



**An Undergraduate Internship on Topic
Inventory Management System
of
Hover Construction Limited**

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Science in Computer Science

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Attestation

This is to notify that this report on “Inventory Management System of Hover Construction Limited” has been prepared as a part of my internship formalities. As it is an obligation part of our Undergraduate Programs to submit an internship report, all my own work and has not been copied in part or in whole from any other source except where duly acknowledged. As such, all use of previously published work (from books, journals, magazines, internet, etc.) has been acknowledged within the main report to an entry in the References list. Moreover, I was inspired and instructed by my supervisor Subrata Kumar Dey, Senior Lecturer of Computer Science & Engineering at School of Engineering, Technology and Science of Independent University, Bangladesh.



Signature

27th January 2021

Date

Simsabil Binte Ahmed Peu

Name

Acknowledgement

First, a special thanks to my Almighty Allah for giving me the strength to successfully attend the internship program at Hover Construction Ltd. And made me able to complete this report within the schedule time. It is very difficult to express my feelings that helped in completion of this report.

I want to thank my internship supervisor Subrata Kumar Dey Sir (Senior Lecturer of Computer Science & Engineering of Independent University, Bangladesh) for his inspiring guidelines, valuable suggestion, and constant help throughout the work and in preparation of this report. I feel fortunate to have the opportunity to work at Hover Construction as an intern position at their Corporate Head Office. I am grateful to Shahid Uddin (Head of HR department) along with other members from Hover Construction, Shehab Uddin (Managing Director), Kazi Ahmed (Senior Analyst) who acted as a mentor to complete my regular task and provided me with valuable information regarding this report. Finally, I am thankful to Independent University, Bangladesh, for providing the platform for this knowledgeable and wonderful internship experience.

Letter of Transmittal

Date: 27th January 2021

Subrata Kumar Dey
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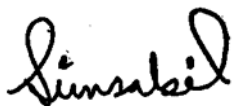
Subject: Request for approval of Internship Report.

Respected Sir,

I am a student of Independent University, Bangladesh in Computer Engineering of School of Engineering & Computer Science and I have completed all my courses. I have completed my internship at Hover Construction Limited and I have finalized my internship report naming as “Inventory Management System of Hover Construction Limited”. I have tried my best to cover adequate information. During this internship, it has given me a great opportunity to learn about different aspects of the networking system this reputed organization closely. I have also had a substantial amount of professional guidance on multiple levels.

Therefore, I am submitting my report on your very concern. I hope you will be kind enough to discover my observation during internship. Rather, in case of any further clarification, I would welcome the opportunity to consult with you to explore how my findings could best meet your needs.

Yours Sincerely



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Evaluation Committee

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Supervisor

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Internal Examiner

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Executive Summary

Internship is known as gaining sensible experiences from the different Organizations that helps a lot to make a relation between the theoretical and practical knowledge. Internship is three credit compulsory courses for the students graduating from Independent University, Bangladesh (IUB). A student from School of Engineering and Computer Science (SECS) should go for these three credit hours practical course that is related to their relevant field. It is very important because it is the first time for a student to acquire a keen practical knowledge from the different organizations. As a student of Computer Science of Independent University, Bangladesh (IUB) I have studied a lot of programming courses during last four years. So, when I got a chance to do my internship at Hover Construction Limited (HCL), I got a scope to work and learn with the developer team. My project paper is on “Inventory Management System on HCL”. This report covers the whole project, which I have learnt during the Internship period. This report will be helpful for those who want to learn more about Inventory Management System of a construction company.

1. Introduction

1.1 Background of Hover Construction Ltd.

Hover Construction Ltd. starts its Journey as a general contractor in 2008, the company has undertaken many challenging projects and accumulated skills, know-how and experiences in design and build solutions such as jetty construction, bridge construction, and construction of railway line, flyover, river protective work, buildings, roads, survey, consultancy and related engineering works.

However, Hover Construction takes the role of main contractor for small to big size projects and performs project management services to co-ordinates specialist traders for industrial or commercial projects. They also provide design inputs and engineering solutions as value-add service to their clients.

Their objective is to provide their clients with experience when they are chosen to execute their projects. Their emphasis on clear communication and flow through procedures ensure that client's objectives are top priority in the planning and execution of all our processes.

They take pride in their delivery; thus, their clients can always be assured that only the most experienced and qualified people are serving them, all the time.

Hover Construction is committed to deliver projects on time with complete satisfactions. They ensure continual improvement through quality process which are directed by strong management team. For safety, Management team takes all kind of necessary actions to make sure the safety of employees at site as well as the public around the site.

They follow honest and transparent business principles as they are committed to deliver our project on schedule with satisfaction and to continually seek out opportunities to be challenged and to grow. Hover Construction is developing an Inventory Management system for their company. Hover Construction is a contractor company that design and build solutions such as develop buildings, jetty construction, bridge construction, construction of railway line etc to their clients. Due to lots of ongoing projects and to supply materials to the construction site Hover Construction buys their construction material in advance and stock them in their own storehouse. As there are lots of stocked materials in the storehouse so to manage and maintain the storehouse Hover Construction Company wants to develop their own inventory system. Inventory Management system solutions are the modern miracle tool that can efficiently

manage all our business processes and reports with its well-designed business modules, thereby bringing in a better production rate and keeping our business well organized. Furthermore, it provides real-time information about the stocks, order management, purchase etc, precisely to help you plan each step cautiously. Previously these tasks were being accomplished manually by the employees which made the process slow and erroneous. With features as such, Inventory Management solution can accelerate our business cycles, improve output and dependability, and provide higher levels of service to customers, suppliers and partners, thus pushing your business up for a success. Further, we will analyze and design necessary requirements to improve the quality of the proposed system.

1.1.1 Mission

To be a respectable Constructor delivering beyond expectation, as always, Company slogan “build to promise wonder” and to provide their customers with valued solution using their expertise.

1.1.2 Vision

To procure projects at competitive price, provide safe working conditions and deliver quality work within reasonable time frame.

1.1.3 Logo



Figure 1: Company Logo

1.2 Methods and Sources:

1.2.1 Primary Sources:

- Conduct survey within employee.
- Discussion with the banking officer in-charge of IFIC Bank Limited.
- Direct conversation with the customers
- Conduct online survey.

1.2.2 Secondary Sources:

- Website.
- Office record
- Newspaper.
- Annual report.

1.3 Limitations of the Report:

There are some limitations in our study. I faced some problems during the study which I am mentioning below:

1.3.1 Lack of Time

The period of this preparing report is very short. I had very short time in my hand to complete this report, which was not enough. So, I could not go in depth of the study. Most of the times the relevant officials were busy and not able to give us time. I also was busy in my assigned jobs in my office.

1.3.2 Insufficient Data

Some desired information could not be collected due to confidentiality of business and proper communication with the competent authority.

1.3.3 New Challenges

Every knowledge in life is important. In this short period of time, I had to learn about General Banking before going through my specific field of IT.

1.3.4 Other Limitations

As I prepared this report with lack of previous experience many practical matters have been written from my own observation that may vary from person to person.

2.Literature Review

2.1 Relationship with Undergraduate Studies:

Database Management (CSE303) help to build database and write sql for query from the tables. Web Application & Internet (CSE309) where I learn about the usage of HTML, CSS, Js, Bootstraps and MVC and CMS pattern works. Analysis and Design (CSE307) give me the idea about OOP and SDLC of software have to follow while developing and diagram of workflow and understand the feasibility through analysis. Software Engineering (CSE451), course help me to understand software testing, architecture design, SDLC, Gantt Chart and WBS.

2.2 Related works:

This is a device based on a computer to monitor inventory levels, purchases, orders and deliveries. Companies use this method to avoid stock overflow and avoid stock outage. This tool is used to manage inventory information that was previously manually stored in excel document, which was very tedious and time-consuming. It is possible to link this tool with Similar to distribution software, this method can be connected as distributors who can compete with fewer cash tied up in inventories have a distinct advantage over their rivals. Inventory management software is also used by businesses to decrease their carrying costs. As they are transported from a vendor to a warehouse, between warehouses, and finally to a retail location or directly to a customer, the device is used to monitor goods and parts. For a number of purposes, inventory management systems are used.

2.3 Market Analysis:

In china market, there are the world biggest supplier and e-commence business. In figure, you can see that in 2019 about 40 USD million was the income from Inventory Management. In near future 2026, the price increment is about 3.1 times or 140 USD million.

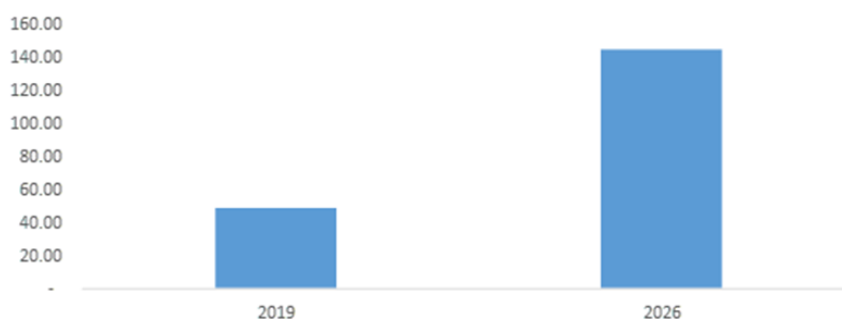


Figure 2: China Inventory Management Software Market

The cloud arrangement demonstrates in China inventory management computer program advertise is balanced to witness around 10% development amid the forecast period prompted by developing ubiquity of cloud stages and expanding mindfulness of the versatility & adaptability advertised by the innovation. From the Figure, we can say that the Manufacturing and Retail from 2016 to 2026 is rising. The global market demands the product in increase from 6 USD million to 13 USD million.

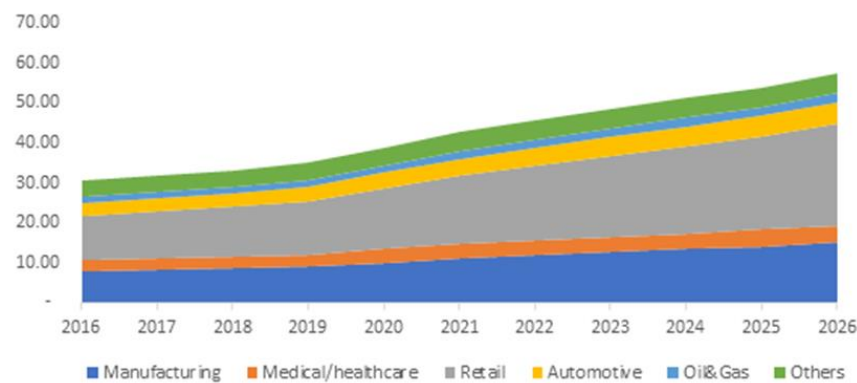


Figure 3: South Africa Inventory Management Software Market

In 2019, the retail segment held more than 35% South Africa market share on account of the basic utility of the innovation to streamline supply chain operations within the division. With the evolution of e-commerce, development within the retail segment has been noteworthy due to the points of interest of economies of scale and commerce development.

2.3.1 Global Market:

inFlow Inventory: “inFlow Inventory” is found the product’s inventory figures supportive in controlling the occasions of over-orders and stock deficiencies. They too said that eCommerce integrative, such as Magento and Shopify, made a difference in them oversee their online inventory. The unit cost is \$399 per user. In 2018-2019, 82% of inFlow’s commentators worked in little businesses.

