Construction Materials Inventory Management System

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Abstract: Material management is a critical component of the construction industry. The goal of material management is to ensure that construction materials are available at their point of use when needed. The material management system attempts to ensure that the right quality and quantity of materials are appropriately selected, purchased, delivered and handled on site in a timely manner and at a reasonable cost. A proper implemented material management program can achieve the timely flow of materials and equipment to the jobsite, and thus facilitate improved workplace planning, increased labor productivity, scheduling and minimize the cost. Material management is an important function in order to improve productivity in construction project. Materials management function which take off, vendor evaluation and selection, purchasing, expenditure, shipping, material receiving, where housing and inventory, and material distribution. In this project we have prepare scheme of material management in the construction industry has been prepared to build also conducted survey of industry and determine the various format for construction material management. Construction material inventory management system of material management in the industry and also discuss the web development for proper management.

Keyword: construction, material, inventory management, stock in, stock out

INTRODUCTION

Inventory management plays an important role in the completion of construction project successfully on time. The role of inventory is to store the materials on site so that those material can be available in time of their use. Inventory not only holds the material required for construction but also store the finished products, spare parts and tools. It is very common in construction industry that the project suffers from cost overrun and exceeding the deadline. The problems like this could be solved by the proper implementation of the inventory management. The system will increase the productivity on site and the progress of project will be consistent. Inventory management consist of many processes like selecting the materials and their procurement, cost involvement in transporting them and storage of materials.

Inventory management has its own dedicated budget, which is allocated to cover various costs required for maintaining and operating the inventory at an optimal level. These costs are mainly categorized into Ordering Cost, Holding Cost, and Storage Cost. **Ordering Cost** refers to the essential expenses incurred when placing an order, including the preparation of purchasing documents, payment processing, and transportation charges. **Holding Cost** is the cost associated with keeping materials in storage before they are used, which may include depreciation, insurance, and potential loss of value due to aging or obsolescence. **Storage Cost**

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refers to both direct and indirect expenses related to the use of storage space, such as rent, electricity, security services, and warehouse maintenance.

PROBLEM

Construction material inventory management presents several significant challenges that hinder the smooth execution of projects. Common problems include inaccurate tracking of materials, theft, supply chain disruptions, and unexpected project delays. These difficulties often result in increased costs, reduced productivity, wastage of resources, and even the risk of project failure. Moreover, human errors, insufficient staff training, lack of transparency, and poor storage practices further complicate the process, making it difficult for project managers to maintain accurate records. The absence of proper demand forecasting and risk management also contributes to shortages or overstocking of materials. In addition, weak communication between site managers, suppliers, and warehouse staff often leads to misunderstandings and late deliveries, further disrupting project timelines. Limited use of technology and reliance on manual processes increase the chance of errors, while the lack of a standardized system for monitoring and reporting inventory adds to the inefficiency. If these problems are not addressed, construction firms may face severe financial losses, inefficiency, safety hazards, and the loss of client trust, ultimately threatening the overall success and sustainability of projects.

APPROACH

This system operates with two main roles: Administrator (Inventory Manager) and User (Staff). On the Staff side, the staff member must log in before accessing the system. Once logged in, they can view the main page, browse categories, check supplier lists, review inventory reports, and manage stock transactions such as receiving and issuing items. These functions are restricted to authorized users to maintain system security and data accuracy. In addition, staff members are able to track the availability of construction materials, request items when necessary, and update the system once materials are utilized. This allows for real-time monitoring of material usage on site and prevents unnecessary delays. When their tasks are finished, staff can log out, and the system will end their session to prevent unauthorized access.

On the Administrator side, the admin must also log in before accessing the system. After logging in, they can view detailed user information, manage categories, update supplier lists, generate inventory reports, and control both stock-in and stock-out operations. The administrator also has the authority to monitor all system activities and make necessary adjustments to ensure accurate and up-to-date inventory records. Furthermore, administrators are responsible for setting reorder levels, approving material requests, and ensuring compliance with organizational policies. They can also assign roles or permissions to different staff members, ensuring that each user only has access to the functions relevant to their responsibilities. Once finished, the admin can log out, and the system will terminate the session, ensuring data security, accountability, and effective system management.

