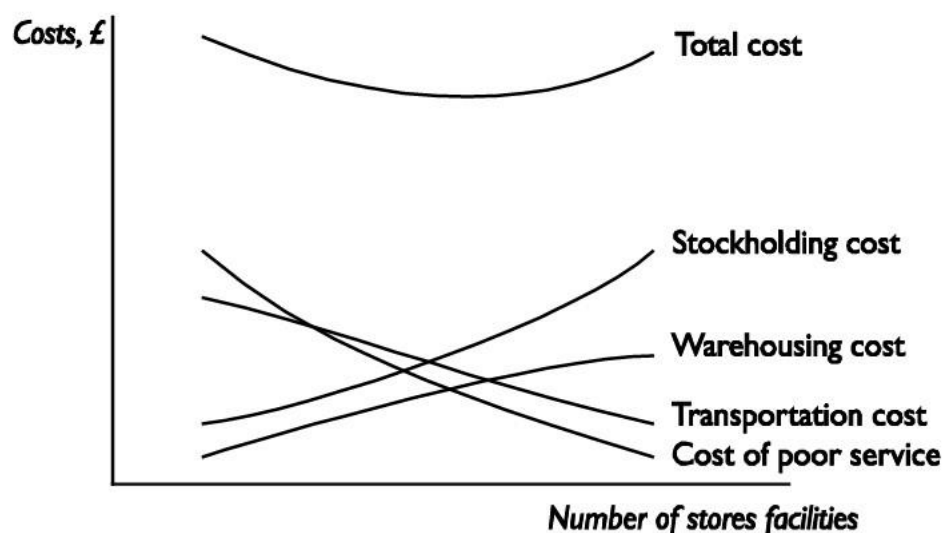


Figure 4.6 Cost of Store Facilities

2. Variable Costs

These fluctuate based on the volume of goods handled and stored:

- **Labor Costs** – Salaries, wages, and benefits for warehouse staff, including pickers, packers, and supervisors.
- **Utilities** – Electricity, heating, cooling, and water consumption.
- **Material Handling Equipment** – Costs associated with forklifts, conveyor belts, pallets, and maintenance.
- **Packaging & Supplies** – Costs for boxes, labels, tape, and other shipping materials.

3. Operational Costs

These relate to the day-to-day activities in the warehouse:

- **Inventory Management Systems** – Costs of warehouse management software (WMS) and IT infrastructure.
- **Security** – Surveillance systems, access control, and security personnel.
- **Shrinkage & Obsolescence** – Loss of inventory due to theft, damage, or expiration.

4. Storage Costs

- **Racking & Shelving** – Investment in storage structures to optimize space utilization.
- **Space Utilization** – Costs per square foot of storage based on capacity.

5. Transportation & Logistics Costs

- **Inbound & Outbound Freight** – Expenses for receiving and shipping goods.
- **Cross-Docking & Distribution** – Costs associated with transferring goods between storage and transport.

4.7 Cost Optimization Strategies

Strategies to Reduce Warehousing Costs

Businesses can effectively minimize warehousing costs by implementing the following strategies:

- **Optimize Space Utilization** – Design an efficient layout and shelving system to maximize storage capacity and improve workflow.
- **Leverage Technology** – Use automation, inventory tracking systems, and warehouse management software (WMS) to enhance accuracy and efficiency.
- **Reduce Labor Costs** – Streamline warehouse processes, implement standardized procedures, and provide targeted staff training to improve productivity.
- **Negotiate Supplier and Logistics Rates** – Secure cost-effective agreements with suppliers and third-party logistics (3PL) providers to lower operational expenses.
- **Adopt Lean Inventory Practices** – Implement just-in-time (JIT) inventory management to minimize excess stock and reduce storage costs.

By incorporating these strategies, businesses can improve warehouse efficiency, reduce operational expenses, and enhance overall supply chain performance.

Efficient warehousing cost management is essential for profitability and smooth supply chain operations.

4.8 The future of warehousing

The new decade will see a move within warehouse operations towards the increased adoption of collaborative robots (cobots). These will work alongside employees and assist with heavy lifting and many repetitive tasks. Cobots tasks can include unloading pallets and putting items to stock and quality inspection tasks that require the visual processing technology, with which many cobots are equipped with.

Whilst still in an early phase, cobots are becoming smaller and cheaper, making them an attractive investment. The benefits lie in the reduction of operating costs by using them for 24 hours working, increasing the speed of repetitive tasks, flexibility in deployment and releasing human's capital for high value tasks.

Recently, warehouses are becoming much more sustainable. Many warehouses produce not only enough energy to power its own production, but feeds back into the country's general supply lines.

4.9 the effectiveness of warehousing operations

Total Quality Management (TQM) is a management approach that emphasizes the importance of quality in warehouse operations. It focuses on achieving long-term success through customer satisfaction while also providing benefits to employees, society, and the environment. Since its adoption, TQM has had a significant impact on both the manufacturing and logistics industries.

The quality and exceptional performance of a company are primarily influenced by four key factors:

1. **Customer Focus** – Prioritizing customer needs and ensuring that warehousing operations meet or exceed their expectations.

2. **Continuous Improvement** – Implementing ongoing enhancements in processes, efficiency, and overall operational effectiveness.
3. **Employee Involvement** – Engaging employees at all levels to foster a culture of quality, accountability, and teamwork.
4. **Process Optimization** – Streamlining warehouse procedures to improve productivity, reduce waste, and enhance overall performance

4.10 Lean Warehousing

Lean mean process optimization and remove waste from process. The generation of waste in the warehouses creates two problems:

- o the value which is added is lost due to the wastes generated in the warehouse.
- o the waste generates the cost of disposals which is always increasing in nature.

A stringent inspection within the supply chain can effectively minimize waste generated during transportation. In the manufacturing process, defective items often become waste, ultimately discarded as scrap. This not only leads to disposal but also results in unnecessary costs. Similarly, ordering excess inventory that remains in the warehouse until disposal is just as wasteful. Such items occupy valuable storage space that could otherwise be used for more productive operations.

Waste in warehousing leads to lost value, increased disposal costs, and inefficiencies in space utilization. With disposal costs constantly rising, reducing waste through strict supply chain inspections becomes crucial to improving operational efficiency and cost-effectiveness.

4.11 Continuous Training Period

Teamwork plays a vital role in the growth and success of any organization. It fosters collaboration, enables the sharing of skills and knowledge, and encourages innovative problem-solving across different departments within a warehouse. Regular and effective training programs enhance the expertise of warehouse personnel, leading to improved efficiency, higher operational standards, and overall better performance. (Gunasekaran, Marri, Menci, 1999)

4.12 ISO Certification For A Warehouse

The quality certification for a warehouse offers a proof of commitment to quality for a company which is certified with ISO certification. The certification also acts as a benchmark

allowing the businesses to measure the progress towards the direction of continual improvement of the warehousing operations. If a company goes ahead for the certification, all the personnel should be aware of it and everybody should contribute for the achievement of the certification. The certification helps in growth of confidence within the company as well as the confidence of the client towards the supplier as a result of improved relations which become more visible and direct. There can also be accumulation of knowledge due to the quality standards followed in the company which helps the personnel to use that respective knowledge in the future. The efficiency as well as the control over the operations will also increase due to the growth of knowledge and confidence in an organization which is a direct impact of the certification. (Gunasekaran, Marri, Menci, 1999).

4.13 Inventory Control

Despite extensive literature on inventory control and management, there is limited discussion on the best methods for measuring and monitoring inventory within a warehouse. While thousands of organizations track their stock daily, effective inventory measurement and monitoring remain underexplored.

Inventory control is often viewed as a management function involving forecasting, assessing requirements, setting targets, and issuing directives. On the other hand, stock monitoring in warehouses is typically considered a supervisory task that demands minimal expertise. However, neglecting proper monitoring and measurement processes can result in inaccurate, inefficient, and low-quality inventory management.

The primary goal of inventory management is to provide relevant data to enhance operations and minimize errors. However, it is frequently reduced to a mere stock valuation exercise rather than a strategic contributor to logistics efficiency.

Inventory in a warehouse can be classified into three main categories:

- **Raw materials and components:** Goods purchased by the organization for production.
- **Work in progress (WIP):** Partially manufactured items that have undergone value addition.
- **Finished goods:** Products that are ready for shipment to customers.

The quantity and management of inventory vary significantly across organizations. Therefore, it is crucial to ensure continuous monitoring of inventory, regardless of where it is stored. (Ballard, 1996)

4.14 Value Adding Activities In A Warehouse

In economics, the difference between a product's selling price and the cost of resources used to produce it is known as **value added**. The pursuit of additional value is typically driven by customer demand, aiming to retain a higher monetary value for each unit sold. This is achieved through product enhancements and improved service offerings.

Although the role of warehouses has evolved significantly over time, they have traditionally been a fundamental component of industrial distribution. Industrial companies depend heavily on inventories of raw materials, work-in-progress (WIP), and finished goods, which are typically stored in warehouses or production facilities with warehouse-like departments.

A simplistic view of warehousing suggests that it is only responsible for storage, repacking, and shipment. However, the modern competitive environment has highlighted the potential for warehousing to enhance a firm's value proposition. By redesigning warehouse functionality, businesses can significantly improve their service offerings. Since most customer-specific services are physically performed in the warehousing environment, customer-centric planning and order fulfillment strategies are essential.

1. **Consolidation:** The warehouse aggregates individual items into bulk orders based on manufacturer or plant requirements before shipping a unified product.
2. **Product Mixing:** Warehouses receive various finished products from different plants and consolidate them into customized assortments to meet specific customer needs.
3. **Service Enhancement:** Warehouses offer additional services, such as product customization or decorative modifications, before final shipping.
4. **Contingency Protection:** Warehouses maintain backup data and essential records to manage risks and unexpected situations, ensuring inventory security and future operational stability.

5. **Smooth Operations:** Warehouses act as a bridge between manufacturers and customers, facilitating efficient operations by ensuring the right products reach the right place at the right time. Consolidation and product mixing are particularly crucial in improving customer satisfaction and maintaining a seamless supply chain.

By incorporating these value-adding activities, warehouses can go beyond basic storage functions and play a strategic role in enhancing logistics efficiency, customer satisfaction, and overall business performance.

Chapter-5

Data Analysis and Result

5.1 Foreword

This chapter presents the analysis and discussion of the findings related to the current challenge of the IVVR Store Management Software and future opportunity which need to include next upgradation. It also includes insights into how respondents evaluate the existing IVVR Store Management Software.

5.2 Data Analysis

5.2.1 Characteristics of the respondents

To conduct the survey, the questionnaires were distributed among 75 respondents. Out of 75, a total of 63 questionnaires were returned from the respondents in which one was left blank or partially filled up, which were screened out for analysis. Finally, a total of 62 completely filled-up questionnaires have been considered for further analysis. The overall response rate is 84%, which is quite satisfactory. As the sampling was chosen through convenient sampling method and the survey was done by the researcher through self-administered process, the response rate is quite satisfactory. Questionnaire survey has been conducted on the employee from Bangladesh power development board and the respondents were selected randomly from different designation from different level of office from different Procuring Entity. Thirty-one respondents answered an open-ended question, where both opportunities and challenges section fill-up 17 responses. For the first open-ended question regarding challenges, 13 respondents provided answers, while only one respondent identified an opportunity.

A summary about the demographic condition of the respondents are given below:

Particulars	Variables	No of respondents	Percentage (%)
Designation	Executive Engineer	14	22.22%
	Sub-Divisional Engineer	7	11.11%
	Assistant Engineer	19	30.16%
	Chemist	1	1.59%
	Store Officer	4	6.35%
	Sub Assistant Engineer	11	17.46%
	Store Keeper	7	11.11%

Particulars	Variables	No of respondents	Percentage (%)
Length of service	<5 years	18	28.57%
	5-10 years.	18	28.57%
	11-15 years.	19	30.16%
	16-20 years.	0	0.00%
	21-25 years.	4	6.35%
	> 25 years.	4	6.35%
Relevancy with IVVR Software (Pls. Tick one)	Store Keeper	7	11.11%
	Store Official	9	14.29%
	PE's official	36	57.14%
	Others	11	17.46%
Educational qualification	Post Graduate	14	22.22%
	Graduate	37	58.73%
	Diploma	8	12.70%
	HSC	4	6.35%
training on IVVR Software	Yes	34	53.97%
	No	29	46.03%

Table 5.1 Demographic condition of the respondents

5.3 Statistical assessment of challenge of IVVR Project at BPDB.

5.3.1 Measurement of the central tendency & dispersion of the respondents in the view IVVR Phase-2 project is more user friendly and more effective than Manual.