ZhenHub: “ZhenHub” is found the Shopify integration accommodating as they were able to oversee their inventory and shipping for site orders with ease. They too found the product’s highlights effectively customizable as per their commerce needs. The unit price is \$29 per month. In 2018-2019, all ZhenHub’s commentators came from little businesses within the attire and design as well as buyer gadgets segments.

Zoho Inventory: “Zoho Inventory” discover the product’s sales order (SO), purchase order (PO), and cost following functionalities accommodating in computerizing stock obtainment. They are moreover famous that Zoho’s shipping administration following usefulness made a

difference them plan and track the area of stock things more effectively. \$49 per month expense for “Zoho Inventory”. In 2018-2019, 98% of Zoho Inventory’s commentators were from little businesses. Most of these commentators had a place in the retail, electrical and hardware fabricating, customer merchandise, and IT administration businesses.

2.3.2 Local Market:

Next Inventory: “Next Inventory” empower centralized administration of assignments such as tracking inventory levels and stock areas. Overall, it is similar other warehouse or inventory management system. Warehouses play a crucial part within the supply chain industry by controlling the capacity and in and out the movement of materials. It has few features like real-time information, inbound and outbound serial tracking, thing Development Review Report, item Lead Time Investigation, etc.

Wholesale: “Wholesale” is a mechanization computer program to track the stock record, ordering, obtaining. It moreover keeps up the account of provider & stock warehouses. This software maintains the overflow stock and keep it under control. It also gives the product time, date, purchase, supplier, etc. of an item. It has the similar few feature of our current project.

3. Customer Requirement Analysis:

3.1 Surveys:

Survey is processed to know how to develop software features and feasibility. It also helps to know the limitation and requirement to fulfill the client needs. For survey questionnaires are created for knowing opinions of different clients and users. A cautious survey will assist you to center you extend whereas directing your usage and investigation, so the overview research is wrapped up faster. You can at that point concentrate on executing well-supported choices.

3.2 Group Interviews:

During time of pandemic, it is difficult to find people to interview. The best way to solve this problem is to make questionnaire for survey. The questionnaire can be created Google doc and can use the social media’s help to find the user preference. There is two way to make the survey questionnaire, one is “Open Ended” and another one is “Closed Ended”.

Open Ended: Open questions inquire members to type in special reactions, which are free form. They are more suited to an exploratory investigation that looks to depict a subject based on patterns and designs.

Closed Ended: Typically, closed questions will have a one-word answer, such as “yes” or “no” or have a multiple choose option.

For the project, I use Closed Ended. It will be easy for a person to answer my question without thing much.

3.3 Document Analysis:

The study of previous or old report for requirement analysis is called document analysis. It is like literature review. We make compare between the old system and newly added system in the software. If old document exists than it will help us to find problem, change system and avoid unnecessary functions and work. The document will make a clear which stakeholder are involved in the system and what function will they have.

3.4 Gathering from the Analysis:

From the analysis, we can gather few information due to pandemic. Most of the information was gather through conversation between hover construction manager and Accounts team. The function requirement of each stakeholder is given details in the stakeholder analysis.

4.Requirement Specification

A requirements specification may be a record that depicts what the software will do and how it will be anticipated to perform. We are developing a web base software or application. We are trying to build a simple user base application and user understand able platform. But to run this software, a few recommend hardware and software are to be used.

4.1 Hardware Requirement:

- Keyboard & Mouse.
- LAN/WIFI Network.
- Any Laptop/Desktop.
- 512MB or above RAM.
- Pentium 4 and 2.4GHZ or above.
- 256MB or above Hard disk.
- Display.

4.2 Software Requirement:

- Browser (Firefox, Google Chrome, Safari, Opera, Internet Explore etc.).
- Microsoft office or WPS (excel, word, etc.).
- PDF reader (like Adobe Reader).

5. Project Management and Financing:

5.1 Work Breakdown Structure (WBS):

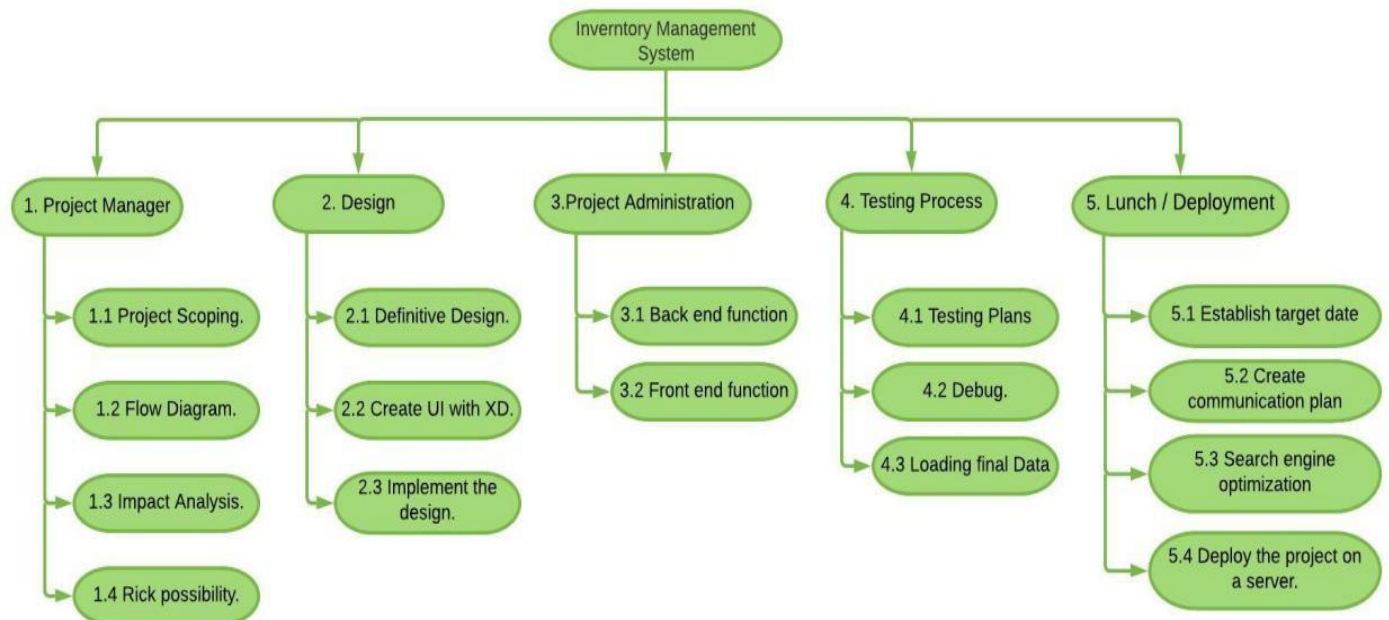


Figure 4: WBS

- **Project Manager.**
 - Project Scoping.
 - Flow Diagram.
 - Impact Analysis.
 - Rick possibility.
- **Design**
 - Definitive Design.
 - Create UI with XD.
 - Implement the design.
- **Project Administration**
 - Back end function
 - Front end function
- **Testing Process.**
 - Testing Plans
 - Debug.
 - Loading final Data
- **Lunch / Deployment**
 - Establish target date.
 - Create communication plan.
 - Search engine optimization
 - Deploy the project on a server.

5.2 Process/Activity Wise Time Distribution:

On the Work Breakdown Structure, all the activities of the project are included. For completion of those activities, we work with a flow of definite time scale to maintain the harmony with other developer. My project manager fixes the time with other developer working long side the project. The days of time are assigned in the table for the current activities or task.

No.	Task	Days	Work Percentage
1.	Project Manager	12	10.53 %
2.	Design	25	21.93 %
3.	Project Administration	45	39.47 %
4.	Testing Process	20	17.54 %
5.	Lunch / Deployment	12	10.53 %
Total		114	100 %

The pie graph shows the amount of work time distribution for each activity.

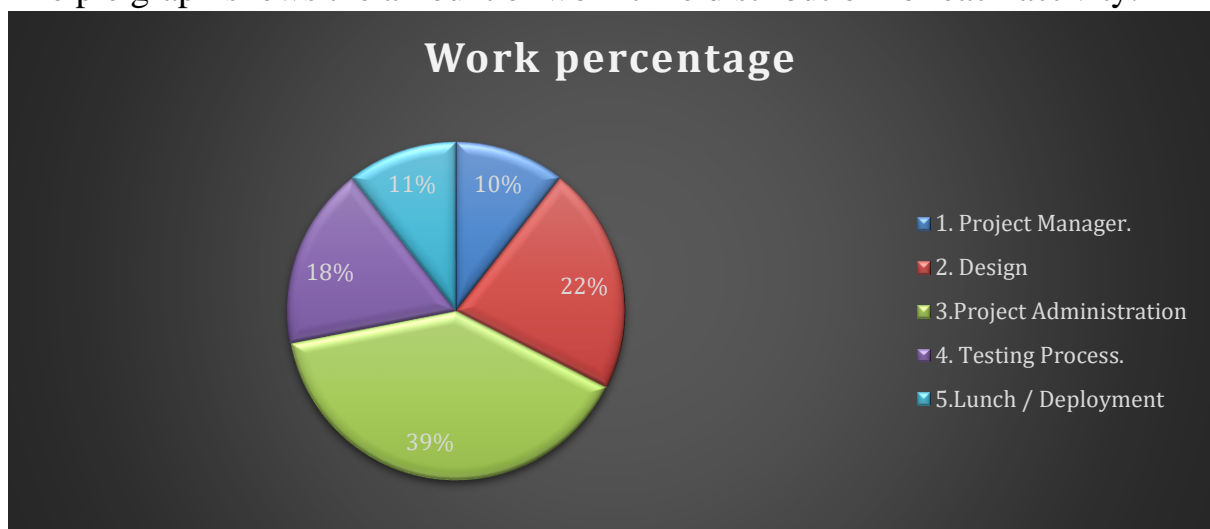


Figure 5: Work Percentage of Process Wise Time Distribution (Pie Graph).

