Streamlining Inventory for Different Lighting Categories in One Centralized System – How Centralizing Inventory Data Improved Cross-Department Coordination and Reduced Stockouts

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Abstract:
Lighting suppliers in the hospitality sector manage dozens of product categories—from LED bulbs and panel lights to wall packs, can lights, exit signs, vanity lights, and parking-lot fixtures. When inventory for these categories is scattered across spreadsheets, warehouse notebooks, and ad hoc updates, organizations face chronic delays, inaccuracies, and stockouts that directly impact motel projects. This paper describes how USA LEDs transitioned from fragmented category-wise tracking to a centralized inventory system covering all lighting categories in one place. The study outlines the architecture, data flows, process changes, and cross-department communication improvements, along with measurable reductions in stockouts and deadstock. Results show that centralization improved forecasting accuracy, strengthened alignment between sales, purchasing, warehouse, and management, and reduced stock discrepancies by roughly 18–26% across major categories.

Keywords: Inventory management, hospitality lighting, data centralization, supply chain coordination, forecasting, stockout reduction, motel projects.

I. Introduction

The hospitality lighting supply chain requires fast, accurate, and coordinated inventory control. Motels often order multiple categories of lighting at once—panels for rooms, wall packs for exteriors, vanity lights for bathrooms, exit signs for compliance, and LED bulbs for ongoing maintenance. A single new-build property can involve hundreds of SKUs with different wattages, color temperatures, certifications, and lead times. When inventory information is decentralized, the sales team may commit to delivery dates without full visibility, purchasing may reorder too late, and management may rely on outdated reports.

Before centralization, USA LEDs managed each lighting category with its own Excel sheets, informal notes, and periodic warehouse counts. This approach worked when volumes were smaller, but became risky as the company expanded into larger motel projects and multi-property supply programs. Small errors—such as missing exit signs or short shipments of vanity lights—turned into delays, rush orders, and strained client relationships. A centralized system was needed to unify inventory for all categories, eliminate duplicate tracking, and provide real-time availability to all departments through a single source of truth.

This paper documents the journey from fragmented spreadsheets to a unified inventory platform. It focuses on design decisions, implementation steps, and the practical results observed after centralization, with the goal of offering a repeatable playbook for other hospitality suppliers facing similar challenges.

II. Background and Problem Statement
A. Pre-Centralization Environment
Before centralization, inventory data existed in multiple disconnected forms:

- Separate spreadsheets for bulbs, fixtures, wall packs, and panels.
- Personal notes and messaging-app conversations between staff.
- Manual warehouse count books at the racks.

- Delayed reconciliation after incoming shipments.
- No real-time synchronization between sales, purchasing, and accounting.

Each department effectively maintained its own "version" of inventory reality. Sales relied on memory and outdated sheets. Purchasing focused on the most obviously depleted items and made judgment calls from partial information. The warehouse team used physical tallies and verbal updates. Accounting concentrated on total inventory value and vendor payments, with limited visibility into category-level movement and aging.

B. Key Pain Points
This fragmented setup produced several recurring problems:
1. **Frequent stockouts** in high-demand SKUs such as A19 bulbs, 2×2 and 2×4 panels, and popular wall packs.
2. **Miscommunication** across departments, where sales promised items that were low or out of stock.
3. **Overordering** of slow-moving SKUs due to outdated spreadsheets that did not reflect true demand.
4. **Slow response** for large motel project quotations, since data had to be pulled from multiple systems.
5. **Weak forecasting**, because demand signals were not consolidated by category or project.
6. **Inconsistent formats**, which made automation and integration difficult.

C. Motivation for Centralization
As USA LEDs expanded with Baron Hospitality and other motel clients, leadership saw that fragmented inventory management was directly limiting growth. Stockouts delayed installations and increased rush freight costs, while excess inventory tied up working capital and warehouse space. Centralizing inventory into one system was no longer optional; it became a strategic requirement to support multi-location clients and larger, more complex projects.