In this dissertation the 5-point Likert scale were used where scoring was 1 for “Strongly disagree”, 2 for “Disagree”, 3 for “Neutral”, 4 for “Agree” and 5 for “Strongly Agree”. All respondent is asked to 11 Question related challenge of IVVR Project at Bangladesh Power Development Board.

For statistical analysis of the data Frequency distributions for these questions are presented in Table 5.2 and Table 5.3 respectively below:

Question	Frequency Distribution (Weightages)					Total frequency
	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)	
Q-1	0	4	4	36	18	62
Q-2	0	11	20	19	12	62
Q-3	0	4	12	33	13	62
Q-4	3	8	12	21	18	62
Q-5	1	2	12	28	19	62
Q-6	1	10	12	29	10	62
Q-7	0	7	14	34	7	62
Q-8	1	1	14	33	13	62
Q-9	0	2	5	33	22	62
Q-10	0	0	6	27	29	62
Q-11	0	6	16	26	14	62

Table 5.2: Statistical analysis of the data as Frequency distributions

The frequency distribution of the respondent's response in percentages are given in the following table

Question	Frequency Distribution (Weightages)					Total frequency (%)
	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	
Q-1	0.00%	6.45%	6.45%	58.06%	29.03%	100.00%
Q-2	0.00%	17.74%	32.26%	30.65%	19.35%	100.00%
Q-3	0.00%	6.45%	19.35%	53.23%	20.97%	100.00%
Q-4	4.84%	12.90%	19.35%	33.87%	29.03%	100.00%
Q-5	1.61%	3.23%	19.35%	45.16%	30.65%	100.00%
Q-6	1.61%	16.13%	19.35%	46.77%	16.13%	100.00%
Q-7	0.00%	11.29%	22.58%	54.84%	11.29%	100.00%
Q-8	1.61%	1.61%	22.58%	53.23%	20.97%	100.00%
Q-9	0.00%	3.23%	8.06%	53.23%	35.48%	100.00%
Q-10	0.00%	0.00%	9.68%	43.55%	46.77%	100.00%
Q-11	0.00%	9.68%	25.81%	41.94%	22.58%	100.00%

Table 5.3: frequency distribution of the respondent's response in percentages

Now as the statistical analysis of the data given in the above table 5.2 & 5.3, central tendencies, i.e., mean, median, and standard deviation of responses are conducted and the results are given in the following table

Question	No of respondent					Mean	Median	Standard Deviation
	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)			
Q-1	0	4	4	36	18	4.10	4.00	0.78
Q-2	0	11	20	19	12	3.52	3.50	1.00
Q-3	0	4	12	33	13	3.89	4.00	0.81
Q-4	3	8	12	21	18	3.69	4.00	1.17
Q-5	1	2	12	28	19	4.00	4.00	0.89
Q-6	1	10	12	29	10	3.61	4.00	1.03
Q-7	0	7	14	34	7	3.66	4.00	0.83
Q-8	1	1	14	33	13	3.90	4.00	0.80
Q-9	0	2	5	33	22	4.21	4.00	0.73
Q-10	0	0	6	27	29	4.37	4.00	0.66
Q-11	0	6	16	26	14	3.80	4.00	0.89

Table 5.4: Central tendency & dispersion of respondents view of challenges in IVVR Software

We find that majority of the respondents agree with the statements but standard Deviation are different one from another. Question-1 (IVVR Phase-2 project is more user friendly and more effective than Manual.), Question-5 (The same items with identical specifications are listed in the IVVR software under different system codes due to variations in the spelling of the item names.), Question-9 (IVVR Software reduces the degree of pilferage of store items as it is documented in software.) and Question-10 (The users of store items are finding the IVVR software user-friendly, with 24/7 access to inventory item positions whenever needed.) are strongly agree with the statement. Whereas Question-2 (IVVR software/system covering all manual events/fields.) and Question-6 (IVVR software reduces the overall organization's reliance on manpower.) are very important due IVVR software main function is convert all manual events and reduce manpower but respondent give us different signal.

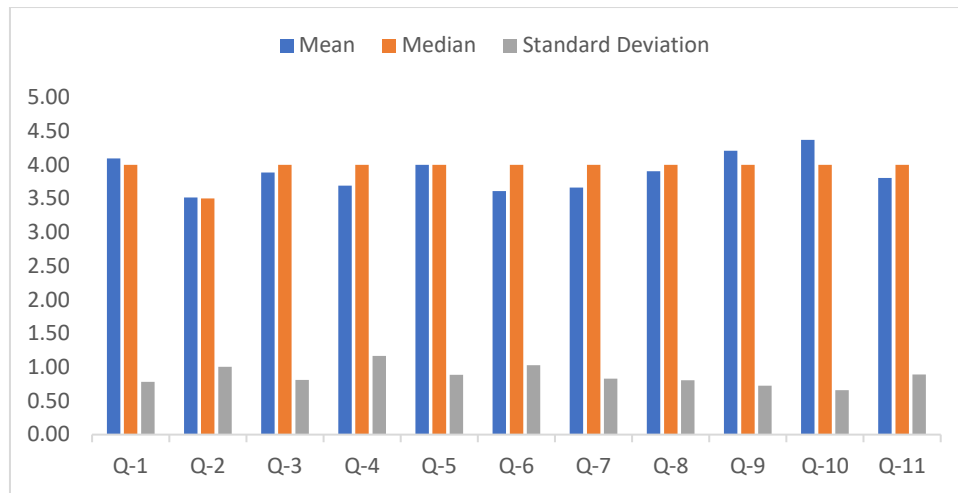


Chart -01 Central Tendencies and Standard Deviation of responses

5.4 Details discussion and analysis about the questionnaire survey

The survey data is discussed in detail below, focusing on each individual question.

Question -1: IVVR Phase-2 project is more user friendly and more effective than Manual.

Among the 62 respondents in this study, 29% strongly agreed, while 58% agreed that the IVVR Phase-2 project is more user-friendly and effective than the manual system. In contrast, only one respondent strongly disagreed. This indicates that the IVVR software is generally perceived as more user-friendly and efficient compared to the manual process.

This has been shown in Table 5.3 and graphically expressed in Chart 2.

IVVR Phase-2 project is more user friendly and more effective than Manual.

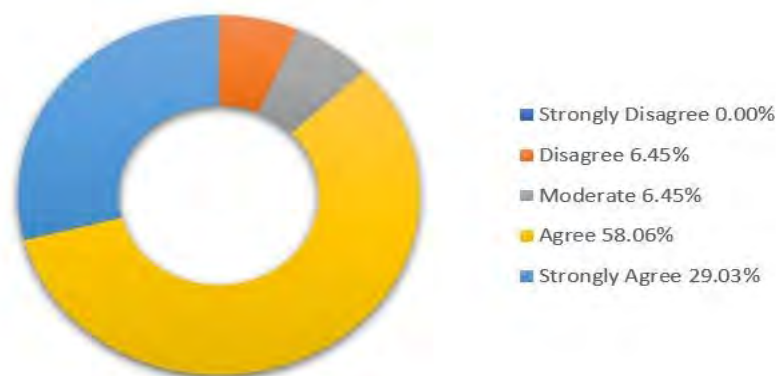


Chart-2 : IVVR Phase-2 project is more user friendly and more effective than Manual.

Question -2: IVVR software/system covering all manual events/fields.

Among the 62 respondents in this study, 19.35% strongly agreed, 30.65% agreed, and 32.26% remained neutral, while 17.74% disagreed that the IVVR software/system covers all manual events and fields. This indicates that the IVVR software does not fully encompass all manual processes, with certain aspects such as reverse logistics and return items still missing from the system.

This has been shown in Table 5.3 and graphically expressed in Chart 3.

IVVR software/system covering all manual events/fields.

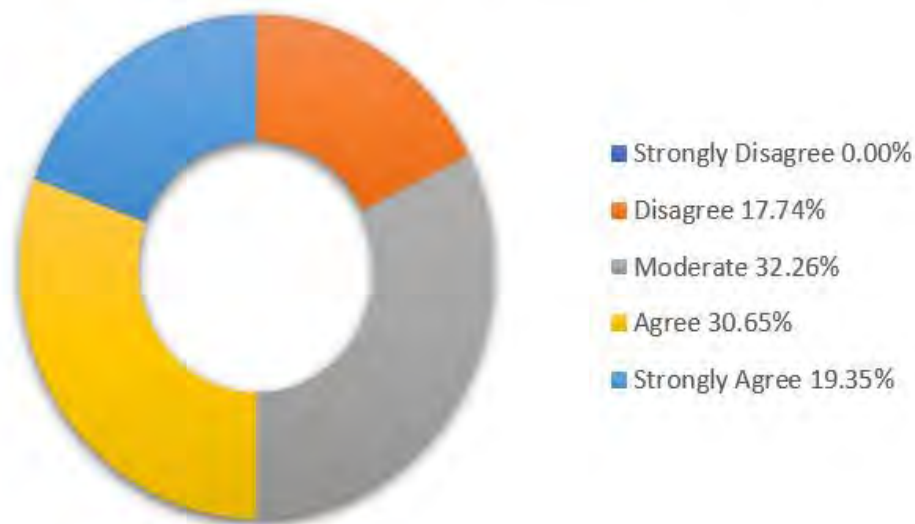


Chart-03:-IVVR software/system covering all manual events/fields.

Question -3 : All the reports in IVVR Software found in the system are effective, fruitful and satisfactory as well.

Among 62 respondents of this study, 20.97 % respondents strongly agree, 53.23% respondents agree, Moderate 19.35% and disagree with 6.45% that All the reports in IVVR Software found in the system are effective, fruitful and satisfactory as well. This means report in IVVR Software is effective but there is some report are not relevant with manual systems. Some event like reverse logistic, return items etc are still missing in IVVR Software.

This has been shown in Table 5.3 and graphically expressed in Chart 4.

All the reports in IVVR Software found in the system are effective, fruitful and satisfactory as well.

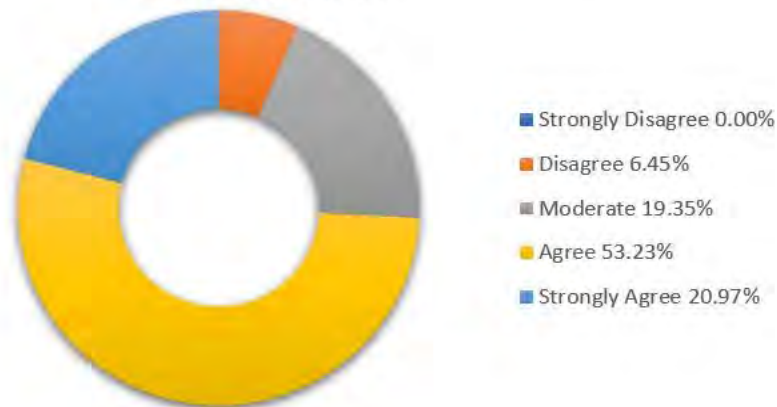


Chart-4- All the reports in IVVR Software found in the system are effective, fruitful and satisfactory as well.

Question-4: Paperless communication is being established through the implementation of IVVR software.

Among the 62 respondents in this study, 29.03% strongly agreed and 33.87% agreed that the implementation of IVVR software is helping to establish paperless communication. Additionally, 19.35% remained neutral on the matter. Meanwhile, a smaller portion of respondents expressed disagreement, with 12.90% disagreeing and 4.84% strongly disagreeing with the statement. This has been shown in Table 5.3 and graphically expressed in Chart 5.