5.3 Gantt Chart:

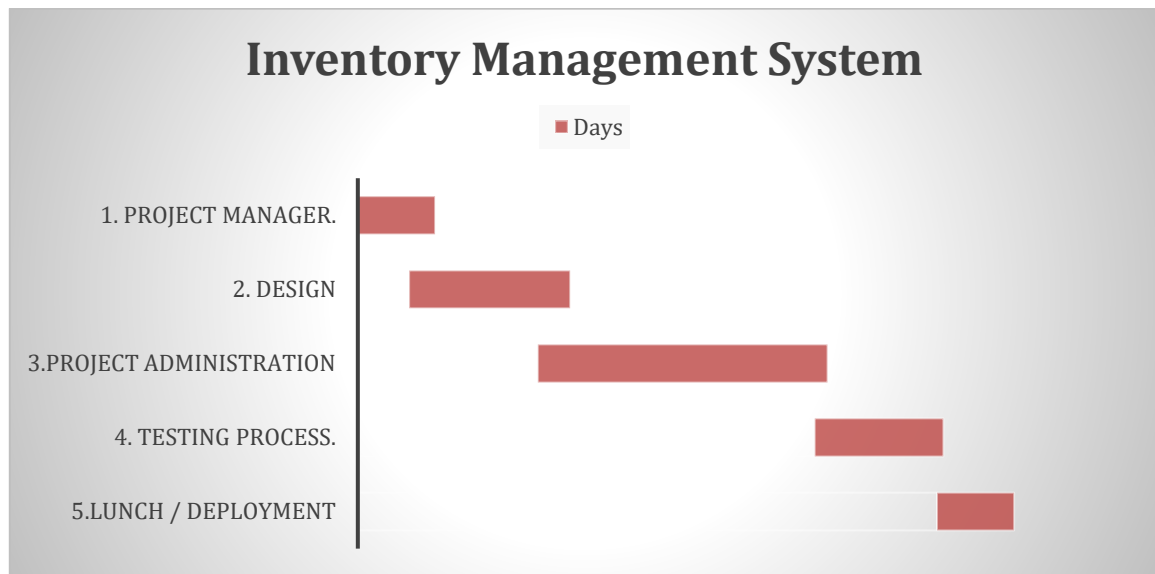


Figure 6: Gantt Chart

5.4 Process/Activity Wise Resource Allocation & Estimated Costing:

The amount of cost needs to complete the project is about 55000 Tk. There are few additional costs like domain and host cost which is about 3000 Tk.

Table: Table for Estimated Costing.

No.	Task	Work Percentage	Estimated Cost
1.	Project Manager	10.53 %	5790 Tk
2.	Design	21.93 %	12000 Tk
3.	Project Administration	39.47 %	21710 Tk
4.	Testing Process	17.54 %	9700 Tk
5.	Lunch / Deployment	10.53 %	5800 Tk
Total		100 %	55000 Tk

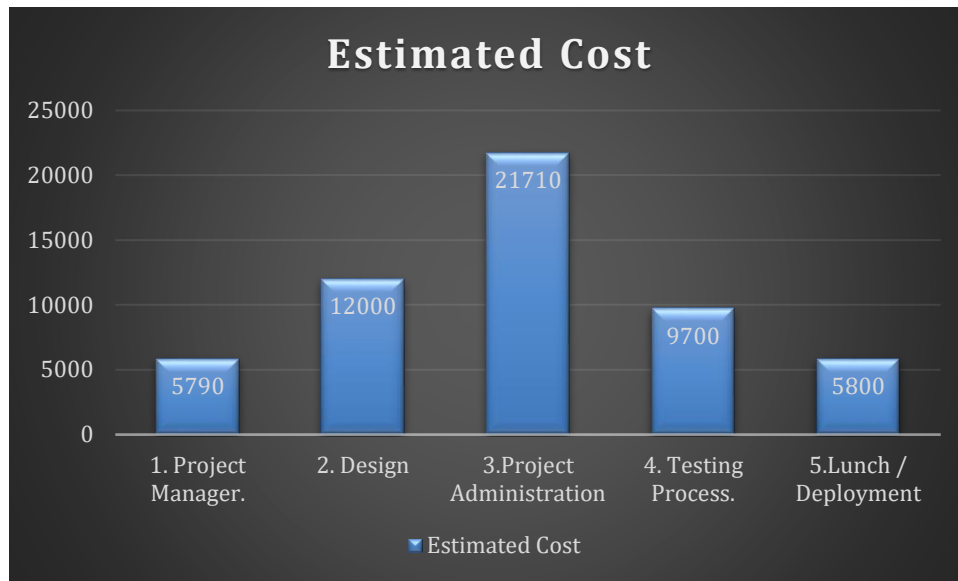


Figure 7: Estimated Costing (Bar Graph)

6. Methodology

6.1 Data Dictionary

6.1.1 Brand

Name	Data Type	Size	Remark
id	int	11	"Id" is the primary key in this relation, and it will auto increment the brand id.
name	varchar	255	It will have the name of the brand. Example: "Lux" Ordinary Portland Cement. Here, "Holcim" is brand.
category_id	int	11	It will assign the category where the brand of product will be.
created_at	timestamp		With the help of this field, the created time will be posted and recorded.
updated_at	timestamp		When there will be a change, this field will take the current time and date.

6.1.2 Category

Name	Data Type	Size	Remark
id	int	11	“Id” is the primary key in this relation and it will auto increment the category id.
name	varchar	255	It will have the name of the category. Example: “Ordinary Portland Cement”, “Low Heat Cement”, etc. are categories.
created_at	timestamp		With the help of this field, the created time will be posted and recorded.
updated_at	timestamp		When there will be a change, this field will take the current time and date.

6.1.3 Product

Name	Data Type	Size	Remark
id	int	11	“Id” is the primary key in this relation and it will auto increment the product id.
category_id	int	11	It will keep id of category from category table.
brand_id	int	11	It will keep id of brand from brand table.
employee_id	int	11	It will keep id of employee from employee table.
name	varchar	255	It will have the name of the product.
code	varchar	120	This will hold the code number of the product
garage	varchar	200	The location from where the product is store.
route	varchar	200	The location from where the product comes from.

buying_price	int	128	It will contain the price or value of the product.
unit	varchar	180	It will contain the unit of the product.
image_url	text		It will help to attach multiple image of product.
created_at	timestamp		With the help of this field, the created time will be posted and recorded.
updated_at	timestamp		When there will be a change, this field will take the current time and date.

6.1.4 User

Name	Data Type	Size	Remark
id	int	11	“Id” is the primary key in this relation and it will auto increment the user id.
name	varchar	128	It will have the name of the user.
mobile_no	varchar	16	It will have the email of the user.
gender	tinyint	4	It will take the gender of user.
email	varchar	128	It will have the mobile number of the user.
password	varchar	128	It will take password of the user.
assess_level	enum	admin, site_manager, employee	This field will hold selected type date which is fixed.
created_at	timestamp		With the help of this field, the created time will be posted and recorded.
updated_at	timestamp		When there will be a change, this field will take the current time and date.

6.1.5 Site manager

Name	Data Type	Size	Remark
id	int	11	“Id” is the primary key in this relation and it will auto increment the site manager id.
user_id	in	11	It will keep the id of the user from the user table which is the only id of site manager.
address	text		Site manager location of stay or home location.
nid_number	vchar	50	According to Bangladesh, every person has a unique id number card.
city	vchar	128	Site manager’s state location.
photo	text		Site manager’s personal image will be hold here.
created_by	int	11	The admin id will be placed here.
created_at	timestamp		With the help of this field, the created time will be posted and recorded.
updated_at	timestamp		When there will be a change, this field will take the current time and date.

6.1.6 Employee:

Name	Data Type	Size	Remark
id	int	11	“Id” is the primary key in this relation and it will auto increment the employee id.
user_id	in	11	It will keep the id of the user from the user table which is the only id of employee.
address	text		Employee location of stay or home location.
nid_number	vchar	50	According to Bangladesh, every person has a unique id number card.
city	vchar	128	Employee’s state location.

photo	text		Employee's personal image will be hold here.
assess_level	enum	Supplier, Accounts	This field will hold selected type date which is fixed.
created_by	int	11	The admin id will be placed here.
created_at	timestamp		With the help of this field, the created time will be posted and recorded.
updated_at	timestamp		When there will be a change, this field will take the current time and date.

6.1.7 Order

Name	Data Type	Size	Remark
id	int	11	"Id" is the primary key in this relation and it will auto increment the order id.
ref_number	varchar	180	A unique id generate will create a unique number for the order.
total_amount	float		Total amount of the order will be here.
status	tinyint	4	This will take approved or disapproved status of order
created_by	int	11	The site manager id will be placed here to track the created order.
created_at	timestamp		With the help of this field, the created time will be posted and recorded.
updated_at	timestamp		When there will be a change, this field will take the current time and date.

6.1.8 Order product

Name	Data Type	Size	Remark
id	int	11	“Id” is the primary key in this relation, and it will auto increment the order_product id.
order_id	int	11	It will keep the order id of similar product.
product_id	int	11	It will keep the ordered product id.
quantity	int	80	The amount of product which is ordered.
created_at	timestamp		With the help of this field, the created time will be posted and recorded.
updated_at	timestamp		When there will be a change, this field will take the current time and date.

6.1.9 Stock

Name	Data Type	Size	Remark
id	int	11	“Id” is the primary key in this relation and it will auto increment the stock id.
product_id	int	11	The number of product available for sell.
reserve_number	int	120	Current amount of product available in the store house.
amount	int	150	The cost of current amount of product present in the store house or storage.
previous_stock	int	130	The previous amount of stock in the store house or storage.
restock	int	180	The amount of product newly added in the stock.

created_by	int	11	The person who initially created the stock.
is_active	tinyint	4	It will show whether the stock is active or inactive.
created_at	timestamp		With the help of this field, the created time will be posted and recorded.
updated_at	timestamp		When there will be a change, this field will take the current time and date.

6.1.10 Stock record

Name	Data Type	Size	Remark
id	int	11	“Id” is the primary key in this relation and it will auto increment the stock id.
stock_id	int	11	The number of product available for sell.
current_amount	int	180	The cost of current amount of product present in the store house or storage.
current_quantity	int	120	Current amount of product available in the store house.
withdraw_amount	int	180	The cost of last amount of products are taken out from storage.
withdraw_quantity	int	120	Last amount of products are taken out from storage.
restock_quantity	int	120	The amount of product newly added in the stock.
status	varchar	180	Here, the status of the stock will be taken.
created_by	int	11	The person who last work with the stock function.
created_at	timestamp		With the help of this field, the created time will be posted and recorded.
updated_at	timestamp		When there will be a change, this field will take the current time and date.

7. Body of the Project

7.1 Work Description

An effective inventory management system could be dependable proficient with fabulous record-keeping capacities. The software has to be incredible consideration to detail and a commerce mentality. Look at the levels of supplies and raw materials to decide shortages. Arrange unused supplies to dodge wasteful aspects or over the top overflow. Analyze distinctive suppliers to get the leading cost-effective bargains. In the software there will be 3 stakeholders (Warehouse Manager, Site Manager and Employee). Their functionality is separated because they have different work structure. There are two type of employee (Supplier and Accounts). Supplier do not have power to use the system, but we add them to keep the track of supply and get in touch through mail and SMS. Stock plays the main role of the project which can create, add, re-stock, edit active/ inactive and delete. Also, stock history is available. Stock overall transaction in observe and calculated by the accounts.