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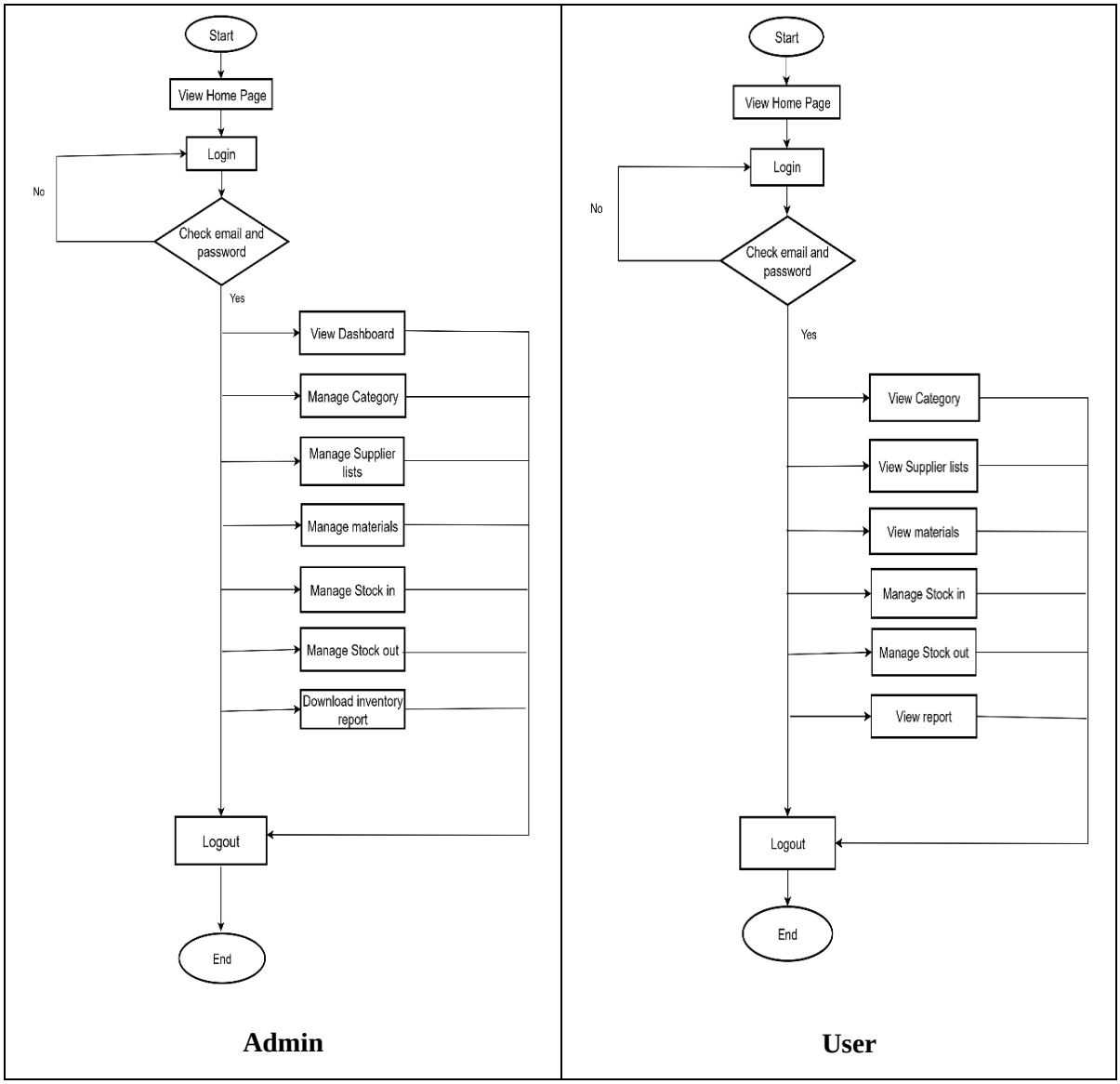

Figure 1: System Flow Diagram

Figure 1 shows system flow diagram of admin and staff. Admin manage the whole system. Staff can do viewing activities and managing activities have limitations. Firstly, admin role has to log in. Then, admin can do managing activities. Staff have to log in at first and staff can do viewing activities.