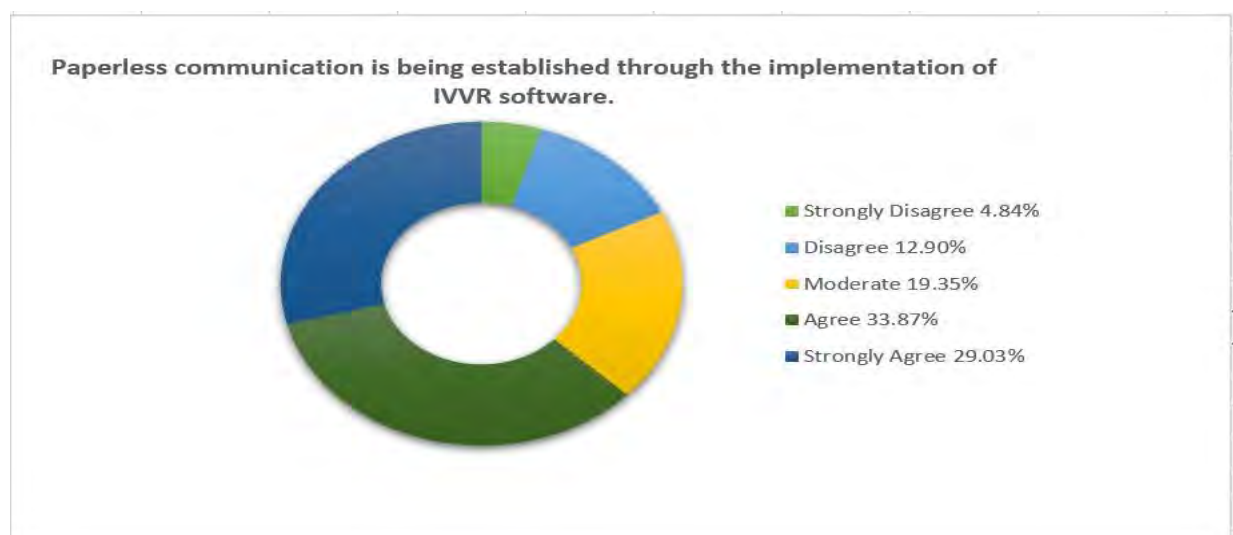


Chart-5: Paperless communication is being established through the implementation of IVVR software.

Question-5: The same items with identical specifications are listed in the IVVR software under different system codes due to variations in the spelling of the item names.

Among the 62 respondents in this study, 30.65% strongly agreed and 45.16% agreed, indicating that 75.81% believe that identical items with the same specifications are listed under different system codes in the IVVR software due to inconsistencies in spelling. This issue undermines the effectiveness of the IVVR software, creating practical challenges for store officials that require attention. Conversely, 1.61% strongly disagreed, 3.23% disagreed, and 19.35% remained neutral on the matter. This has been shown in Table 5.3 and graphically expressed in Chart 6.

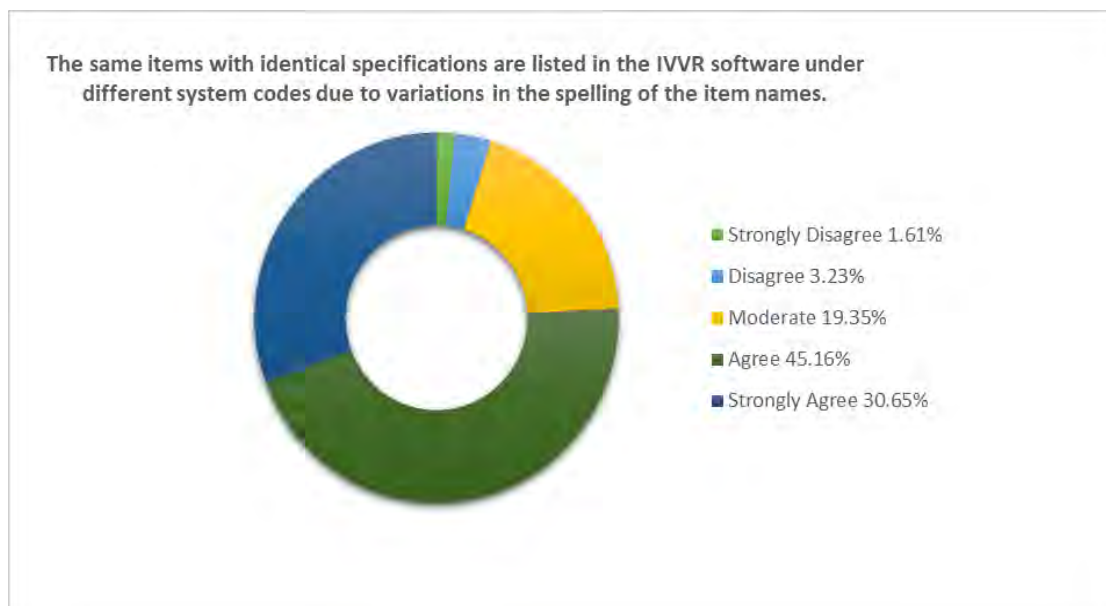


Chart-6: The same items with identical specifications are listed in the IVVR software under different system codes due to variations in the spelling of the item names.

Question-6: IVVR software reduces the overall organization's reliance on manpower.

Among the 62 respondents in this study, 14.52% strongly agreed, and 46.77% agreed which mean 61.29 % respondents believed that IVVR software reduces the overall organization's reliance on manpower. As public organization, Manpower cannot reduce but can be relocated other area. whereas Strongly disagree 1.61%, Disagree 16.13% and Moderate 19.35% gave opposite view regrading matters. This has been shown in Table 5.3 and graphically expressed in Chart 7.

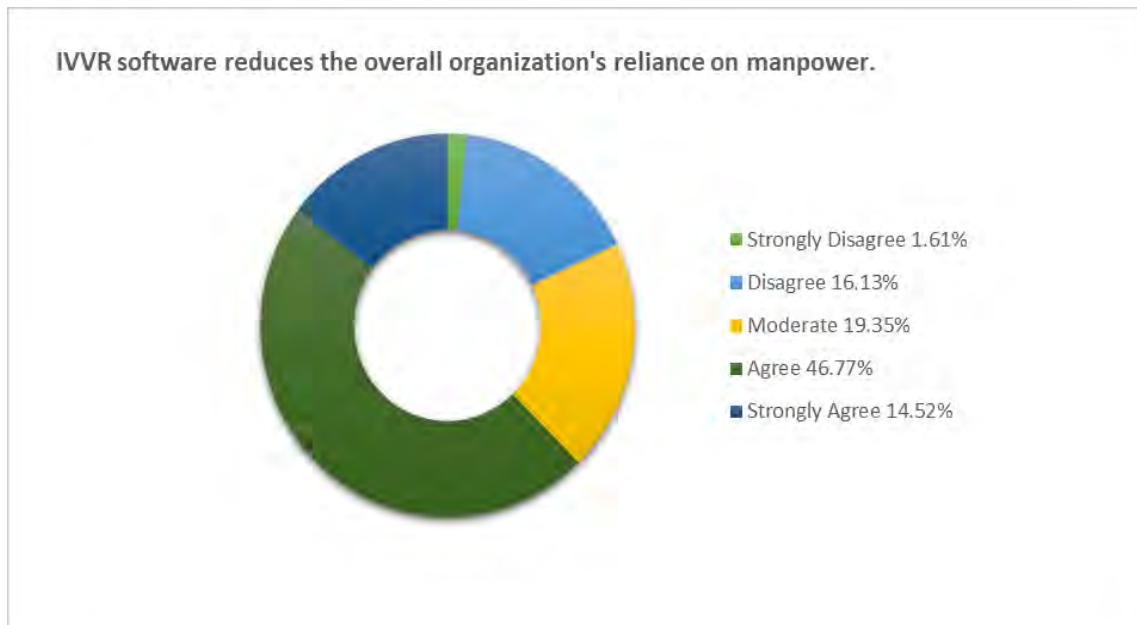


Chart-7: IVVR software reduces the overall organization's reliance on manpower.

Question-7: It takes less time to resolve any problem than before.

Among the 62 respondents in this study, 11.29% strongly agreed, and 54.84% agreed which two-third respondents believed that It takes less time to resolve any problem than before. As public organization, Store and administration office and work station are not in same place. So it need movement for approbation of high official. Time of those Movement are reduced. whereas Disagree 11.29% and Moderate 22.58% gave opposite view regrading matters. This has been shown in Table 5.3 and graphically expressed in Chart 8.

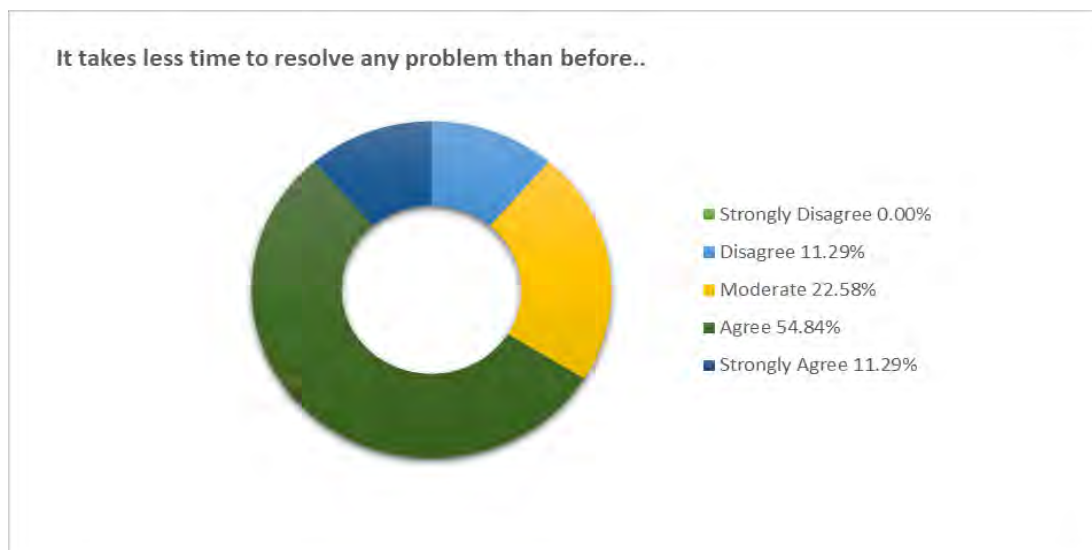


Chart-8: It takes less time to resolve any problem than before.

Question-8: The requisition process is faster through IVVR system than manual system.

Among the 62 respondents in this study, 20.97% strongly agreed, and 53.23% agreed which almost 75% respondents believed that the requisition process is faster through IVVR system than manual system. As public organization, Store and administration office and work station are not in same place. So, it need movement for approbation of high official. Time of those Movement are reduced. whereas almost 25% (Disagree & strongly Disagree 1.61% and Moderate 22.58% gave opposite view regrading matters. This has been shown in Table 5.3 and graphically expressed in Chart 9.

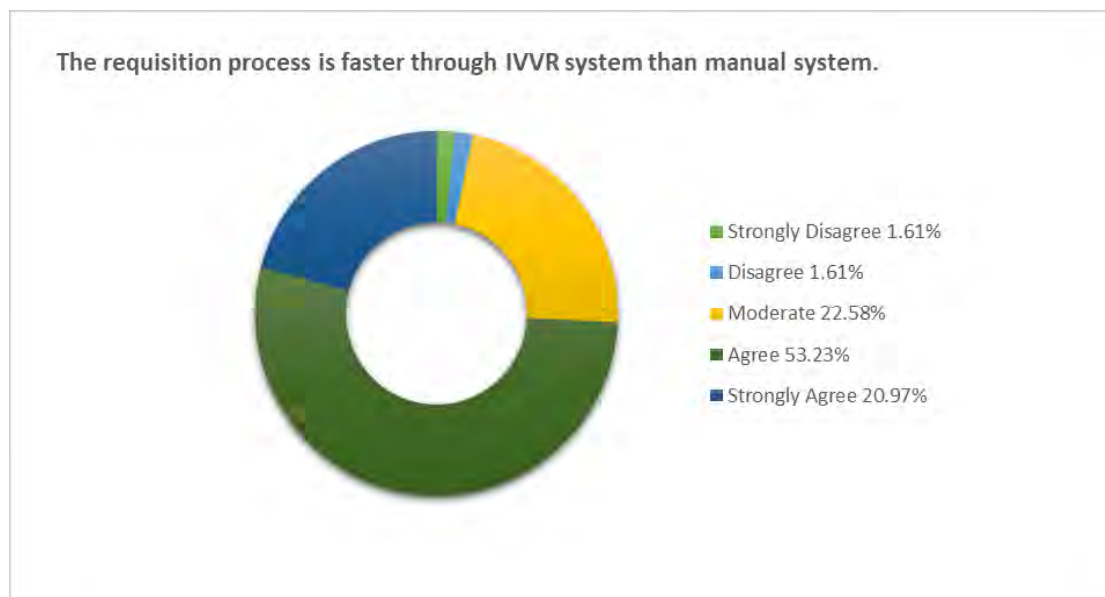


Chart-9: The requisition process is faster through IVVR system than manual system.