7.2 System Analysis

7.2.1 Six Element Analysis

Process	System Roles					
	Human	Non-computing Hardware	Computing Hardware	Software	Database	Communication & Network / Connectivity
Login	Admin, site manager and employee	--	PC/Laptop to login.	Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.	Database	Internet
Create employee, site manager, product, stock brand and category	Admin	--	PC/Laptop to create.	Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.	Database	Internet
Create order	Site manager	--	PC/Laptop to create.	Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.	Database	Internet
Withdraw stock	Admin and Site manager	--	PC/Laptop to withdraw.	Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.	Database	Internet
Print excel of stock	Admin, site manager and employee	--	PC/Laptop to get excel file.	MS office, Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.	Database	Internet
Print out the order pdf	Admin, site	--	PC/Laptop to get pdf.	PDF reader, Chrome, Mozilla	Database	

	manager and employee			Firefox, Microsoft Edge, Opera, etc.		Internet
Approved and disapproved order	Admin	--	PC/Laptop to click.	Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.	Database	Internet
Re-stock, active , inactive stock	Admin	--	PC/Laptop to process.	Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.	Database	Internet
Edit stock, employee, site manager, brand, category and product	Admin	--	PC/Laptop to fix.	Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.	Database	Internet
View list of stock, brand, category and product	Admin, site manager and employee	--	PC/Laptop can see.	Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.	Database	Internet
View list of order, employee and site manager.	Admin	--	PC/Laptop can see.	Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.	Database	Internet

7.3 Feasibility Analysis

7.3.1 Feasibility Study:

The feasibility study is the test of the proposed system inside the light of its workability, get together of the user's prerequisites, compelling utilize of resources, and of course, cost-effectiveness. The foremost objective of the feasibility consider is not to comprehend the issue but to realize the scope. Feasibility thinks about is carried out based on numerous purposes to analyze whether software items will be right in terms of advancement, implantation, the commitment of project to the organization, beneficial items, and costly upkeep. This as well characterizes the resources required to total the point-by-point examination. The result may be a possibility report submitted to the organization. This may be recognized or recognized with modifications or rejected. The feasibility study itself examines the technical, economic, and financial.

7.3.2 Economic Feasibility:

The cost management analysis is done in the Economic Feasibility. Those who are in startup conditions cannot bear software. They ought to keep up their calculations store information physically. It was found out that the entire tangible advantage alone barring the intangible advantage exceeds the cost.

Intangible Cost and Benefits,

- Easy to Use.
- Simple and easy to understand User-Interface.
- Low-cost Maintenance.
- Less Usage of Papers.
- Save Allowance for losing and buying Tools and Equipment.

There is a lot of tool, machine and time required for this software. As the budget calculation, we only focus on the software building cost and launching cost which was possible. As the cost of cloud is not higher and SMS server which is has to renew yearly. For this, it will be very difficult for the company to fulfill this simple charge.

7.3.3 Operational Feasibility:

We have explored numerous operators. They are using Microsoft Word and Excel to store all their information on a computer hard or internal storage disk. It is exceptionally hazardous and parcels time-consuming. The focuses to be considered are - system interface is to be standard, user-friendly, and gives broad help. No extraordinary preparation isn't required. Working the computer program for 30 to 40 minutes will suffice to create stakeholders' work it legitimately.

As the software is web-based application, it must be supported by smartphone and other devices. We should add the bar-code scanner with smartphone or bar scanner for adding product information. The process is not available due to pandemic situation but later on for further integration, it will be added in future.

7.3.4 Technical Feasibility:

This evaluation centers on the technical assets accessible to the organization. It helps organizations decide whether the specialized assets meet capacity and whether the technical group is able of changing over the thoughts into working frameworks. Technical feasibility too includes the assessment of the equipment, and program specialized prerequisites of the proposed framework. Hover Construction Limited is one of the rumored companies. They have gifted specialized experts to total and keep up this venture.

The project will be upload in cloud-server and multiple data will be handle my software through internet. Due to pandemic situation, all people in the country are using internet which will cause delay of speed sometimes. Also, a lot of data will be showed for order and stock history in a cloud.

7.4 Problem Solution Analysis:

Process	Stakeholders	Concerns (Problems)	Analysis (Reason of the Problem)	Proposed Solution
Keep track	All user	Need to keep track on every product shipment and distribute location.	Multiple location for shipping and storage houses. So noted document cant keep up to track. So, a software is needed.	The data is in the database where all information can be access by all user anytime by web. So, it is not difficult to keep up with the history log.
Cost consumption	Whole system	Need to keep all the required document in the hard copy and use phone to communicate with one another.	There was no communication system or data documented system.	Now, the product can request by a manager through order and admin approve and add it to the stock later. After that who is withdrawing the product and it's amounted a history is kept track on.
Human error	All user	The calculation of overall product amount and amount spend may face problem while tracking from document.	Hard to find old documents from stacked away files.	Now, the data is stored. So, the data can be found through search option in the database. And old or new data can be sort out with ease.
Time consuming	Stakeholders	The manual process takes more time.	The workflow was prolonged.	The automation system will be faster at doing things.
Maintenance	Stakeholders	Harder to maintain /replace /correct information.	Things are done manually so the main thing must do again if anything must be modified.	Everything is done automatically and stored in the database. Easier to maintain and modify as things are present in the automation system.

7.5 Effect and Constraints Analysis

7.5.1 Effect:

As before when the software was not present. It was difficult for the company to keep track of the stock and its history. Th old system was to keep all stock detail in a documented file. So, finding old histories and record about each warehouse was hard and need a lot of manpower. For this reason, a software is built for solving this issue.

The newly built software everything can be query out from the database, as the data is stored in a cloud. No more problem manpower for going through all the documents and keep track of the process in software. Only that the request for order in available in the system by manager and site manager will approve it after checking the process.

7.5.2 Constraint:

There are many difficulties while finding a solution for this software. The old system was tried some and the manual process takes more time. The cost for the overall process was higher and the amount was not fixed. But for the current software, a certain amount of money has to spend on the host, domain, SMS gateway, etc. At first budget of the software was problem for the software but later there were some change take place and minimize few functions and workload for the software to meet up with the budget. This software was effective for the company. It saves time and extra spend of money.

7.6 Rich Picture

7.6.1 Rich Picture of Existing System

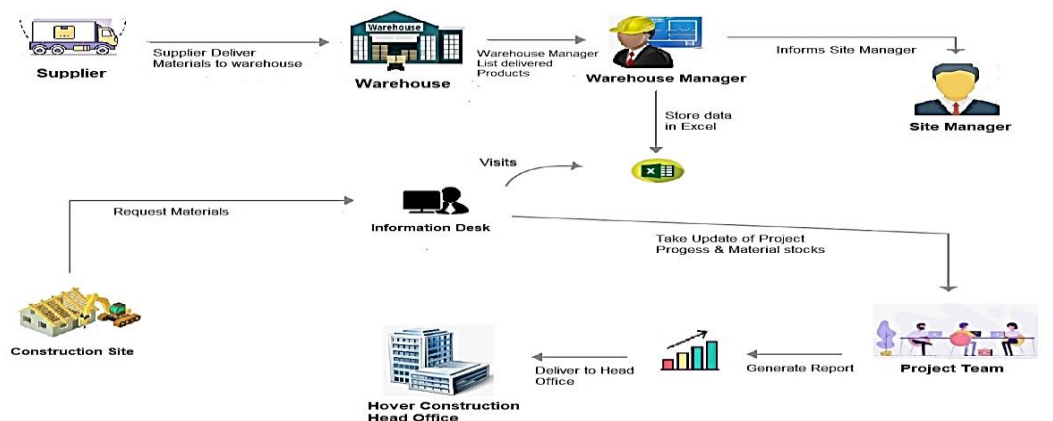


Figure 8: Existing Rich Picture

This rich picture illustrates the existing system, first the supplier delivers the products to the warehouse from where the materials are transferred to construction sites when needed. After the materials are delivered the assistant manager list the products that have been delivered. He informs the site manager and inputs the data in Excel sheet and share it with the desk Information operator.

When materials are needed in construction site, Construction Manager informs the Info Desk employee to request materials for site. When the request is approved then the request is set, and the materials are delivered in desired site.

Project team works continuously ask latest update of the warehouse and generate graphs and reports to present it to the Officials.

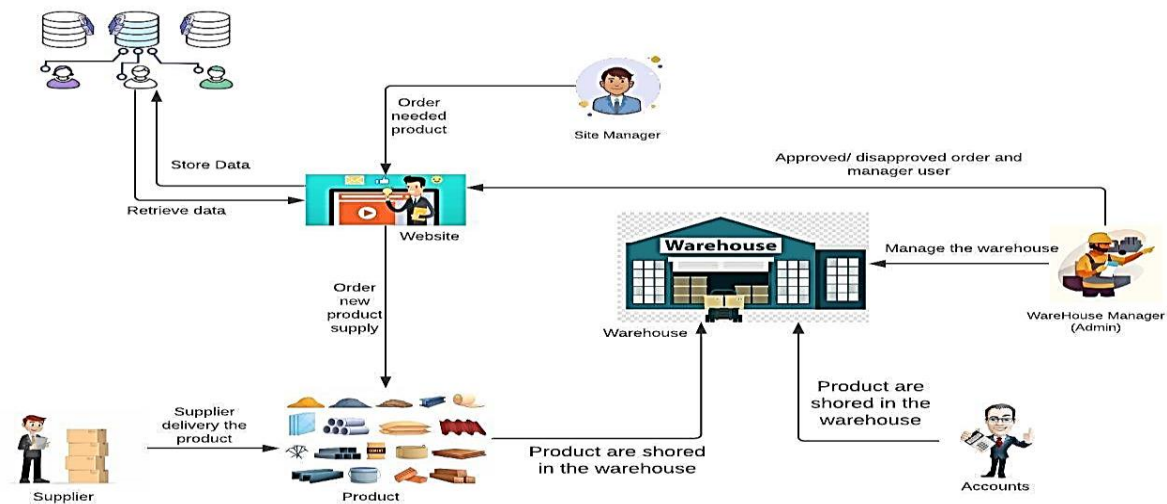


Fig: Rich Picture (Proposed)

In proposed system, first the supplier delivers the products to the warehouse from where the materials are transferred to construction sites when needed. Site Manager can order from the website and check for latest warehouse updates and can withdraw if needed. Warehouse managers accept order and manage the warehouse. He inputs the latest warehouse information in the server. He can create or add new product and select the supplier of the product. Accounts can get the stock detail from a particular for managing the finance.