RESULTS

The design of each page of the construction materials inventory management system has been carefully structured to be both simple and user-friendly. In construction materials inventory management, the staff can view categories, supplier lists, inventory reports, and can manage stock transactions. Admin also can manage categories, supplier lists, inventory reports, and stock in/stock out activities. The system is capable of accurately managing construction material inventory and ensuring smooth workflow across all users. In addition, the system provides secure access with role-based permissions, which helps prevent unauthorized usage.

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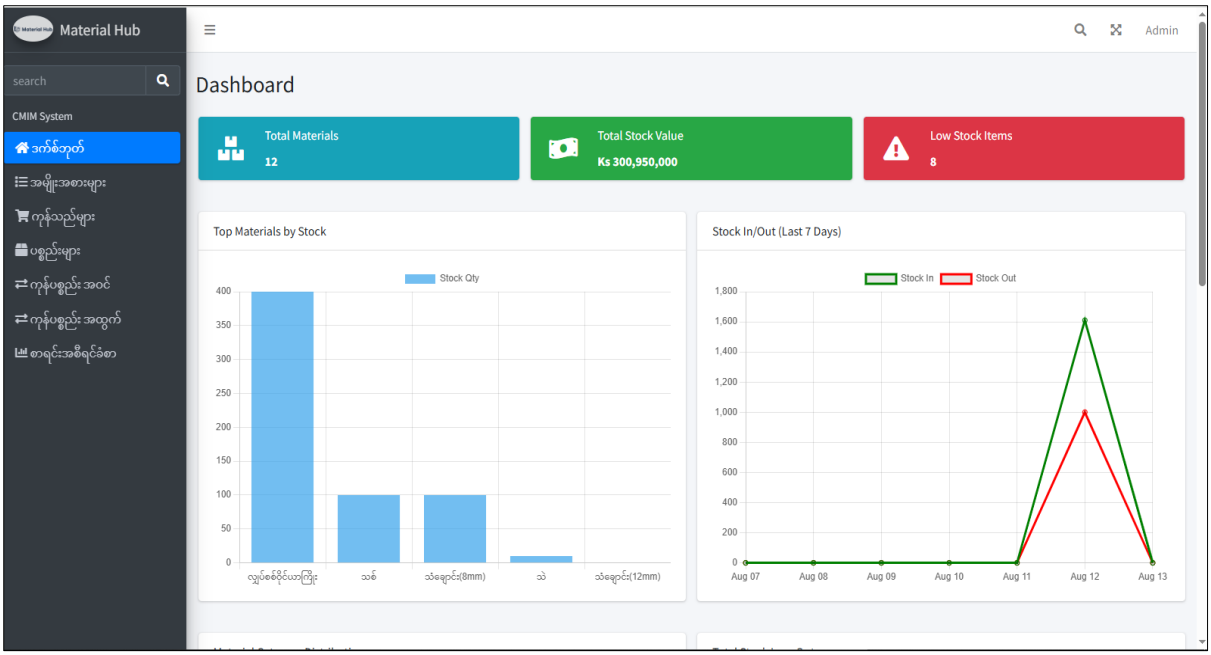

Figure 2: Implementation of the system

In Figure 2, the bar chart displays each material by stock, while the line graph shows weekly stock in and stock out. This makes it easy to see which materials are available and how the stock changes from week to week. It also helps to understand which materials move quickly, which ones stay longer in storage, and when restocking may be needed.

ကုန်ပစ္စည်းအဝင်များ

ရက်စွဲ	ပစ္စည်း	ကုန်ပစ္စည်းသွင်းသည့်ကုမ္ပဏီ	အရေအတွက်	စုစုပေါင်းတန်ဖိုး(ကျပ်)
2025-08-12 12:53	ဝက်အူ	Dagon International Ltd.	10000	4,000,000.00
2025-08-12 21:00	လျှပ်စစ်ဝိုင်ယာကြိုး	Shwe Taung Group	1000	500,000.00
2025-08-12 21:01	သစ်	Shwe Taung Group	1000	3,000,000,000.00
2025-08-14 08:36	နံရံကပ်ကြွေပြား	Htoo Group	500	550,000.00
2025-08-14 08:40	ဘောင်	First Myanmar Investment	100	10,000,000.00
2025-08-14 15:46	ဘိလပ်မြေ	Myanmar Economic Corporation	1000	33,000,000.00
2025-08-15 23:01	သဲ	Zayar Shwe Myay Construction	10000	450,000,000.00
2025-08-16 08:19	3တန်ကရိန်း	First Myanmar Investment	10000	13,000,000,000.00
2025-08-16 08:41	သံချောင်း(8mm)	Asia World Company	1000	3,000,000.00

Figure 3: Stock in report

In Figure 3, the admin (inventory manager) and staff can generate a stock-in report. This report shows the details of materials received, including date, quantity, and supplier information, which helps in tracking deliveries and keeping accurate records. Staff can also use the report to check if the stock has been updated correctly in the system.