Question-9: IVVR Software reduces the degree of pilferage of store items as it is documented in software.

Among the 62 respondents in this study, 35.48% strongly agreed, and 53.23% agreed which almost 89% respondents believed that IVVR Software reduces the degree of pilferage of store items as it is documented in software. When Store data like requisition, allocation and outstanding information is available to all concern member, Pilferage option will drastically reduce. whereas almost 11% (Disagree 3.23% and Moderate 8.06% gave opposite view regrading matters.

This has been shown in Table 5.3 and graphically expressed in Chart 10.

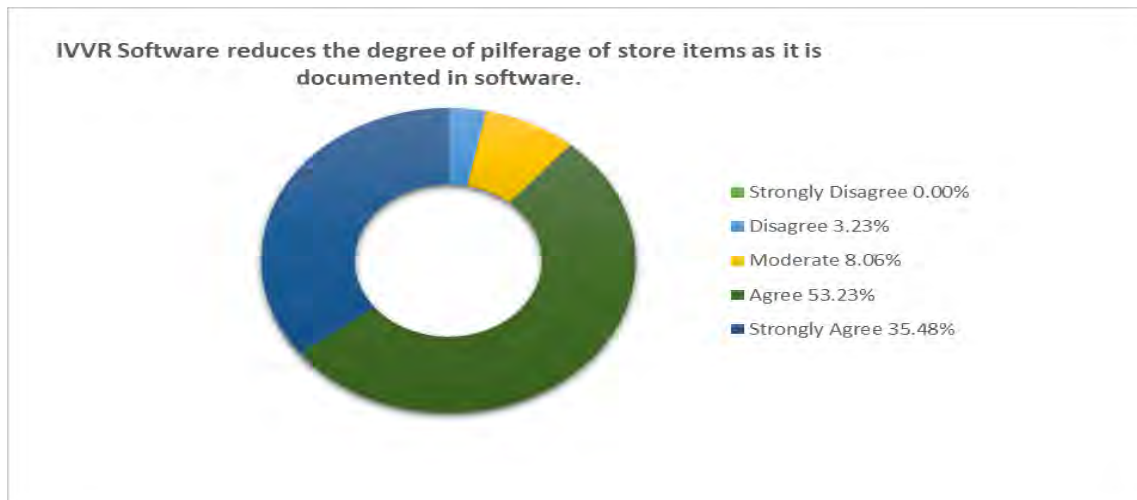


Chart-10: IVVR Software reduces the degree of pilferage of store items as it is documented in software.

Question-10: The users of store items are finding the IVVR software user-friendly, with 24/7 access to inventory item positions whenever needed.

Among the 62 respondents in this study, 46.77% strongly agreed, and 43.55% agreed respondents believed that the users of store items are finding the IVVR software user-friendly, with 24/7 access to inventory item positions whenever needed. This Question is signification question where strange agree is most respondent and strange disagree and disagree 0% whereas Moderate 9.68% gave opposite view regrading matters.

This has been shown in Table 5.3 and graphically expressed in Chart 11.

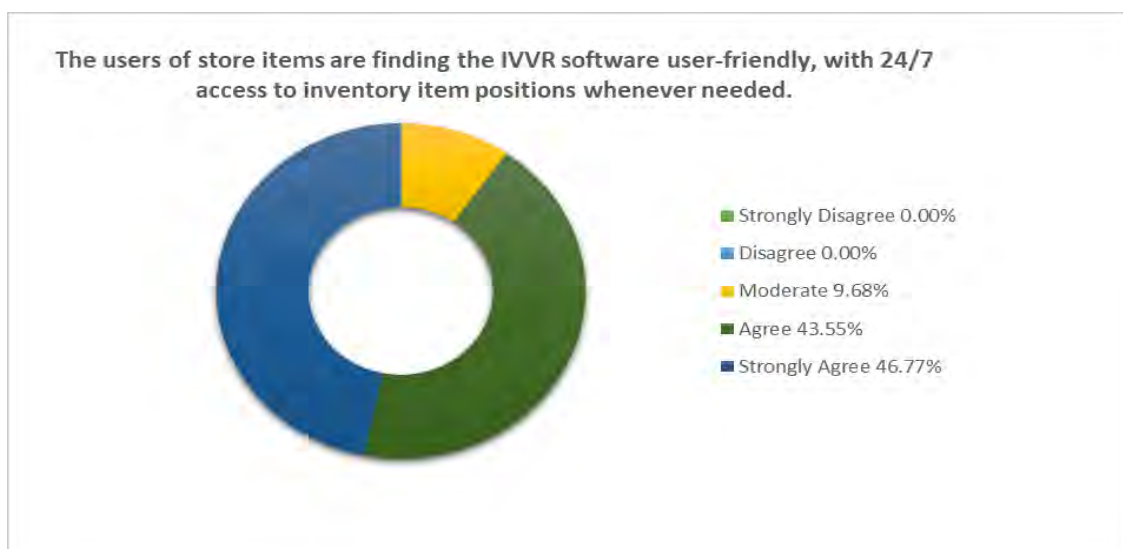


Chart-11: The users of store items are finding the IVVR software user-friendly, with 24/7 access to inventory item positions whenever needed.

5.5 Statistical assessment of opportunities related to the IVVR project of IVVR Project at Bangladesh Power Development Board.

Section C and E are open question. Open-ended questions are crucial as they allow respondents to freely express their opinions. Such questions can uncover new dimensions that management may not have been aware of. Insights from practitioners can provide valuable feedback that can be incorporated into future updates. Among the 62 respondents, 30 answered the first question, 23 responded to the last question, and 18 answered both. Answer of Questions are not unique but make group which abridge of question almost same. There are four question are slotted which are commonly repeated in same theme. we arrange a table which is given below.

Sl No	Additional challenges in IVVR Software	No. of respondents	Remarks
1.	Showing Data entry failed/slow process	11	
2.	Requisition and allocation step should be merge	9	
3.	there is no option for goods return	8	
4.	Damage item cannot identify	3	

Table-5.4: Additional challenge of IVVR Software

In this dissertation the 5-point Likert scale were used where scoring was 1 for “Strongly disagree”, 2 for “Disagree”, 3 for “Neutral”, 4 for “Agree” and 5 for “Strongly Agree”. All respondent is asked to 13 Question related opportunities of IVVR Project at Bangladesh Power Development Board.

For statistical analysis of the data Frequency distributions for these questions are presented in Table 5.5 and Table 5.6 respectively below:

Question	Frequency Distribution (Weightages)					Total frequency
	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)	
Q-1	0	1	4	11	46	62
Q-2	6	2	5	16	33	62
Q-3	9	5	9	28	11	62
Q-4	2	2	9	35	14	62
Q-5	5	7	16	22	12	62
Q-6	4	7	8	26	17	62
Q-7	0	2	17	31	12	62

Question	Frequency Distribution (Weightages)					Total frequency
	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)	
Q-8	2	6	18	22	14	62
Q-9	1	4	17	27	13	62
Q-10	0	1	13	28	20	62
Q-11	4	5	15	30	8	62
Q-12	1	5	7	32	17	62
Q-13	2	3	8	28	21	62

Table 5.5 : Central tendency & dispersion of respondents view of challenges in IVVR Software

Question	Frequency Distribution (Weightages)					Total frequency (%)
	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	
Q-1	0.00%	1.61%	6.45%	17.74%	74.19%	100.00%
Q-2	9.68%	3.23%	8.06%	25.81%	53.23%	100.00%
Q-3	14.52%	8.06%	14.52%	45.16%	17.74%	100.00%
Q-4	3.23%	3.23%	14.52%	56.45%	22.58%	100.00%
Q-5	8.06%	11.29%	25.81%	35.48%	19.35%	100.00%
Q-6	6.45%	11.29%	12.90%	41.94%	27.42%	100.00%
Q-7	0.00%	3.23%	27.42%	50.00%	19.35%	100.00%
Q-8	3.23%	9.68%	29.03%	35.48%	22.58%	100.00%
Q-9	1.61%	6.45%	27.42%	43.55%	20.97%	100.00%
Q-10	0.00%	1.61%	20.97%	45.16%	32.26%	100.00%
Q-11	6.45%	8.06%	24.19%	48.39%	12.90%	100.00%
Q-12	1.61%	8.06%	11.29%	51.61%	27.42%	100.00%
Q-13	3.23%	4.84%	12.90%	45.16%	33.87%	100.00%

Table 5.6: Statistical analysis of the data as Frequency distributions

Now as the statistical analysis of the data given in the above table 5.5 & 5.6, central tendencies, i.e., mean, median, and standard deviation of responses are conducted and the results are given in the following table

Question	No of respondent					Mean	Median	Standard Deviation
	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)			
Q-1	0	1	4	11	0	4.65	5.00	0.68
Q-2	6	2	5	16	6	4.10	5.00	1.28
Q-3	9	5	9	28	9	3.44	4.00	1.29
Q-4	2	2	9	35	2	3.94	4.00	0.87
Q-5	5	7	16	22	5	3.44	4.00	1.16
Q-6	4	7	8	26	4	3.70	4.00	1.17
Q-7	0	2	17	31	0	3.85	4.00	0.76
Q-8	2	6	18	22	2	3.65	4.00	1.04
Q-9	1	4	17	27	1	3.76	4.00	0.92
Q-10	0	1	13	28	0	4.08	4.00	0.77
Q-11	4	5	15	30	4	3.53	4.00	1.04
Q-12	1	5	7	32	1	3.95	4.00	0.93
Q-13	2	3	8	28	2	4.03	4.00	0.96

Table 5.7 : frequency distribution of the respondent's response in percentages

We find that majority of the respondents agree with the statements but standard Deviation are different one from another. Question-1(An effective application for mobile version is very urgent to entry and authorize promptly.), Question-2(Each cash procurement event (Impress and advance payment) is need to be recorded in this software/system.), Question-10(IVVR Software has provision to update in Data.) and Question-13 (IVVR Software provides the ease of speed communication to concern People.) are strongly agree with the statement. IVVR software system has lots event need to improvement. Mobile version, Inclusion of Cash procurement is very important which need to include in software system. All respondents are feed it need to include it. Whereas Question-4 (IVVR Software triggers or notify to users (management and procurement departments) when go for procurement while the reorder level of items captured in the system is reached.) , Question-5(IVVR software is designed with robust security features to prevent data theft, security break, and data manipulation.), Question-11 (The cost of inventory and order processing has been significantly reduced due to the

implementation of the IVVR system.) and Question-12(Quick Response has become Possible.) are updated deliverable but respondents are scattered regarding deliverable. Those statement are related Just-in-time, Economic Order Quantity which are recent Method. Those method are process of cost minimization method. Bangladesh Power Development Board is government Organization. This type organization are push method for update system not pull method. Employees are not inhabited with this type system. Respondents are given diverse opinion regarding statement.

5.6 Details discussion and analysis about the questionnaire survey

The survey data is discussed in detail below, focusing on each individual question.

Question -1: An effective application for mobile version is very urgent to entry and authorize promptly.

Among 62 respondents of this study, 46 respondents or 74.19 % respondents strongly agree, 11 respondents or 17.74% respondents agree and on one respondent strongly disagree that an effective application for mobile version is very urgent to entry and authorize promptly. That means Mobile version of IVVR software is essential of expedite process.