7.7 Entity Relationship Diagram (ERD)

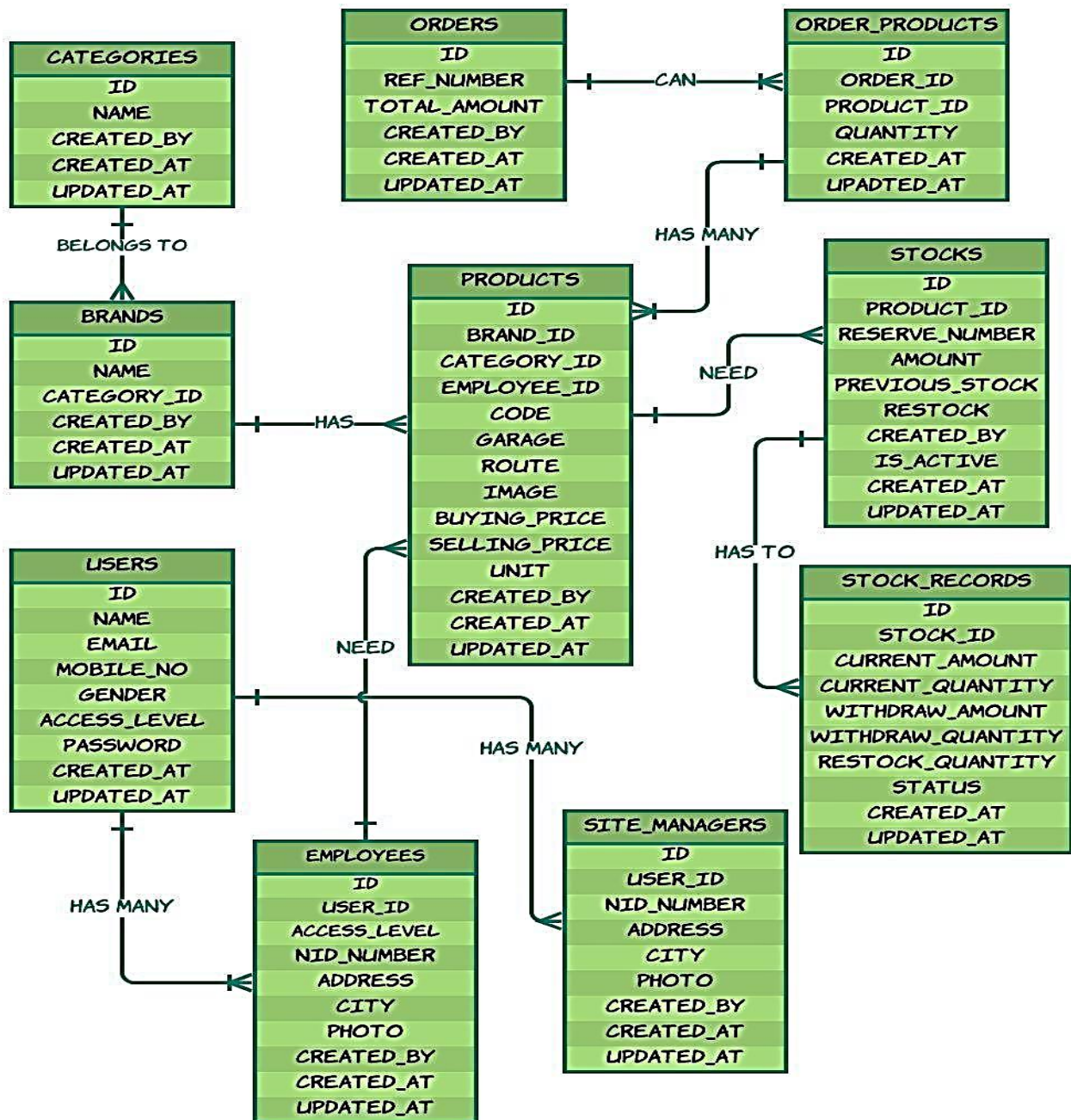


Figure 9: Entity Relationship Diagram (ERD)

7.8 Functional and Non-Functional Requirement

7.8.1 Functional Requirement:

FR01: Login function:

Name of the Function: Login function.		
Input: Admin, Manager, Employee	Process: User has to give email address and password to login	Output: User will be able to enter dashboard.
Precondition: Must give user's given mail and password which have to be verified.		
Post condition: User will be able to enter the site and perform other function in the site.		
Alternate Options: N\A		
Side Effects: N\A		

FR02: Create Manager or Employee:

Name of the Function: Create Manager or Employee.		
Input: Admin	Process: Need to fill-up the form.	Output: A new manager or employee will be created.
Precondition: To add a new manager or employee admin must logged in and fill up the required information than pressing "Submit" button.		
Post condition: A new manager or employee will be added in the system who can take issue.		
Alternate Options: Without filling up the required field, a new manager or employee cannot be created.		
Side Effects: N\A		

FR03: Add Category:

Name of the Function: Add Category.		
Input: Admin	Process: 1. Allows to add new category.	Output: A new Category will be added.
Precondition: Need to go admin panel to add new category.		
Post condition: A new category will be added to category tables		
Alternate Options: N\A		
Side Effects: N\A		

FR04: Delete Category:

Name of the Function: Delete Category.		
Input: Admin	Process: 1. Allows to delete category.	Output: The targeted category will be deleted.
Precondition: Need to go admin panel to delete category.		
Post condition: The category will be deleted from database and the table will be updated.		
Alternate Options: N\A		
Side Effects: N\A		

FR05: Edit Category:

Name of the Function: Edit Category.		
Input: Admin	Process: 1. Allows to edit category.	Output: The selected category will be edited.
Precondition: Need to go admin panel to edit category.		
Post condition: The category will be edited from database and the table will be updated.		
Alternate Options: N\A		
Side Effects: N\A		

FR06: Edit brand:

Name of the Function: Edit brand.		
Input: Admin	Process: 1. Allows to edit brand.	Output: The selected brand will be edited.
Precondition: Need to go admin panel to edit brand.		
Post condition: The brand will be edited from database and the table will be updated.		
Alternate Options: N\A		
Side Effects: N\A		

FR07: Delete brand:

Name of the Function: Delete brand.		
Input: Admin	Process: 1. Allows to delete brand.	Output: The targeted brand will be deleted.
Precondition: Need to go admin panel to delete brand.		
Post condition: The brand will be deleted from database and the table will be updated.		
Alternate Options: N\A		
Side Effects: N\A		

FR08: Add brand:

Name of the Function: Add brand.		
Input: Admin	Process: 1. Allows to add new brand.	Output: A new brand will be added.
Precondition: Need to go admin panel to add new brand.		
Post condition: A new brand will be added to category tables		
Alternate Options: N\A		
Side Effects: N\A		

FR09: List all category and brand:

Name of the Function: List all category and brand.		
Input: Admin, Manager, Employee	Process: Allows display all the category and brand.	Output: Show list of category and brand in a table.
Precondition: Be logged on the website and go to personal Panel to see list of category and brand.		
Post condition: By default, whole list of category and brand will be displayed on their respective page.		
Alternate Options: N\A		
Side Effects: N\A		

FR10: List all manager and employee:

Name of the Function: List all manager and employee.		
Input: Admin	Process: Allows to view all the manager and employee.	Output: Show list of manager and employee in a table.
Precondition: Be logged on the website and go to personal Panel to see list of manager and employee.		
Post condition: By default, whole list of manager and employee will be shown on their respective page.		
Alternate Options: N\A		
Side Effects: N\A		

FR11: Create a product:

Name of the Function: Create a product.		
Input: Admin	Process: Allows to create a new product with its information.	Output: New product info. is updated and create new product ID.
Precondition: Logged in as an Employee or Admin role on the website can only create a new product.		
Post condition: A new product Information will be added to Database.		
Alternate Options: if a field does not have a required input, an error will be show.		
Side Effects: N\A		

FR12: Edit product or item:

Name of the Function: Edit product or item.		
Input: Admin	Process: Allows to edit an existed product.	Output: Old and existed data will be replaced by new data.
Precondition: Manage site panel can edit product.		
Post condition: A product information will be edited from database.		
Alternate Options: If there was an error while editing a product, the error message will be shown.		
Side Effects: N\A		

FR013: Delete product or item:

Name of the Function: Delete product or item.		
Input: Admin	Process: Allows to delete an existed product.	Output: The data will be erased with database.
Precondition: Manage site panel can delete product. The table will have a dynamic change in it.		
Post condition: An appointment information will be deleted from database.		
Alternate Options: If there was an error deleting an appointment from a database, it will be validated.		
Side Effects: N\A		

R14: Make Order:

Name of the Function: Make Order.		
Input: Manager	Process: Need to select product and item.	Output: A new order will be created.
Precondition: Be logged in the system, pick necessary item and product having total amount and check “Submit “button		
Post condition: The order will be generated, and admin will approve it.		
Alternate Options: A order cannot be approved if the admin wants to do it.		
Side Effects: N\A		

FR15: List all order of a Manager:

Name of the Function: List all order of a Manager.		
Input: Admin, Manager, Employee	Process: Allows display all the orders made by manager.	Output: Show list of order in a table.
Precondition: Be logged on the website and go to personal Panel to see list.		
Post condition: By default, only today’s order will be displayed will display in the dashboard.		
Alternate Options: By going to “Order List”, the detail of all the previous order with their whole detail will be shown and the Pdf of the ordered item can be downloaded.		
Side Effects: N\A		

FR16: Approve or Not Approve order:

Name of the Function: Approve or Not Approve order.		
Input: Admin	Process: Allows admin to confirm or disapprove an order.	Output: Show the info. on order table.
Precondition: Be logged on the website and go to personal Panel to confirm the order.		
Post condition: The order will be approved or disapproved by the admin.		
Alternate Options: After process, the order will move to approved and not approved list.		
Side Effects: N\A		

FR017: Delete order:

Name of the Function: Delete Category.		
Input: Admin	Process: Allows to delete order.	Output: The targeted order will be deleted.
Precondition: Need to go admin panel to delete order.		
Post condition: The order will be deleted from database and the table will be updated.		
Alternate Options: N\A		
Side Effects: N\A		

FR18: Edit manager or employee:

Name of the Function: Edit manager or employee.		
Input: Admin	Process: Allows to edit an existed manager or employee.	Output: Old and existed data will be replaced by new data.
Precondition: From admin panel can edit manager or employee.		
Post condition: A manager or employee information will be edited from database.		
Alternate Options: If there was an error while editing a manager or employee, the error message will be shown.		
Side Effects: N\A		

FR019: Delete manager or employee:

Name of the Function: Delete manager or employee.		
Input: Admin	Process: Allows to manager or employee order.	Output: The targeted manager or employee will be deleted.
Precondition: Need to go admin panel to delete manager or employee.		
Post condition: The manager or employee will be deleted from database and the table will be updated.		
Alternate Options: N\A		
Side Effects: N\A		

FR20: Create Stock:

Name of the Function: Create Stock.		
Input: Admin	Process: Allows to add new stock on a product.	Output: A new stock will be added.
Precondition: Need to go admin panel to add new stock.		
Post condition: A new stock will be added to stock tables		
Alternate Options: N\A		
Side Effects: N\A		

FR21: Edit stock:

Name of the Function: Edit stock.		
Input: Admin	Process: Allows to edit stock.	Output: The selected stock will be edited.
Precondition: Need to go admin panel to edit stock.		
Post condition: The stock will be edited from database and the table will be updated.		
Alternate Options: N\A		
Side Effects: N\A		

FR22: Re-stock product:

Name of the Function: Re-stock product.		
Input: Admin	Process: Allows to add more in the stock.	Output: The selected stock will be added with more amount.
Precondition: Need to go admin panel to re-stock.		
Post condition: The stock will be re-stock from database and the table will be updated.		
Alternate Options: N\A		
Side Effects: N\A		

FR23: Withdraw stock:

Name of the Function: Withdraw stock.		
Input: Admin, Manager	Process: Allows to withdraw or take out from stock.	Output: The selected stock will be taken out.
Precondition: Need to go admin/manager panel to withdraw stock.		
Post condition: The stock will be withdrawing from database and the table will be updated.		
Alternate Options: N\A		
Side Effects: N\A		

FR24: Change status of stock (Active/inactive):

Name of the Function: Change status of stock (Active/inactive).		
Input: Admin	Process: Allows to active or inactive stock product.	Output: The selected stock will be active or inactive.
Precondition: Need to go admin panel to active or inactive stock.		
Post condition: The stock will be active or inactive from database and the table will be updated.		
Alternate Options: N\A		
Side Effects: N\A		

FR25: Stock Details:

Name of the Function: Stock Details.		
Input: Admin, Manager and Employee	Process: Allows to see the stock history	Output: The selected stock status will be shown
Precondition: A table will be shown where all the detail of stock is available.		
Post condition: A table with stock status will be there for analysis.		
Alternate Options: N/A		
Side Effects: N/A		

FR26: Print Stock:

Name of the Function: Print Stock.		
Input: Admin, Manager and Employee	Process: Allows to print the stock history	Output: The selected stock detail history will be printed
Precondition: The whole selected stock history will be printed on a excel sheet.		
Post condition: The calculation for the accounts will be easier.		
Alternate Options: N/A		
Side Effects: N/A		

7.7.2 Non-Function Requirement:**Usability requirements:**

- UR01: User Interface should be easy to understand where a new employee can use each component.
- UR02: The client ought to have the option to figure out how to utilize a framework in under 30 minutes.
- UR03: Time required for creating data should be less than 5 to 6 minutes.
- UR04: Error messages should explain how to recover from the error.
- UR05: Actions which cannot be undone should ask for confirmation.
- UR06: Must keep a alternate way to solve user properties.