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ကုန်ပစ္စည်းအထွက်များ

ရက်စွဲ	ပစ္စည်း	ကုန်ပစ္စည်းသွင်းသည့်ကုမ္ပဏီ	အရေအတွက်	reorder level	စုစုပေါင်းတန်ဖိုး(ကျပ်)
2025-08-12 12:55	ဝက်အူ	Dagon International Ltd.	100	5000	40,000.00
2025-08-14 10:41	လျှပ်စစ်ဝိုင်ယာကြိုး	Shwe Taung Group	50	700	25,000.00
2025-08-14 10:45	သစ်	Shwe Taung Group	4	98	12,000,000.00
2025-08-14 10:46	သစ်	Shwe Taung Group	10	98	30,000,000.00
2025-08-14 11:12	နံရံကပ်ကြေးပြား	Htoo Group	100	700	110,000.00
2025-08-14 15:48	ဘိလပ်မြေ	Myanmar Economic Corporation	300	1800	9,900,000.00
2025-08-15 22:29	ဘောစင်	First Myanmar Investment	5	72	500,000.00
2025-08-15 22:30	ဘောစင်	First Myanmar Investment	7	72	700,000.00
2025-08-15 23:02	သဲ	Zayar Shwe Myay Construction	300	1200	13,500,000.00

Figure 4: Stock out report

In Figure 4, the admin (inventory manager) and staff can generate a stock-out report. This report not only highlights products that are currently unavailable but also indicates the frequency of stock-outs, the departments affected, and the potential impact on sales or operations. By reviewing this report, management can forecast demand more accurately, adjust procurement schedules, and set automated alerts to prevent future shortages.

```
$material = Material::create($validated);

$today = now()->toDateString();
$todayStockOut = $material->transactions()
    ->whereDate('created_at', $today)
    ->where('type', 'stock_out')
    ->sum('quantity');

$reorder_level = $todayStockOut * $material->supplier->delivery_day;

$material->update(['reorder_level' => $reorder_level]);

return redirect()->route('materials.index')->with('success', 'Material created successfully.');
```

Figure 5: Reorder level calculation

In Figure 5, this code snippet is written in Laravel (PHP framework) and represents the logic for creating a new material record while also calculating its reorder level. First, the $material object is created using validated input data. The current date is retrieved with now()->toDateString(), and then the code checks all transactions of the material on that date where the transaction type is stock_out. It calculates the total quantity of items stocked out for the day using the sum('quantity') function. Next, the reorder level is determined by multiplying the total stock-out quantity of the day with the supplier's delivery days. This calculated reorder_level value is then updated in the material record. Finally, the function redirects the user back to the materials index page with a success message, confirming that the material has been created successfully.

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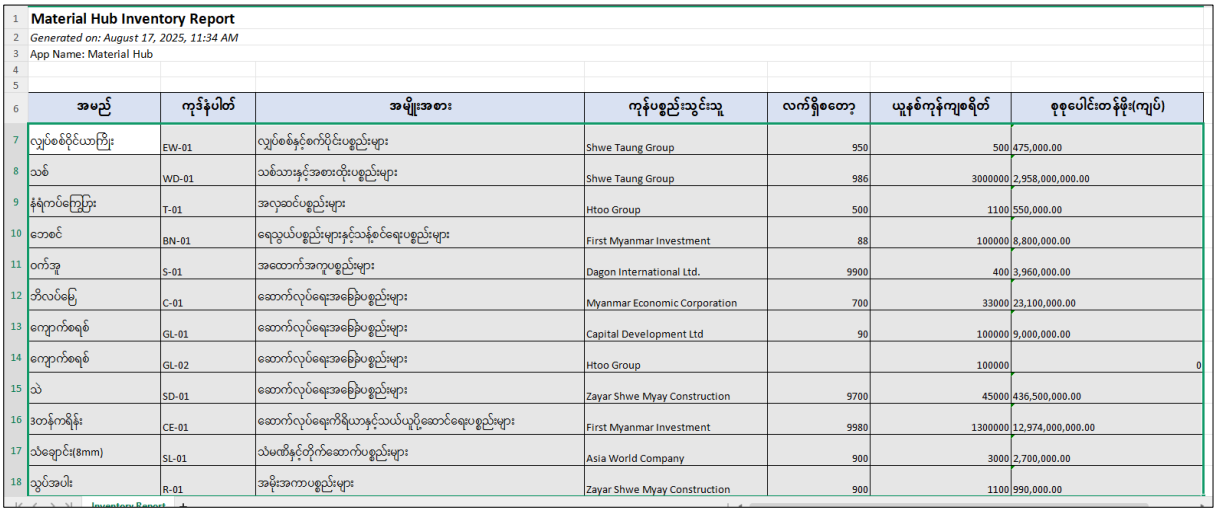