This has been shown in Table 5.6 and graphically expressed in Chart 12.

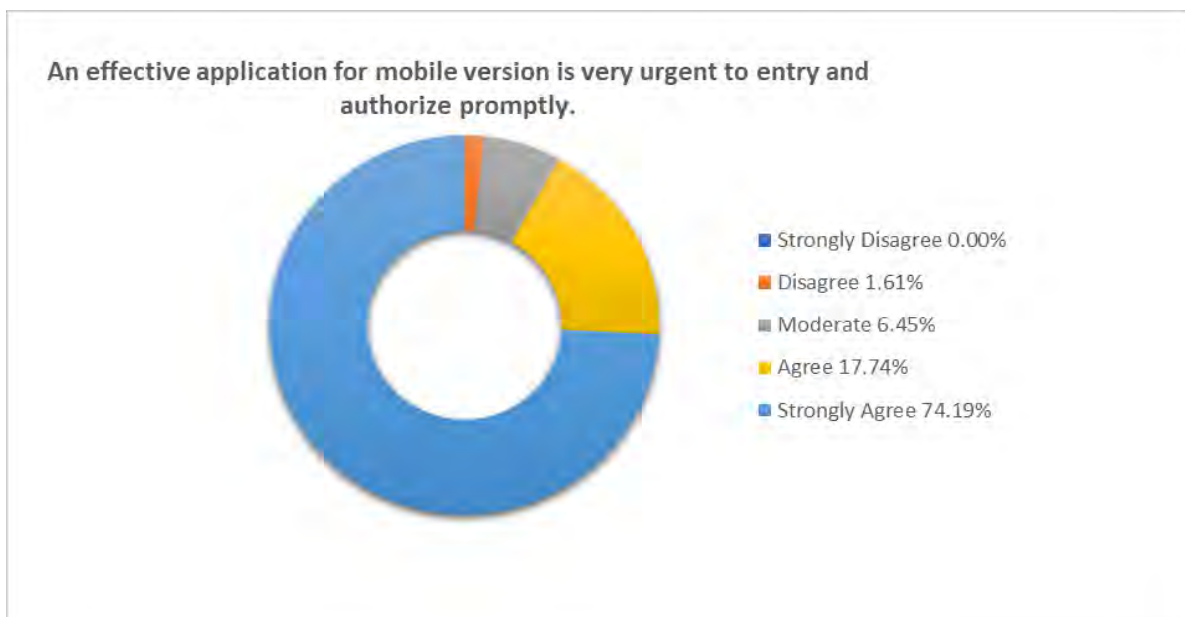


Chart-12: An effective application for mobile version is very urgent to entry and authorize promptly.

Question- 2: A Each cash procurement event (Impress and advance payment) is need to be recorded in this software/system.

Among 62 respondents of this study, 33 respondents or 53.23 % respondents strongly agree, 16 respondents or 25.81% respondents agree and more than 10 % disagree and respondent strongly disagree that An Each cash procurement event (Impress and advance payment) is need to be recorded in this software/system. Cash purchase are important. Every procuring Entity procure day to day small items in cash basis. In PPR-2008, authority give importance cash procurement which include DPM process. If small purchase is procurement framework, it is difficult for PE to maintain. This why cash purchase is important. If IVVR software are included cash purchase event, transparency will increase.

This has been shown in Table 5.6 and graphically expressed in Chart 13.

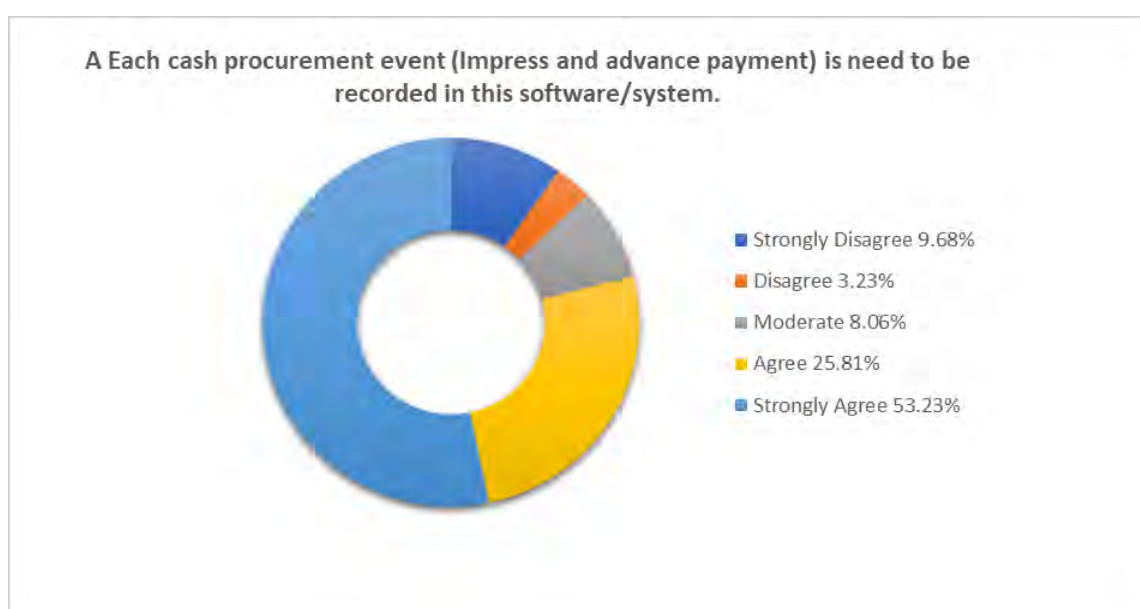


Chart 13: A Each cash procurement event (Impress and advance payment) is need to be recorded in this software/system.

Question -3: IVVR Software triggers or notify to users (management and procurement departments) when go for procurement while the reorder level of items captured in the system is reached.

Among 62 respondents of this study, 28 respondents or 45.16 % respondents agree, 11 respondents or 17.74% respondents strongly agree that IVVR Software triggers or notify to users (management and procurement departments) when go for procurement while the reorder level of items captured in the system is reached and more than 22% disagree and respondent strongly disagree regrading this statement. More than 62% BPDB employee believe that reorder alert is important for management and procurement departments to start procurement process. This has been shown in Table 5.6 and graphically expressed in Chart 14.

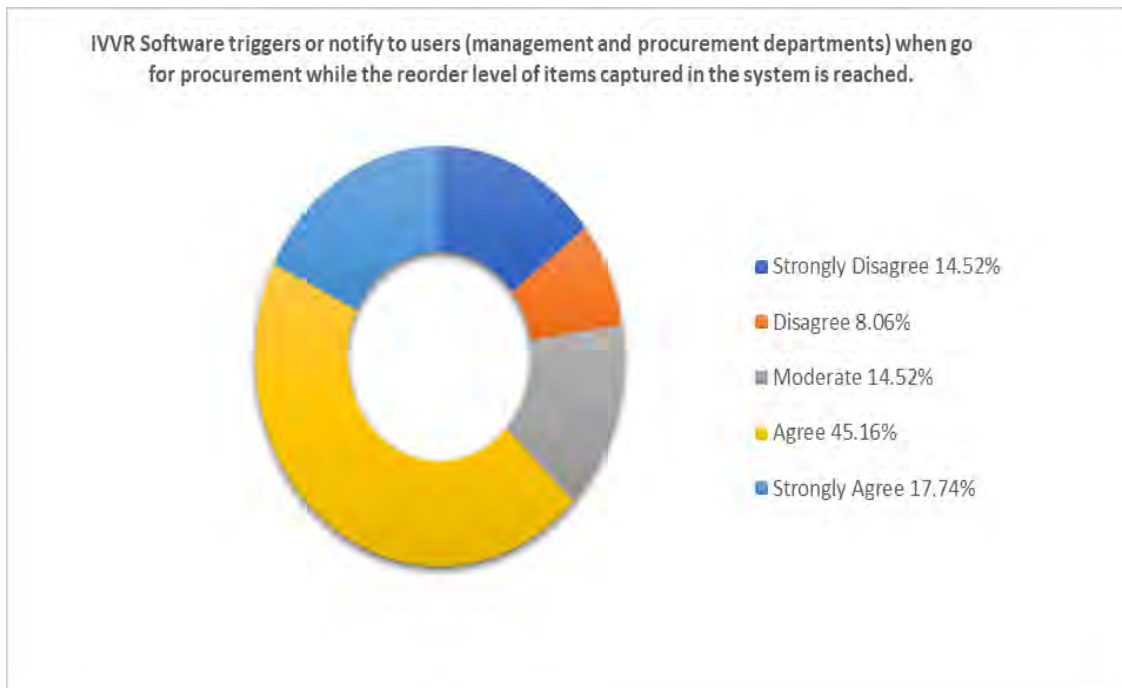


Chart 14: A Each cash procurement event (Impress and advance payment) is need to be recorded in this software/system.

Question -4: Procuring Entity get accurate forecast for fast moving Goods or Repeated use Goods.

Among 62 respondents of this study, 35 respondents or 56.45 % respondents agree, 14 respondents or 22.58% respondents strongly agree that Procuring Entity get accurate forecast for fast moving Goods or Repeated use Goods and more than 6.46% disagree and respondent strongly disagree regrading this statement. Fast moving Goods or repeated use Goods core consumption of organization. If any items interrupt in supply chain, Company face major problem. So accurate forecasting is important every organization. BPDB employee believe that Procuring entity get accurate forecast for FMG Goods with help of IVVR software.

This has been shown in Table 5.6 and graphically expressed in Chart 15.

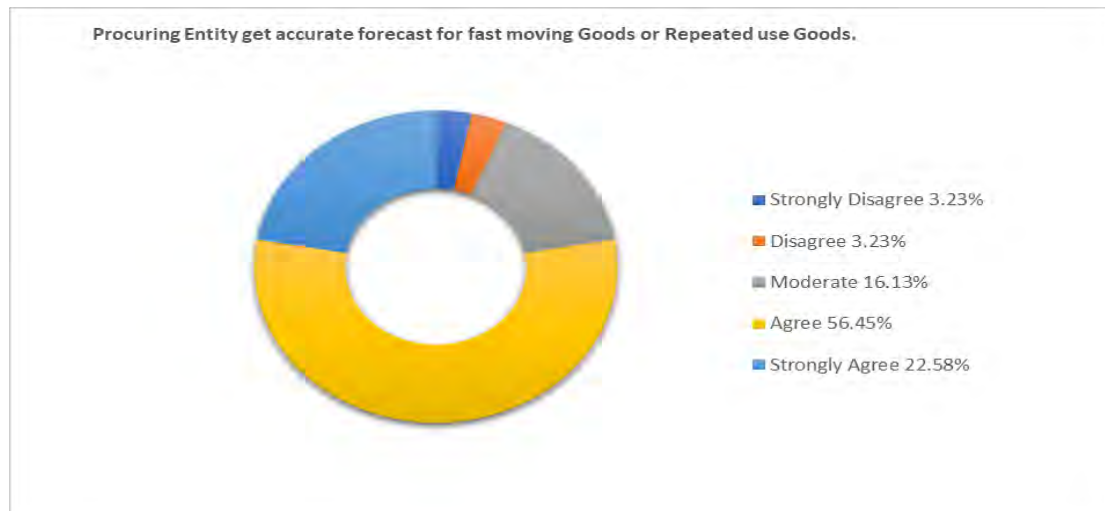


Chart 15: Procuring Entity get accurate forecast for fast moving Goods or Repeated use Goods.

Question -5: IVVR software is designed with robust security features to prevent data theft, security break, and data manipulation.

Among 62 respondents of this study, more than 50% respondents agree and strongly agree that IVVR software is designed with robust security features to prevent data theft, security break, and data manipulation. more than 6.46% disagree and respondent strongly disagree regarding this statement. The same items with identical specification are common problem of IVVR software. Same items with slide difference can create new item. This has been shown in Table 5.6 and graphically expressed in Chart 16.