Space requirements:

- SR01: User needs only enough disk space and RAM for web browser.
- SR02: Site will take 100Mb to 200 Mb space in domain, so storing the user info at least 2 to 3 Gb will be needed.

Implementation requirements:

- IR01: All the plugins and components should be free of charge.
- IR02: All the plugins should work correctly and satisfy the performance and reliability requirements.

Portability requirements:

- PR01: This website is compatible with different popular web browsers (Google Chrome, Mozilla Firefox, Opera and Internet Explorer).
- PR02: The time of response depends on browser to browser. So, Mozilla will have a better performance. Also, the internet Speed matter to get a faster respond.

Interoperability requirements:

- IR01: The system should properly inter-operate with the database (MySQL).

Scalability requirements:

- SR01: In case of needing more bandwidth or disk space, the system should be prepared to those situations.
- SR02: When increasing the resources of the website, there can't be any penalty to response time or having more errors than usual.
- Security requirements:
- SR01: The password should be at least 8 characters, 1 Upper case, 1 lower case and 1 number.
- SR02: Website should use different techniques to have secure transfer of data to database and level has its own token wise security.

User friendly requirements:

- UFR01: The System is to be very interactive. Design focuses on anticipating what users might need to do and ensuring that the interface has elements that are easy to access.
- Privacy requirements:
- PR01: All the user's data cannot be sold or distributed to other entities without their previous approval.
- PR02: No user data in available for other parties to be use as admin has the control over the system. Only admin can see the user information and data.

7.8 Product Features

7.8.1 Architectures

We used Client Server Architecture in our Inventory Management System. Client server architecture of a computer network in which many clients (remote processors) request and receive service from a centralized server (host computer). Stakeholder's computers provide an interface to allow a computer user to request services of the server and to display in return.

Servers are effective computers or forms devoted to overseeing disk drives, printers, or network traffic. Clients are PCs or workstations on which clients run applications. Clients depend on servers for assets, such as records, gadgets, and indeed preparing control.

Client Server Architecture

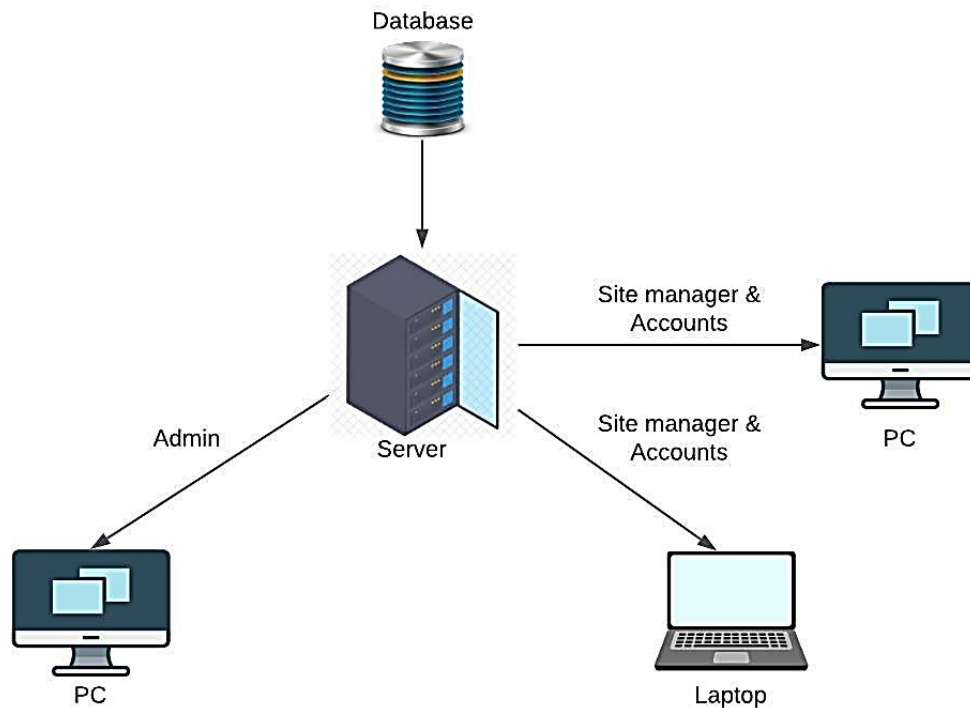


Figure 10:Client Server Architecture

We choose client server architecture. In this case, Access, resources and integrity of the data are controlled by the dedicated server so that a program or unauthorized client cannot damage the system. This centralization also facilitates task of updating data or other resources. It has also facility to increase the capacity of clients and server separately.

8. Stakeholders

The user who has the access to use the system or software are the Stakeholders. We can say that we will have 3 types of stakeholders. “Admin (warehouse manager)”, “Site Manager” and “Employee” are part of this system. Each of the stakeholder has separate user interface (UI) and each stakeholder experience the system independently.

8.1 Admin (Warehouse Manager)

This group is responsible for the upkeep, configuration, and reliable operation of whole systems. Admin maintains the whole server and fixes or solves problem occur with or by stakeholder. They have all the functionality provided to the user group in addition to the following ones:

- See and change own profile.
- Login and logout from the account.
- Create stock, order, employee, site manager, brand, category and product.
- Download order's pdf.
- Download excel of stock history.
- View list of order, stock, employee, site manager, brand, category and product.
- Edit stock, employee, site manager, brand, category and product.
- Delete order, stock, employee, site manager, brand, category and product.
- Withdraw, re-stock, active, inactive and view stock history stock.
- Approved and disapproved order.

8.2 Site Manager:

This group will be logged in with credentials given by Admin. Site Manager's main function is to order and withdraw from the stock. They have all the functionality provided to the user group in addition to the following ones:

- See and change own profile.
- Login and logout from the account.
- Download order's pdf.
- Download excel of stock history.
- Create order.
- View list of order, stock, brand, category and product.
- Withdraw stock.

8.3 Employee:

This bunch will be logged in with accreditations given by Admin. Employee has 2 type "Account" and "Supplier". Account gets the access of the system or software meanwhile supplier is kept getting the information of product manager chain. Supplier do not need to access on the system and to keep a track of product supply. They have all the functionality provided to the user group in addition to the following ones:

- See and change own profile.
- Login and logout from the account.
- Download order's pdf.
- Download excel of stock history.
- View list of order, stock, brand, category and product.

9. Language Selection

9.1 HTML:

Hypertext Markup Dialect (HTML) is the standard markup dialect for archives outlined to be shown in a web browser. HTML is the skeleton of any site. Without HTML, a browser would not know how to show content as components or load pictures and records or other highlights. So here I utilized HTML5 to plan this site.

9.2 CSS:

Cascading Style Sheets may be a style sheet dialect utilized for portraying the introduction of a document composed in a markup language such as HTML. CSS is the dialect for depicting the designs of Web pages, counting colors, format, and textual styles. CSS has more noteworthy steadiness in the plan. That is why I utilized the current form of CSS which is CSS3.

9.3 PHP:

PHP (Hypertext Preprocessor) may be a general-purpose scripting language particularly suited to web development. This is often a server-side scripting language that's embedded in HTML. With the help of PHP, I utilized it to oversee energetic substance, databases. I managed to confine clients to get to a few pages of this site utilizing PHP. That is why I utilized PHP for the back end.

9.4 JavaScript (JS):

JavaScript is a programming language that adjusts to the ECMA Script determination. JavaScript is high-level, frequently just-in-time compiled, and multi-paradigm. Right now, JavaScript is the world's well known programming dialect. It could be a text-based programming dialect utilized both on the client-side and server-side that permits us to create web pages intuitively. I utilized a energetic tab to form my frame intuitively and client neighborly.

9.5 Bootstrap:

Bootstrap is a free and open-source CSS framework. In the project, I utilized bootstrap to form this page responsive so that the Client Interface and Client encounter gets way better. In bootstrap, there are distinctive components that help me to include a few dynamic functionalities. Here I took help from bootstrap documentation.

9.6 Laravel:

Laravel is a free, open-source PHP web framework. The founder of Laravel is Taylor Otwell. Laravel follows model view controller (MVC) architectural pattern. I utilized Laravel version 7 where I could use Laravel UI function. I believe development must be an enjoyable and creative experience to be really satisfying. Laravel takes the torment out of development by facilitating common assignments utilized in numerous web ventures.

9.7 Database Selection:

There is an assortment of databases that ready to select from the market. The widely used databases are Microsoft Access, Microsoft SQL, Oracle, firebase, Amazon Web Service (AWS), MySQL, PostgreSQL, etc. For the project I can use MySQL or PostgreSQL. I pick MySQL which is free and open source. A relational database organizes information into one or more information tables in which information sorts may be related to each other; these relations help structure the data. The Apache Server is a free and open-source cross-platform web server software. The server I used for the project is “Apache”.

9.8 Agile:

Software Testing Life Cycle refers to a testing prepare which has particular steps to be executed in an unequivocal arrangement to guarantee that the quality objectives have been met. To develop the project, we followed the Agile Methodology. Agile is the ability to create and respond to change. Agile may be a term utilized to depict software development approaches that utilize continual planning, learning, enhancement, group collaboration, evolutionary advancement, and early conveyance. The client has early and frequent opportunities to see at the item and make choices and changes to the project or software.

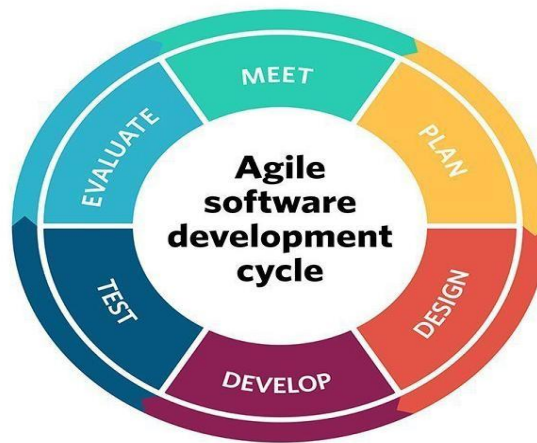


Figure 11: Agile Diagram.

The reason for using Agile:

- There is room for adjustments.
- Little documentation
- Feedback is provided at intervals.
- There is constant research.
- Focuses on revenue.

10.Project/work as Engineering Problem

Analysis:

10.1 Sustainability of the Product/work:

The development of sustainable software has been distinguished as one of the key challenges within the field of web application software development. Sustainable development goals to meet appear needs while ensuring the supportability of common systems and the environment so as to not compromise the capacity of future eras to meet there have needs. To keep the software more sustainable maintains of the system is done time to time. Starting from ordering food to booking plane tickets – everything has become more digitized in their manner. Considering such a change in the social atmosphere, it is safe to say that the Inventory Management System is highly sustainable. The Inventory Management System advocates for such a alter, securing its sustainability.