Material Hub Inventory Report
Generated on: August 17, 2025, 11:34 AM
App Name: Material Hub

အမည်	ကုဒ်နံပါတ်	အမျိုးအစား	ကုန်ပစ္စည်းသွင်းသူ	လက်ရှိစတော့	ယူနစ်ကုန်ကျစရိတ်	စုစုပေါင်းတန်ဖိုး(ကျပ်)
လျှပ်စစ်ပိုင်ယာကြိုး	EW-01	လျှပ်စစ်နှင့်စက်ပိုင်းပစ္စည်းများ	Shwe Taung Group	950	500	475,000.00
သစ်	WD-01	သစ်သားနှင့်အစားထိုးပစ္စည်းများ	Shwe Taung Group	986	3000000	2,958,000,000.00
နံရံကပ်ကြေးပြား	T-01	အလှဆင်ပစ္စည်းများ	Htoo Group	500	1100	550,000.00
ဘေစင်	BN-01	ရေသွယ်ပစ္စည်းများနှင့်သန့်စင်ရေးပစ္စည်းများ	First Myanmar Investment	88	100000	8,800,000.00
ဝက်အူ	S-01	အထောက်အကူပစ္စည်းများ	Dagon International Ltd.	9900	400	3,960,000.00
ဘိလပ်မြေ	C-01	ဆောက်လုပ်ရေးအခြေခံပစ္စည်းများ	Myanmar Economic Corporation	700	33000	23,100,000.00
ကျောက်စရစ်	GL-01	ဆောက်လုပ်ရေးအခြေခံပစ္စည်းများ	Capital Development Ltd	90	100000	9,000,000.00
ကျောက်စရစ်	GL-02	ဆောက်လုပ်ရေးအခြေခံပစ္စည်းများ	Htoo Group		100000	0
သဲ	SD-01	ဆောက်လုပ်ရေးအခြေခံပစ္စည်းများ	Zayar Shwe Myay Construction	9700	45000	436,500,000.00
ဒဠာန်ကျိန်း	CE-01	ဆောက်လုပ်ရေးကိရိယာနှင့်သယ်ယူဆောင်ရေးပစ္စည်းများ	First Myanmar Investment	9980	1300000	12,974,000,000.00
သံချောင်း(8mm)	SL-01	သံမဏိနှင့်တိုက်ဆောက်ပစ္စည်းများ	Asia World Company	900	3000	2,700,000.00
သွပ်အပါး	R-01	အမိုးအကာပစ္စည်းများ	Zayar Shwe Myay Construction	900	1100	990,000.00

Figure 6: Inventory report

In Figure 6, the inventory report provides a complete overview of stock balances, material inflow and outflow, and low stock warnings. It is a critical tool for managing, cost control, and effective decision making in construction projects. The report enables managers to track resource utilization, identify patterns of material consumption, and prevent unnecessary overstocking or shortages. Furthermore, it supports transparent communication among project teams, suppliers, and stakeholders by providing accurate and timely data on inventory status.

CONCLUSION

Material management is an essential function in any organization, as it helps to ensure the effective and efficient flow of materials from inventory to customer. Material management aims to ensure that the right materials are available at the right time, in the right amount, and at the right price. To achieve this, organizations should develop a comprehensive material management plan, implement inventory management practices, maintain strong supplier relationships, continuously monitor and analyze data, adopt digital technologies, and foster a culture of continuous improvement.

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