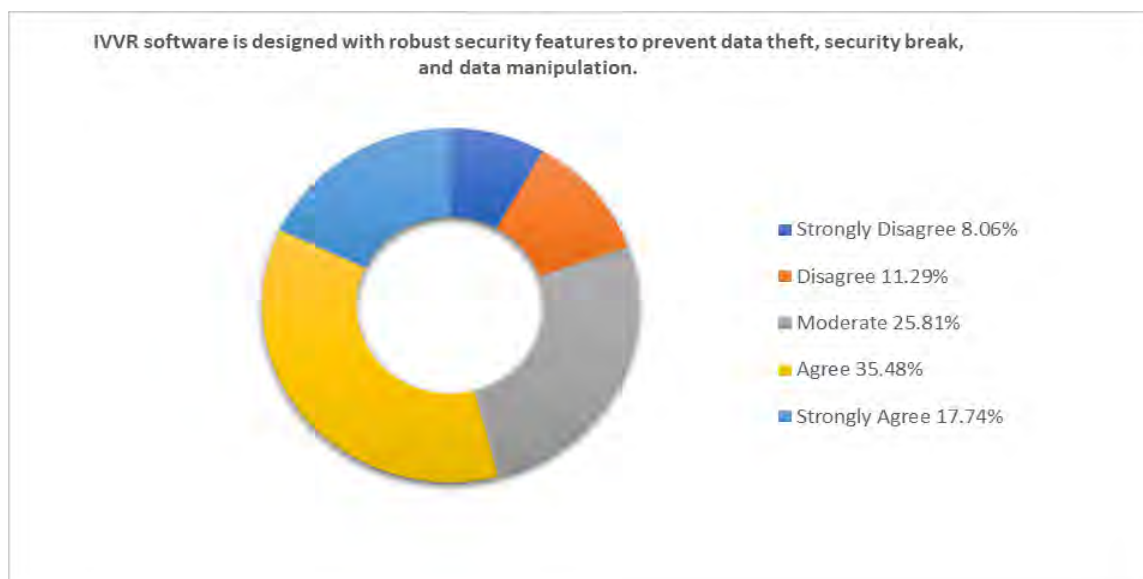


Chart -16: IVVR software is designed with robust security features to prevent data theft, security break, and data manipulation.

Question -6: IVVR software is designed with robust security features to prevent data theft, security break, and data manipulation.

Among 62 respondents of this study, more than 50% respondents agree and strongly agree that IVVR software is designed with robust security features to prevent data theft, security break, and data manipulation and more than more 20% disagree and respondent strongly disagree regarding this statement. This has been shown in Table 5.6 and graphically expressed in Chart 17.

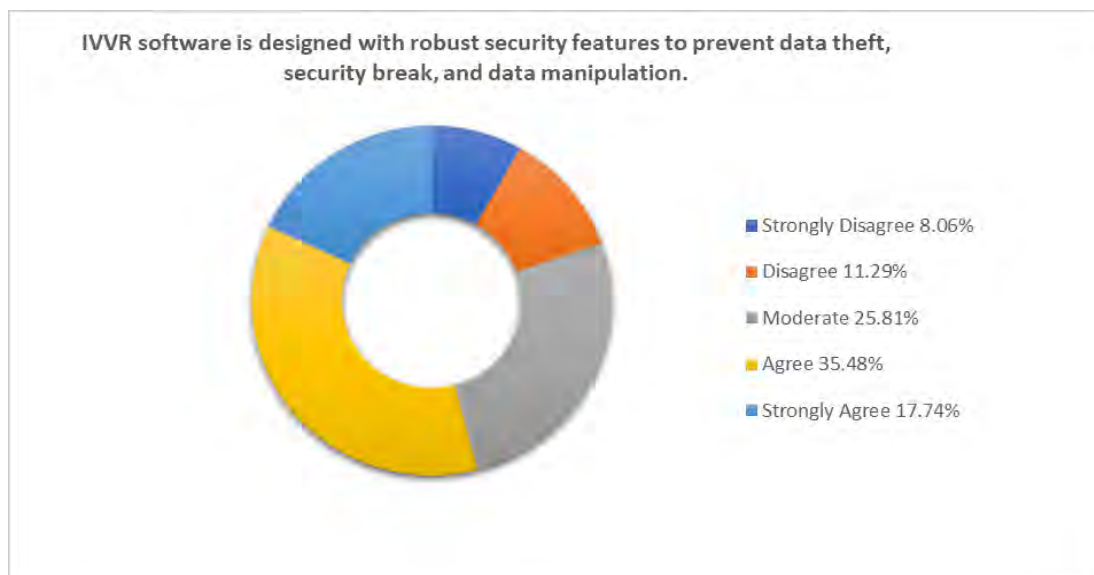


Chart 17: IVVR software is designed with robust security features to prevent data theft, security break, and data manipulation.

Question -7: IVVR software helps maintain a smooth and uninterrupted supply chain.

Among 62 respondents of this study, almost 70% respondent are strongly agreed and agree that IVVR software helps maintain a smooth and uninterrupted supply chain and only 3.23% disagree and respondent strongly disagree regarding this statement. any stakeholder is who have access in IVVR software have an idea about stock and condition which maintain smooth and uninterrupted supply chain.

This has been shown in Table 5.6 and graphically expressed in Chart 18.

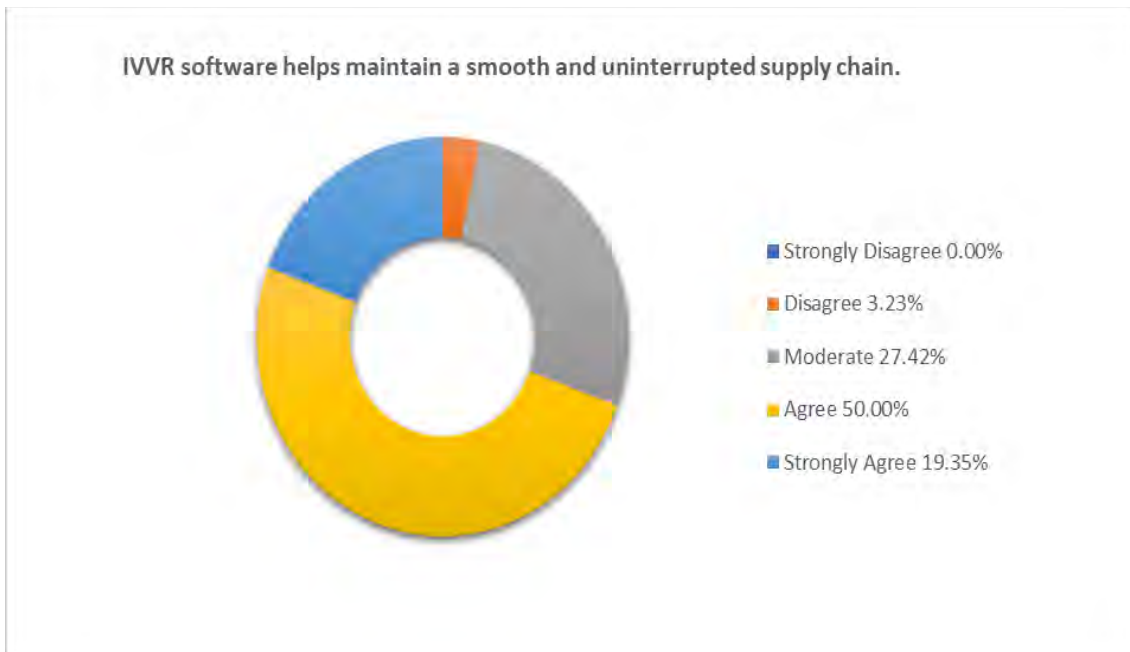


Chart-18: IVVR software helps maintain a smooth and uninterrupted supply chain.

Question -8: The implementation of IVVR software has significantly reduced the need for purchasing large quantities of records, ledger entry books, registers, and other stationery items that were previously required for the manual system.

Among 62 respondents of this study, 14 respondent or 22.58% are strongly agree and 22 respondent or 35.48% agree that the implementation of IVVR software has significantly reduced the need for purchasing large quantities of records, ledger entry books, registers, and other stationery items that were previously required for the manual system and only 14.51% disagree and respondent strongly disagree regarding this statement. Software need to maintain data server not need to maintain paper record.

This has been shown in Table 5.6 and graphically expressed in Chart 19.

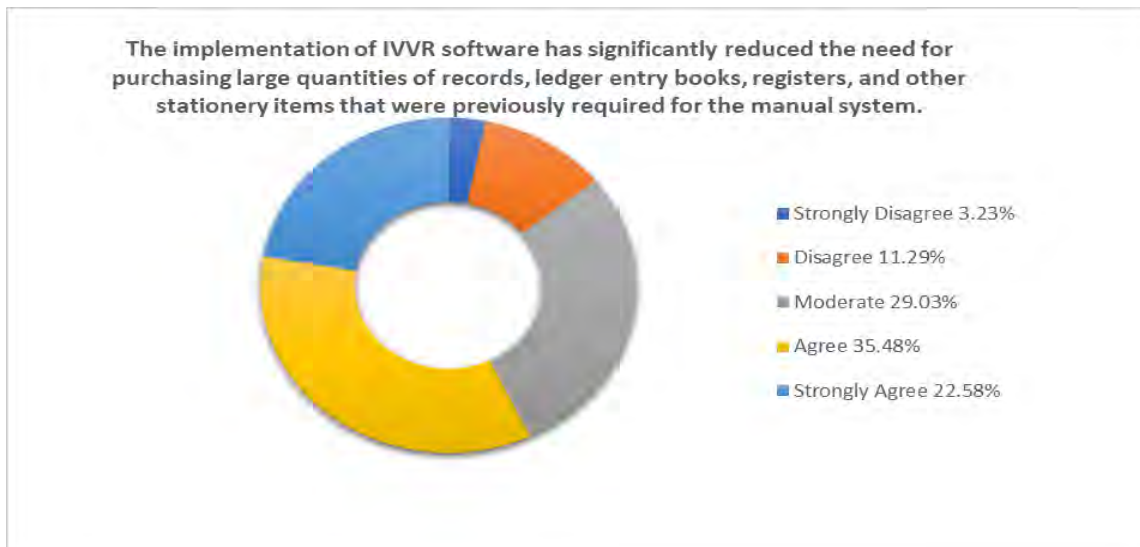


Chart19: The implementation of IVVR software has significantly reduced the need for purchasing large quantities of records, ledger entry books, registers, and other stationery items that were previously required for the manual system.

Question -9: IVVR software plays a supportive role in helping decision-makers to make progressive decisions.

Among 62 respondents of this study, 40 respondent or 66.53% are strongly agree and agree that IVVR software plays a supportive role in helping decision-makers to make progressive decisions that were previously required for the manual system and only 8.05% disagree and respondent strongly disagree regarding this statement. There are lots of progressive decisions like notification alert or just in time technology or user-friendly scope are available which may include next update version.

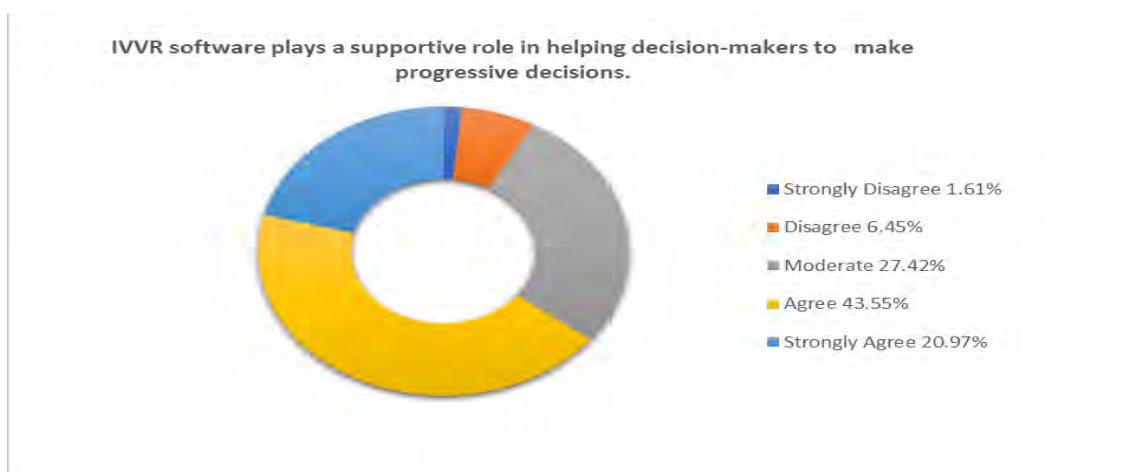


Chart 19: IVVR software plays a supportive role in helping decision-makers to make progressive decisions.