10.2 Social and Environmental effects and analysis:

The most important effect of the Inventory Management System on a social level is its time-saving quality. Time is priceless and the extent to which the usage of Inventory Management System saves time and hassle is extraordinary. On an individual level, the effect has a great positive outcome. Collaboratively, it is sensational. As more people use the Inventory Management System, it would mean that a larger portion of the population would be using a digitalized system of getting inventory with the certain products or items. The main customer for inventory project are e-commerce business or constructional service organization clients. Large scale use of a digitalized system can be considered a development in the general social status to some extent. The System has some effect on the environment as well. Overcrowded places are a common scenario in our country.

10.3 Addressing Ethics and Ethical issues:

Ethics is the consider of esteem concepts such as ‘good,’ ‘bad,’ ‘right,’ ‘wrong’, ‘ought’, connected to activities in connection to bunch standards and rules. The Inventory Management System does not hold any ethical hazard. The user data is collected from the users to keep track of the overall system and make sure the information is kept to admin only. The accounts can the stock detail for the calculating the overall spend and brought of a current product. So, we can tell the whole system is free from ethical hazard.

11.Result and Analysis

11.1 Software Testing

Software testing decides the rightness, completeness, and quality of software being created. Approval alludes to the method of checking that the created computer program meets the prerequisites indicated by the clients. The main objective of software testing is to detect errors in the software.

11.2 Test Plan

1. Verify the portal for adding new stock, order, employee, site manager, brand, category and product have to fill up all the mandatory fields required.
2. Verify update properties of the stock, employee, site manager, brand, category and product are available, and validation is needed.

3. Verify delete properties of the stock, employee, site manager, brand, category and product are available.
4. Verify the properties approved and disapproved orders done by individual site manager.
5. Check the download of stock history and order invoice.

11.3 Test Case

Test Case No	Test Case Name	Purpose	Precondition	Test Steps to Data	Expected Result	Actual Result (P/F) Data Used	Status	Remarks
1.	Login for users	Check whether the user can login to the software or web app.	1. Should give their email and password to enter. 2. Can check radio button to remember password and email. 3. Need to go the site with a device.	1. Fill up the require field with correct credential. 2. Then press "submit" button.	1. If the given credential has no problem. The user will be able to login. 2. If not any error message will be show	website show "Login is done successfully" massage.	Works.	No.
2.	Create a new employee and manager.	Adding a new employee or manager in the system to give access for their dependent work.	1. Must fill up the form with appropriate information. 2. Make sure the required fields are completed.	1. Need to click the "Submit" button on the end of the form. 2. After submission, the data will be saved in the database.	1. A validation will be shown for both cases. 2. The page will redirect to same form page.	The application will show "A new employee/ Manager is created successfully" as an alert.	Works.	No.
3.	Edit profile	Edit employee and manager	1. Must be login as admin. 2. Have to visit the profile page of the particular user and	1. Click the edit button a form will appear. 2. Old data will be shown the input field. 3. Need to press "Update" button to	1. A validation will be thrown on the case of acceptance/ rejection. 2. The change data will be	On creation a alert will be shown "Update is successfully".	Works.	No.

			press the edit option.	change the history.	display on the user profile.			
4.	Create product, category, and brand	Create new product, category, and brand	<ol style="list-style-type: none"> 1. Must be login as admin. 2. Need to go the create side. 3. Fill up the form with required fields with appropriate information. 	<ol style="list-style-type: none"> 1. Need to click the "Submit" button on the end of the form for saving the data. 2. After submission the data will be saved in the database and the will be available to see. 	<ol style="list-style-type: none"> 1. A validation will be thrown on the case of acceptance/ rejection. 2. The page will redirect to same form page. 	App show "A new product/ category/ brand is created successfully " the message and route to the create form page.	Works.	No.
5.	Edit process for product, category and brand.	Edit product, category and brand	<ol style="list-style-type: none"> 1. Must be login as admin. 2. Must visit the particular page and press the edit option. 	<ol style="list-style-type: none"> 1. Click the edit button a form will appear. 2. Old data will be shown the input field. 3. Need to press "Update" button to change the history. 	<ol style="list-style-type: none"> 1. A validation will be thrown on the case of acceptance/ rejection. 2. The change data will be display on the edit form. 	On creation a alert will be shown "Update is successfully ".	Works.	No.
6.	Delete process for product, category and brand.	Delete product, category and brand.	<ol style="list-style-type: none"> 1. Must be login as admin. 2. Go to the list and a delete press the delete button. 	<ol style="list-style-type: none"> 1. After press delete the data record will disappear from the record. 2. The data record will be deleted from the database as well. 	<ol style="list-style-type: none"> 1. A confirmation alert will be there to confirm the data has been deleted. 2. After reloading to the list again the data will be missing. 	After processing an alert message will be show ("The Product/ category / brand has been deleted successfully. ")	Works.	No.
7.	Delete process for employee	Delete product, employee and manager	<ol style="list-style-type: none"> 1. Must be login as admin. 2. Go to the list and a 	After completion of the process the record will be remove from	<ol style="list-style-type: none"> 1. Validation will be shown if id not found. 	website show "The employee/ manager has been deleted	Works.	No.

	and manager.		delete press the delete button.	the database and the history will be shown in list as well.	2. On success the data will be removed.	successfully” message.		
8.	Create order and stock	Create new order and stock	1. Must be login as admin for stock and as manager for order. 2. Must go to particular create form to add a new	1. Need to add the product in cart and add just the number of order than press invoice button. 2. Checking the number of order and shipping the required product are add in the stock.	The order will be done through selection of product and stock will be updated after the admin approved the product amount.	On succession, a alert will be shown on the screen.	Works.	No.
9.	Confirmation of order	Order approved and disapproved	1. Must be login as admin. 2. Has to go to order list for checking status and approve it.	Just Have to click “Approved” Button to approve it.	The data will change the status to the order in the database.	There will be alert on the change of order status.	Works.	No.
10.	Delete process for order	Delete order	1. Must be login as admin. 2. Has to go to order list to press the delete button.	Just must click the “Delete” button to remove the data from the list.	The data will be removed from the database and there will no history of it.	There will be on delete alert on the function.	Works.	No.
11.	Pdf conversion	To convert the order in pdf and download	1. Any user can do it. 2. Must go to order	Just have to press “convert to pdf” to download the pdf file of the invoice.	Open the pdf the order information will be shown.	Ask for the file location for saving.	Works.	No.
12.	Stock withdraws	Withdrawing stock from the inventory	1. Must be login as admin or manager. 2. Must go to the stock	Just give the number of product that the manager has to withdraw, and press	The change will be seen the stock list and current amount will	An alert will be given to user on completion.	Works.	No.

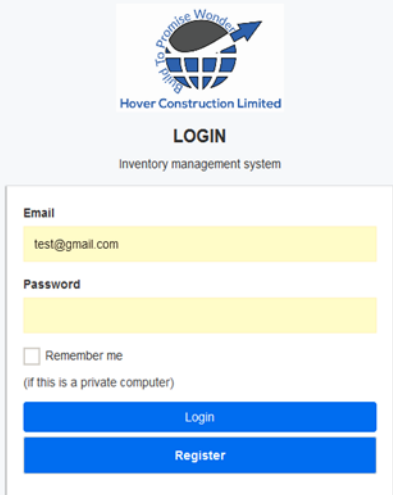
			list press withdraw icon and card will appear.	“Withdraw” button.	be calculated.			
13.	Re-stock process	Add more stock in the inventory	1. Must be login as admin. 2. Must go to the stock list press re-stock icon and card will appear.	Have to give the number of product which has to be re-stock.	The change will be seen in the stock list and it will also be updated in database	A completion alert of success will be shown.	Works.	No.
14.	Edit stock	Reset the whole history of the stock.	1. Must be login as admin. 2. Must go to the stock list press edit icon and card will appear.	Have to give the number of products which has to be edit and press “Edit” button.	The whole data record of the product will be reset.	Alert will be shown.	Works.	No.
15.	Status change of a stock.	Active/ Inactive stock.	1. Must be login as admin. 1. Must go to the stock list press active/ inactive icon and card will appear.	Have to give the number of product which has to be edit and press “Active/ Inactive” button.	The status of the stock in the list will change.	Alert will be shown.	Works.	No.
16.	Print whole stock record	Download the excel file of a product stock overall changes.	1. It can be use by all users. 2. Overall stock status history will be shown.	Have go to individual stock and see the whole record and download excel file.	Just must press “print” button to download the file.	Ask for the file location for saving.	Works.	No.

11.4 Test Result

There were a lot of issue while testing the software. This were some minor issue which we fix. After processing these issues test cases were documented. All test cases have been justified by testing methodologies. We tested on a local hosting. After going live, we will again test everything on the hosting. So, some changes might happen on that time. There are few integrations is possible. But it will be added in the future. So, all the tastings are not done. But up to current feature available all the testing is done, and it is running fine. But live testing with stakeholder is not done. It was not possible due to pandemic.

12. Overview of Related works

12.1 Overview of the inventory software



The screenshot displays the login interface for the 'Inventory management system' by Hover Construction Limited. At the top, the company logo is shown, featuring a globe and the tagline 'To Promise Wonder'. Below the logo, the word 'LOGIN' is prominently displayed, followed by the system name. The login form itself is a white box with a thin border, containing an 'Email' input field with the text 'test@gmail.com', a 'Password' input field, a 'Remember me' checkbox, and the text '(if this is a private computer)'. At the bottom of the form are two blue buttons: 'Login' and 'Register'.

Figure 12 Login Page

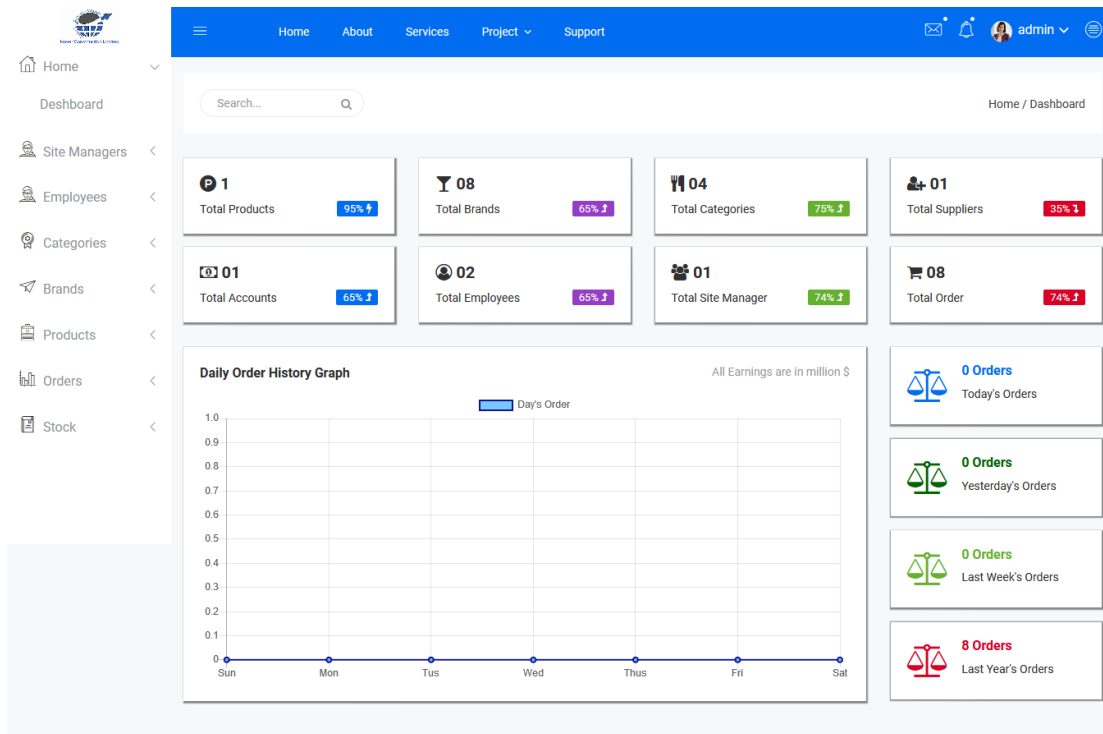


Figure 13: Dashboard.