Question -10: IVVR Software has provision to update in Data.

Among 62 respondents of this study, 48 respondent or 75.42% are strongly agree and agree that IVVR Software has provision to update in Data and only 1.61% disagree and 0% respondent strongly disagree regarding this statement. the only constant is change” is a philosophy that states that change is a fundamental aspect of reality and that everything in life is subject to transformation. change or update is common for everyone. It is also true for any kind of software. Field data are accumulated with previous data which synergic next update.

This has been shown in Table 5.6 and graphically expressed in Chart 20.

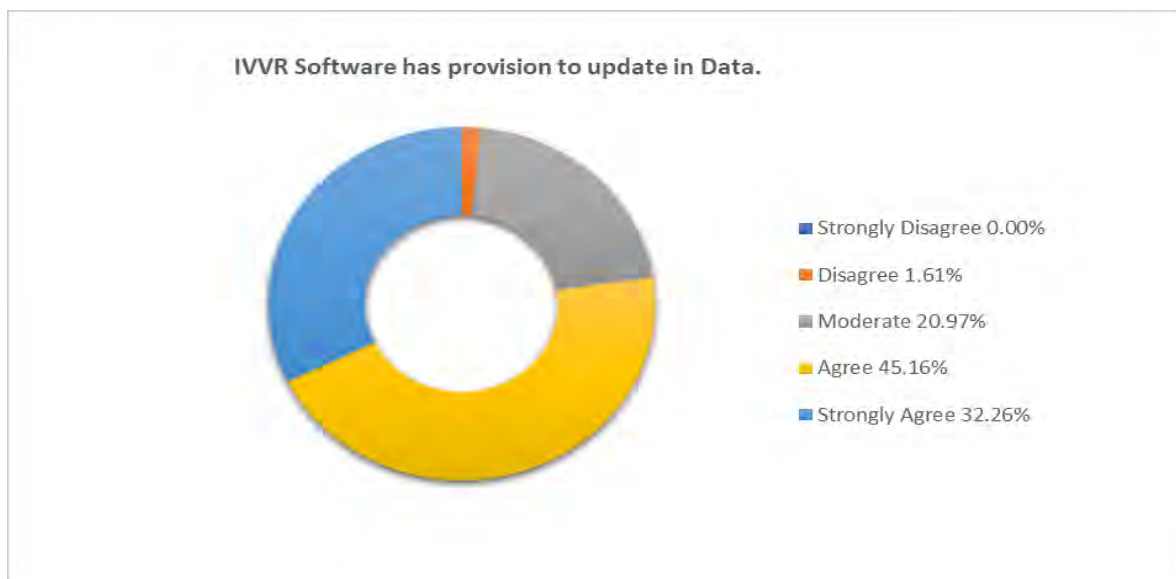


Chart -20: IVVR Software has provision to update in Data.

Question -11: The cost of inventory and order processing has been significantly reduced due to the implementation of the IVVR system.

Among 62 respondents of this study, 38 respondent or 61.29% are strongly agree and agree that the cost of inventory and order processing has been significantly reduced due to the implementation of the IVVR system. and only 8.06% disagree and 6.45% respondent strongly disagree regarding this statement. Cost of inventory is significant for all store items. Economic order quantity is important all store. obsolete item and redundant items are good for procuring entity. If IVVR software incorporate cost analysis, Cost of inventory and order processing has

been significantly reduced.

This has been shown in Table 5.6 and graphically expressed in Chart 21.

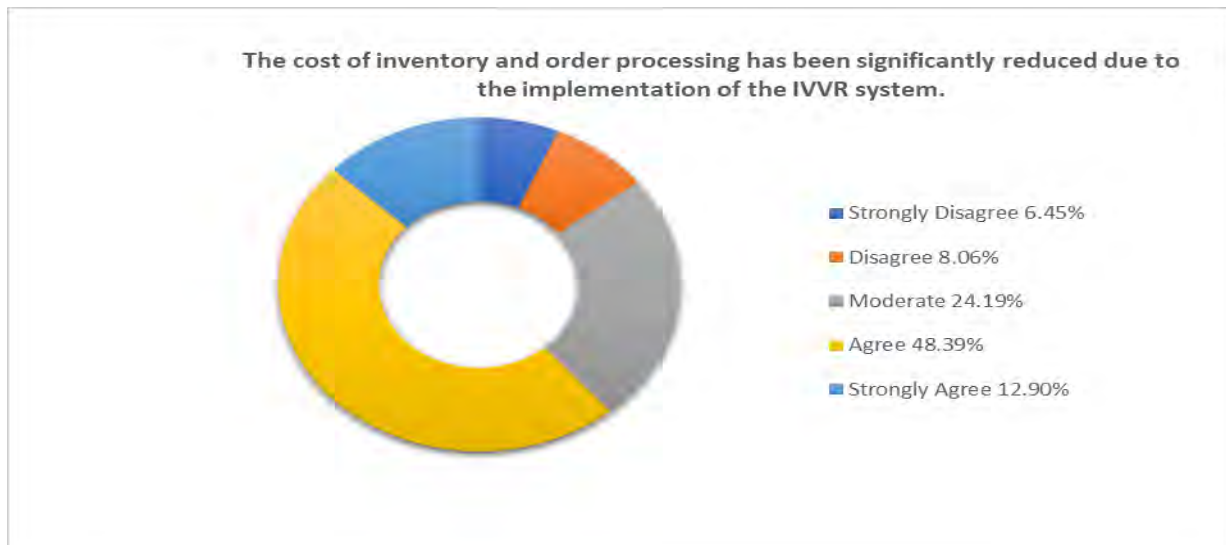


Chart 21: The cost of inventory and order processing has been significantly reduced due to the implementation of the IVVR system.

Question -12: Quick Response has become Possible.

Among the 62 respondents in this study, 49 respondents, or 79.09%, either strongly agreed or agreed that the implementation of IVVR software has made quick responses possible. This suggests a significant majority of participants recognize the software's efficiency in streamlining operations and enhancing workflow. In contrast, only 8.06% disagreed, and a mere 1.61% strongly disagreed with this statement.

The consensus among BPDB representatives indicates that the IVVR software has played a crucial role in expediting the flow of work by enabling faster data retrieval, reducing manual paperwork, and improving overall operational efficiency. By minimizing delays and enhancing system responsiveness, the software has contributed to better inventory management, quicker decision-making, and smoother coordination between departments. However, addressing the concerns of the minority who disagree could further optimize the system and ensure broader acceptance among users.

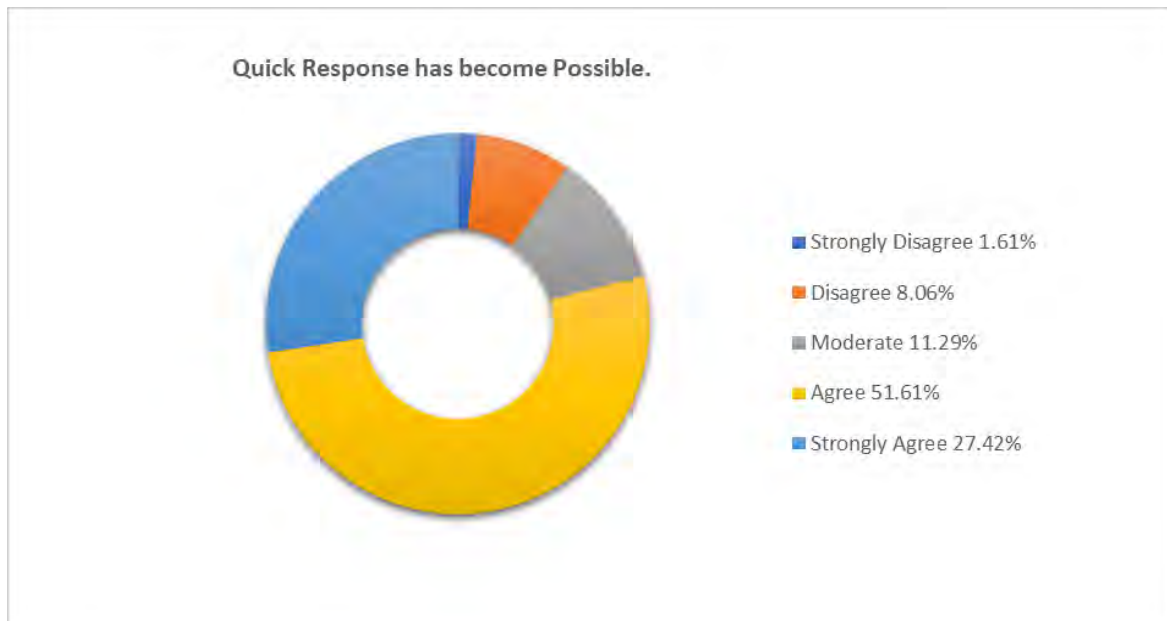


Chart-22: Quick Response has become Possible.

Question -13: IVVR Software provides the ease of speed communication to concern People.

Among 62 respondents of this study, 49 respondent or 79.09% are strongly agree and agree that IVVR Software provides the ease of speed communication to concern People and only 4.84% disagree and 3.23% respondent strongly disagree regarding this statement. BPDB representation believe IVVR Software provides the ease of speed communication to concern People.

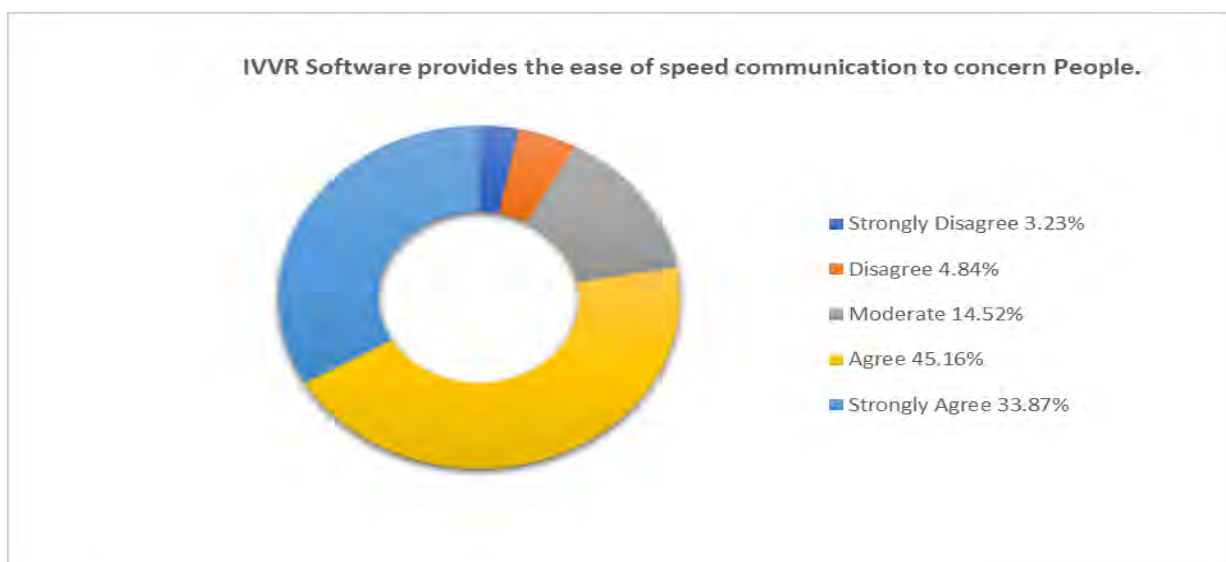


Chart-24: IVVR Software provides the ease of speed communication to concern People.

Chapter-6

Conclusion and Recommendation

6.1 Conclusion

Use of IVVR software is significant for organization like Bangladesh Power Development Board. It paradigm shift bureaucratic organization. Generally public Organization like Bangladesh maximum record are manual. Lots of clerical work done for single work which can be easily solve with help of technology. late is better than never. IVVR project is done lots of work which converted lots of record to virtual. IVVR software are useful for end user but still it faces a lot of challenge which is the main concern for our analysis. IVVR software are not cover all manual events which need to farther development like auction items and reverse logistic are not incorporate in IVVR software. Monthly division wise summery sheet cannot generate.

Virtual work reduces use of paper which contribute on environment. But IVVR software have less benefit on this cluster. Store official are inhabited in brick and mortar system. They are not adopted with d computer and internet. when computer related work confronts on them. they tried to avoid it. So virtual and paper-based record system are maintained. As a result, work load and use of paper are increased. Employee need proper training and motivated with different method like Elisabeth Kübler-Ross theory. When employee is motivated, use of paper drastically reduce.

every Software are face tremendous pressure early phase it. IVVR software are one of them. Conversion from one phase to cutting edge technology, IVVR software are face mainly employee behavior, network problem, buffering problem and internal architecture problem

Other challenge of IVVR software which are not prescribe question. This type of Question is full type question. Respondent are face problem which are/is not included questionnaires. There are 63 respondent who give different observation. we discuss those problem which are repeated are discuss below.

Showing Data entry failed/slow process: 11 respondents are given their opinion about data entry failed or slow processing during surfing IVVR server. It generally happens for high traffic volume exceeding the server's capacity, insufficient processing power (CPU), low memory (RAM), slow storage devices, network bottlenecks, poorly optimized applications, database queries taking too long, outdated software, configuration issues, and even malicious attacks

like DDoS (Distributed Denial of Service). IVVR software may face heavy traffic volume or poorly optimized applications which need to solve in further development.

Requisition and allocation step should be merge: There are 9 respondent which give option merge two option which are requisition and allocation. IVVR Software have lots of step to complete process. Some step is assumed to be duplicate. If anyone want complete requisition process, she or he need to first requisition, then allocation. but both systems are almost unique or identical. So, Allocation may omit with modification of requisition option.

Reverse logistic: There are 8 respondent which give feedback about inclusion return goods. Reverse Logistic is common in store management. Some product specially tools items which may use single time for month. Official may collect equipment from store and need to return it after complete purpose. There is another purpose which need return that is defect product. Defect product need proper management. Start from collection and end in auction process.

Damage item cannot identify: 3 respondents are rewritten about damage item identification. IVVR Software have list which is collection of stores of all items. This list compromise name of goods, quantity, Price of Goods, contract no etc. but there is no remarks option which are not include condition of product. If condition of product is including in IVVR software, Preventive action may take regarding goods.

IVVR Software have opportunity which are not included in recent software but need to explore in future development.

A fast and efficient mobile application is essential for quick entry and authorization. In the age of globalization, every renowned software offers a mobile version for seamless accessibility. Employees work in various locations and require a convenient way to complete tasks. When a manual requisition is created, employees currently have to move through multiple levels for authorization. A mobile solution would streamline this process, ensuring swift approvals and improved productivity.

Each cash procurement event (such as impress and advance payments) must be recorded in the IVVR software. This system provides options for generating daily, monthly, and yearly consumption reports, enabling procurement officials to analyze consumption patterns

effectively. These insights support the optimal use of resources. However, the accuracy of these analyses depends entirely on the quality of the recorded data.

Currently, the IVVR software does not include cash purchases, such as petty cash transactions and advance payments. As a result, procurement officials cannot fully benefit from the system's capabilities. If cash purchases were integrated into IVVR, small but frequently recurring invoices could be grouped and tendered under a framework contract. This approach would allow procurement entities to leverage better pricing and reduce procurement time.

A procuring entity can achieve accurate forecasting for fast-moving or frequently used goods, as each entity has its own unique consumption pattern. These patterns vary based on factors such as geographical location, the nature of the entity, and industry output. Since consumption patterns are not universally aligned, a tailored approach is necessary. The IVVR software provides various reporting options, including daily reports and conventional activity reports. By leveraging Software's dynamic analysis capabilities to categorize procurement types, procuring entities can strategically plan their procurement cycles for greater efficiency and convenience.

The IVVR software plays a crucial role in maintaining a smooth and uninterrupted supply chain. Supply chain failures can occur due to various factors, including natural disasters, geopolitical events, cyberattacks, pandemics, labor shortages, transportation delays, poor inventory management, material shortages, fluctuations in raw material costs, and inadequate communication between supply chain stakeholders. These disruptions can lead to delays, product shortages, and increased business costs.

While some disruptions, such as natural disasters or force majeure events, are beyond control, others—such as material shortages, poor inventory management, and inadequate communication—are preventable. IVVR software can help mitigate these risks by providing real-time notifications on the status of goods. With this functionality, procuring entities can take proactive measures to prevent supply chain interruptions, ensuring a steady flow of resources and minimizing operational disruptions.

The IVVR software enhances communication efficiency among relevant personnel. The store is the heart of any organization, and its items must be accurately recorded and stored in their

designated locations. Store employees are responsible for maintaining precise records, but any mistakes can take significant time to correct.

Additionally, updating store information often requires manually searching ledgers and physically verifying stock, making the process time-consuming. IVVR software bridges this gap by streamlining record-keeping and facilitating faster communication with concerned personnel, ensuring timely updates and improved operational efficiency.

6.2 Recommendation

Depending on the findings from the study we can recommend about the improving the effectiveness of IVVR Software as follows

1. IVVR software/system should cover all manual events/fields. If IVVR software cover all manual events, it will touch important milestone.
2. The implementation of IVVR software is driving a shift toward paperless communication. This software represents a paradigm shift in record-keeping, ensuring that all processes are fully digital. At every step, authorities must use their designated IDs and passwords to authenticate and actively fulfill their responsibilities, ensuring a secure and efficient workflow.
3. The IVVR software faces several challenges and is still experiencing teething problems. It has yet to fully address the interests of all stakeholders. To improve its effectiveness, future developments must incorporate feedback and acknowledge the needs of all users.
4. The IVVR software has web-version which any one cannot access any time any location due availability of computer and laptop as a result it cannot fulfill seamless communication. As mobile version application mean app need to develop which give user freedom to use of IVVR software.
5. The Bangladesh Power Development Board (BPDB) utilizes IVVR software for almost all completed tenders. However, micro-procurements are not included due to the time required relative to their value. As a result, petty purchases accumulate into a large volume, preventing the organization from gaining any strategic advantage. To maximize efficiency and leverage, BPDB should incorporate all cash procurement events, including impress and advance payments, into the IVVR system.

6. Procurement officials should categorize all procurement activities through effective category management, which will positively impact the organization. This approach enables procuring entities to identify consumption trends for various goods. By analyzing these trends, procurement officials can optimize resource utilization while considering economic value.
7. The IVVR application contains several nearly identical steps, which can cause user confusion. For example, requisition and allocation have similar processes and could be merged with minor modifications to streamline the application and improve user experience.
8. Storage and damage management are integral parts of an organization. Damage can occur due to mishandling or product expiration. Additionally, an efficient return process is essential for effective store management. To enhance inventory control, the IVVR software should incorporate both damage and return processes.
9. Smooth operation is crucial for any application. If data entry fails or the process is slow at the entry level, users may become discouraged from using the system. To ensure better performance, adequate server capacity and a user-friendly interface are essential.
10. Training is crucial for the successful implementation of IVVR software. Users are accustomed to manual systems, so they need proper motivation and comprehensive training to effectively utilize the software.

Chapter-7

ANNEXURE-A

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1. Appendix-1

Institute of Governance and Development (BIGD)
(Former Institute of Governance Studies (IGS))
BRAC University

Survey Questionnaire

Research Topic: Improving Performance of Store Management: A Case Study of
the IVVR Project at Bangladesh Power Development Board

This is a survey questionnaire for conducting a case study to find out challenge and opportunity in Store management software (IVVR Project) which have been Practice in Bangladesh Power Development. The aim of this research is to find out Challenge and opportunity in Store management software (IVVR Project). It is a part of academic necessity for the Masters in Procurement and Supply Management in Brac Institute of Governance and Development (BIGD), BRAC University. Your Sincere and honest response is valuable for the academic purpose. The researcher ensures you that the information to be provided by you will be kept confidential & will be used only for academic purpose.

Part A: Respondent's Profile [Please encircle (o) where appropriate]

1.	Name of the respondent :						
2.	Designation :						
3.	Name of the organization						
4.	Job Experience (pls. tick)	<5 yrs.	5-10 yrs.	11-15 yrs.	16-20 yrs.	21-25 yrs.	> 25yrs.
5.	Relevancy with IVVR Software (Pls. Tick one) :	Store Keeper	Store Official	PE's official		Others	
6.	Educational qualification (Last degree obtained)						
7.	Do you have training on IVVR Software?	Yes/No					

Part B: The following statements ask you about challenge of IVVR Project at Bangladesh Power Development Board. Please encircle (O) only one number that best reflects your opinion on the following 5 points scales (1=Strongly Disagree, 2=Disagree, 3=Moderate, 4= Agree, 5=Strongly Agree).

Quest. No.	IVVR Software practices in BPDB	Scale 1 to 5				
1	IVVR Phase-2 project is more user friendly and more effective than Manual.	1	2	3	4	5
2	IVVR software/system covering all manual events/fields.	1	2	3	4	5
3	All the reports in IVVR Software found in the system are effective, fruitful and satisfactory as well.	1	2	3	4	5

4	Paperless communication is being established through the implementation of IVVR software.	1	2	3	4	5
5	The same items with identical specifications are listed in the IVVR software under different system codes due to variations in the spelling of the item names.	1	2	3	4	5
6	IVVR software reduces the overall organization's reliance on manpower.	1	2	3	4	5
7	It takes less time to resolve any problem than before.	1	2	3	4	5
8	The requisition process is faster through IVVR system than manual system.	1	2	3	4	5
9	IVVR Software reduces the degree of pilferage of store items as it is documented in software.	1	2	3	4	5
10	The users of store items are finding the IVVR software user-friendly, with 24/7 access to inventory item positions whenever needed.	1	2	3	4	5
11	The IVVR software is still experiencing tethering Problem.	1	2	3	4	5

Part C: Please mention the additional challenges you found in IVVR Software, excluding those mentioned in list B.

Sl No.	Please mention below the Challenge	
1		
2		

Part D: The following statements ask you about the opportunities related to the IVVR project at the Bangladesh Power Development Board. Please encircle (O) only one number that best reflects your opinion on the following 5 points scales 1=Strongly Disagree,2=Disagree, 3=Moderate, 4=Agree,5=Strongly Agree).

Quest. No.	IVVR Software practices in BPDB	Scale 1 to 5				
1	An effective application for mobile version is very urgent to entry and authorize promptly.	1	2	3	4	5
2	Each cash procurement event (Impress and advance payment) is need to be recorded in this software/system.	1	2	3	4	5
3	IVVR Software triggers or notify to users (management and procurement departments) when go for procurement while the reorder level of items captured in the system is reached.	1	2	3	4	5
4	Procuring Entity get accurate forecast for fast moving Goods or Repeated use Goods.	1	2	3	4	5
5	IVVR software is designed with robust security features to prevent data theft, security break, and data manipulation.	1	2	3	4	5
6	IVVR software aides in demand forecasting, procurement planning and timely tendering for indented items, helping to prevent stockouts.	1	2	3	4	5
7	IVVR software helps maintain a smooth and uninterrupted supply chain.	1	2	3	4	5

8	The implementation of IVVR software has significantly reduced the need for purchasing large quantities of records, ledger entry books, registers, and other stationery items that were previously required for the manual system.	1	2	3	4	5
9	IVVR software plays a supportive role in helping decision-makers to make progressive decisions.	1	2	3	4	5
10	IVVR Software has provision to update in Data.	1	2	3	4	5
11	The cost of inventory and order processing has been significantly reduced due to the implementation of the IVVR system.	1	2	3	4	5
12	Quick Response has become Possible.	1	2	3	4	5
13	IVVR Software provides the ease of speed communication to concern People.	1	2	3	4	5

Part E: Please mention the additional opportunities you found in IVVR Software, excluding those mentioned in list D.

Sl No.	Please mention below the Opportunity	
1		
2		

Signature (optional)