From the main login page, a user has to give their personal credential and access the dashboard. In the dashboard, the count of current updates will be available for the user to check. We can also go to the other view through the side bar.

The 'Add New Category' page has a blue header with navigation links: Home, About, Services, Project, and Support. A search bar is located in the top right. The left sidebar contains a list of menu items: Home, Site Managers, Employees, Categories, Add New Category, All Categories List, Brands, Products, Orders, and Stock. The main content area displays a form titled **Add New Category:** with a text input field labeled **Name Of Category** containing the placeholder text 'Add New Category'. A blue **submit** button is located below the input field.

Figure 14: Create a new Category Page.

This page will allow the user to create a new category for the product. If there is any problem a validator will be shown. On submit a success message will be given to the user.

All Categories List:

Export Basic

<input type="checkbox"/>	ID	Name	Created By	Created At	Check	Action
<input type="checkbox"/>	1	Ordinary Portland Cement	admin	18.10.2020	✓	Edit Delete
<input type="checkbox"/>	2	Portland Pozzolana Cement	admin	18.10.2020	✓	Edit Delete
<input type="checkbox"/>	3	Rapid Hardening Cement	admin	18.10.2020	✓	Edit Delete
<input type="checkbox"/>	4	Low Heat Cement	admin	18.10.2020	✓	Edit Delete

Showing 1 to 4 of 4 rows

Figure 15: List of Category Page.

It is the list of category page where all the lists will show in a data table. Here, the data can be deleted or edit. After deletion, the data will not be available in database as well. For edit it will redirect to a new page where the information can be modified.

Add New Brand:

Select Category
Choose a Category

Name Of Brand
Add New Brand

Figure 16: Create a new Brand page.

To create a new brand, we have to select a category. After completion, a validator will be shown. If wrong or missing the alert will be given.

ID	Name	Category	Created By	Created At	Check	Action
1	Shah	Ordinary Portland Cement	admin	18.10.2020	✓	Edit Delete
2	Holcim	Ordinary Portland Cement	admin	18.10.2020	✓	Edit Delete
3	Bashundhara	Portland Pozzolana Cement	admin	18.10.2020	✓	Edit Delete
4	Aman	Portland Pozzolana Cement	admin	18.10.2020	✓	Edit Delete
5	Unique	Portland Pozzolana Cement	admin	18.10.2020	✓	Edit Delete
6	Confidence	Rapid Hardening Cement	admin	18.10.2020	✓	Edit Delete
7	Royal	Rapid Hardening Cement	admin	18.10.2020	✓	Edit Delete
8	Anwar	Rapid Hardening Cement	admin	18.10.2020	✓	Edit Delete

Figure 17: List of Brand Page.

List of brand page is like category page as it is represented in the data table. Only the edit will be different as different data has to be modified.

12.2 Related Questionnaire

1. Orders are placed on a timely basis how would you rate the overall Quality of this process?
2. Who will be using the system?
3. How Accurate are Your Inventory Records?
4. How inventory management system contributes to the company operational activities?
5. What method or technique does company used in determining material needs of its customers?
6. Who receives the invoices for purchased inventory?

12.3 Source code of the software

Route:

Category Group Route:

```
Route::group(['prefix' => 'category', 'as' => 'category.'], function() {

Route::get('create', ['as' => 'create', 'uses' => 'CategoryController@createCategory' ]);
Route::post('save-created', ['as' => 'save_created', 'uses'
=> 'CategoryController@saveCreatedCategory' ]);

Route::get('all-categories', ['as' => 'all_categories', 'uses'
=> 'CategoryController@getCategoryList']);

Route::get('details/{id}', ['as' => 'details', 'uses' => 'CategoryController@detailCategory' ]);

Route::post('delete', ['as' => 'delete', 'uses' => 'CategoryController@deleteCategory' ]);

Route::get('edit/{id}', ['as' => 'edit', 'uses' => 'CategoryController@editCategory' ]);

Route::post('save-edit', ['as' => 'save_edit', 'uses' => 'CategoryController@updateCategory']);

});
```

Brand Group Route:

```
Route::group(['prefix' => 'brand', 'as' => 'brand.'], function() {

Route::get('create', ['as' => 'create', 'uses' => 'BrandController@createBrand' ]);

Route::post('save-created', ['as' => 'save_created', 'uses'
=> 'BrandController@saveCreatedBrand' ]);

Route::get('all-brands', ['as' => 'all_brands', 'uses' => 'BrandController@getBrandList' ]);

Route::get('details/{id}', ['as' => 'details', 'uses' => 'BrandController@detailBrand' ]);

Route::post('delete', ['as' => 'delete', 'uses' => 'BrandController@deleteBrand' ]);

Route::get('edit/{id}', ['as' => 'edit', 'uses' => 'BrandController@editBrand' ]);

Route::post('save-edit', ['as' => 'save_edit', 'uses' => 'BrandController@updateBrand']);

});
```

```
});
```

Model:

Category Group Model:

```
class Category extends Model
{
    public function productBrands()
    {
        return $this->hasMany(Brand::class);
    }
}
```

Brand Group Model:

```
class Brand extends Model
{
    public function category()
    {
        return $this->hasOne(Category::class,'id','category_id');
    }
}
```

Controller:

Category Group Controller:

```
class CategoryController extends Controller
{
    public function createCategory(Request $request)
```

```

{
    return view("categories.add_category");
}

public function saveCreatedCategory(Request $request)
{
    $validator = Validator::make($request->all(), [
        'category' => 'required|min:3',
    ]);

    if ($validator->fails()){
        alert()->warning('Error occurred',$validator->errors()->all()[0]);
        return redirect()->back()->withInput()->withErrors($validator);
    }

    $category = new Category();
    $category->name = $request->post('category');
    $category->created_by = Auth::user()->id;
    $category->save();

    Alert::success('Success', 'Successfully Created a new Category');
    return redirect()->route('category.create');
}

public function deleteCategory(Request $request)
{

```

```

$category_id = $request->post('category_id');

$delete_category = Category::where('id',$category_id)->delete();

Alert::success('Success', 'Successfully Removed, Category from the List');

return redirect()->route('category.all_categories');
}

public function editCategory(Request $request, $id)
{
    return view('categories.edit_category',[
        'category' => Category::find($id),
    ]);
}

public function updateCategory(Request $request){
    $validator = Validator::make($request->all(), [
        'category' => 'required|min:3',
    ]);

    if ($validator->fails()){
        alert()->warning('Error occurred',$validator->errors()->all()[0]);

        return redirect()->back()->withInput()->withErrors($validator);
    }

    $categoryId = $request->post('category_id');

```

```

$category = Category::find($categoryId);

$category->name = $request->post('category');

$category->save();


Alert::success('Success', 'Successfully Updated');

return redirect()->route('category.all_categories');

}

public function getCategoryList(Request $request)

{

    $categories = Category::get();

    return view("categories.category_list",[

        'categories' => $categories,

    ]);

}

}

```

Brand Group Controller:

```

class BrandController extends Controller

{

    public function createBrand(Request $request)

    {

        $categories = Category::get();

        return view("brands.add_brand",[

            'categories' => $categories,

```

```

    });
}

public function saveCreatedBrand(Request $request)
{
    $validator = Validator::make($request->all(), [
        'category' => 'required',
        'brand' => 'required|min:3',
    ]);

    if($validator->fails())
    {
        alert()->warning('Error occurred',$validator->errors()->all()[0]);

        return redirect()->back()->withInput()->withErrors($validator);
    }
    else
    {
        $new_brand = $request->post('brand');

        $inserted_brand = Brand::where('name',$new_brand)->first();

        if($inserted_brand === NULL)
        {
            $brand = new Brand();

            $brand->name = $new_brand;

            $brand->category_id = $request->post('category');

```

```

        $brand->created_by = Auth::user()->id;

        $brand->save();

    }

    else

    {

        Alert::warning('Warning', 'The Brand Name is already added');

        return redirect()->route('brand.create');

    }

    Alert::success('Success', 'Successfully Created a new Brand');

    return redirect()->route('brand.create');

}

}

public function getBrandList(Request $request)

{

    $brands = Brand::get();

    return view("brands.brand_list",[

        'brands' => $brands,

    ]);

}

public function deleteBrand(Request $request)

{

    $brand_id = $request->post('brand_id');

    $delete_brand = Brand::where('id',$brand_id)->delete();

```



```

        Alert::success('Success', 'Successfully Removed, Brand from the List');

        return redirect()->route('brand.all_brands');
    }

    public function editBrand(Request $request, $id)
    {
        $categories = Category::get();

        return view('brands.edit_brand',[
            'brand' => Brand::find($id),
            'categories' => $categories,
        ]);
    }

    public function updateBrand(Request $request){
        $validator = Validator::make($request->all(), [
            'brand' => 'required',
            'category' => 'required',
        ]);

        if($validator->fails())
        {
            alert()->warning('Error occurred',$validator->errors()->all()[0]);

            return redirect()->back()->withInput()->withErrors($validator);
        }
        else
        {

```

```

$brandId = $request->post('brand_id');

$brand = Brand::find($brandId);

$brand->category_id = $request->post('category');

$brand->name = $request->post('brand');

$brand->save();


Alert::success('Success', 'Successfully Updated');

return redirect()->route('brand.all_brands');

}

}

}

```

13. Recommendation and Conclusion

13.1 Conclusion:

We tried to make an Inventory Management System for Hover Construction Ltd. This software is made by considering specific needs of the co-workers and to automate the system which will have huge advantage for the company in the future. We have achieved successfully to finish the first prototype of the software. The software will be handed to the users to test the system. Considering users experience the first prototype will be updated to enhance the usability and increase functionality of the software. The system has reached a steady state where all the bugs have been eliminated. The system is operated at a high level of efficiency and all the users can benefit from it.

13.2 Recommendation:

In Future, we are planning to add this project with the supplier mail and phone number. On order approval, the supplier will receive a message to deliver the product or goods on a certain time and date. For the present system, we have to maintain and change the UI and IX design after 5 to 6 years. For the better user experience and faster response in the system. For the future, the system can improve more to be user friendly and more dynamic.

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