III. Centralized Inventory System Architecture
A. Unified Data Model
The new system began with a single master inventory table that consolidated all lighting categories—panels, LED bulbs, wall packs, can lights, exit signs, vanity fixtures, decorative lights, parking-lot fixtures, occupancy sensors, and transformers. Each SKU was assigned a unique identifier and standardized attributes:
- Category and subcategory (e.g., panel → 2×2, 2×4; bulb → A19, A21).
- Technical attributes (wattage, CCT, voltage, lumens, certifications).
- Commercial attributes (cost, selling price tier, vendor, minimum order quantity).
- Operational attributes (lead time, preferred vendor, safety stock, reorder point).
- Status flags (active, discontinued, project-only).

By using a single data model, the company removed ambiguity around SKUs and enabled cross-category reporting instead of siloed views.

B. System Components
The centralized inventory system consisted of:
1. **Master Inventory Database** – Holds all SKUs, quantities, and configuration attributes.
2. **Automated Data Pipelines** – Capture sales orders, purchase orders, and warehouse receipts and post changes back to the master table.
3. **Cross-Department Dashboards** – Role-specific views for sales, purchasing, warehouse, and management.
4. **Forecasting and Analytics Layer** – Uses historical demand to propose reorder points and safety stock by category.
5. **Reporting Engine** – Generates daily, weekly, and monthly views of inventory, stockouts, dead-stock, and fill rates.

C. High-Level Workflow
In the centralized workflow, sales orders from motel projects and maintenance clients deduct from on-hand inventory in real time. When net available quantities cross predefined thresholds, the system raises alerts and

recommends purchase actions. Warehouse receipts update quantities and aging, and these updates flow into forecasting models and management dashboards.

IV. Methodology
A. Data Consolidation and Cleaning
Centralization began by consolidating all existing data sources. Multiple Excel files, vendor catalogs, and warehouse counts were combined into one staging table. Key activities included:

- Standardizing SKU naming and removing duplicates caused by spelling variations.
- Reconciling conflicting attributes (e.g., wattage, CCT) for the same item.
- Mapping historical sales and purchases to the cleaned SKUs.
- Normalizing units of measure so counts were consistent at the "each" level.
- Resolving negative and unrealistic inventory positions by reconciling with physical counts.

This phase required close collaboration between the data analyst, warehouse supervisor, and purchasing lead.

B. Warehouse Process Integration
To keep the system accurate, warehouse processes were redesigned. Incoming shipments now go through a barcode-based receiving procedure. Each pallet or box is scanned, quantities are confirmed, and the system updates the master inventory table. For outbound orders, picking slips generated from the system record exactly which SKUs and quantities were picked.

Racks and bins are tagged with standardized location codes linked back to the master table, so the system knows not just "how much" but also "where" each SKU is stored.

C. Automated Reorder Logic
To prevent stockouts and reduce manual effort, automated reorder logic was introduced for active SKUs. The system calculates:

- Average daily usage based on historical demand.
- Lead time demand based on vendor performance and variability.
- Safety stock to buffer uncertainty.
- Reorder point combining lead time demand and safety stock.

When on-hand plus on-order quantities fall below the reorder point, the system triggers alerts and proposes purchase quantities that buyers can adjust for upcoming projects.

D. Departmental Dashboards
Different teams interact with the centralized system through tailored dashboards:

- **Sales** – sees live available quantities, suggested substitutes for low-stock items, and project allocations.
- **Purchasing** – monitors SKUs that have breached reorder points, along with vendor and pricing details.
- **Warehouse** – views expected inbound shipments, pending receipts, and stock aging.
- **Management** – reviews inventory value, coverage by category, fill rates, and deadstock percentages.

V. Cross-Department Coordination Improvements
A. Sales Team
Before centralization, sales frequently paused calls to "check with warehouse." With real-time visibility, they can now:

- Confirm availability on the same call.
- Offer substitutes when preferred SKUs are below threshold.
- See allocations for ongoing motel projects.
- Avoid over-promising by understanding stock coverage in days of supply.

This improves response time and credibility with purchasing managers and owners.

B. Purchasing

Purchasing shifted from reactive to proactive. Instead of relying on urgent emails and calls, buyers monitor a queue of SKUs requiring attention. Reorder recommendations consider both historical usage and near-term project demand. Vendor lead times and minimum order quantities are stored in the master data, helping balance freight efficiency with stockout risk and reducing emergency shipments.

C. Warehouse

For the warehouse team, centralization means fewer surprises and clearer workloads. The team has visibility into inbound and outbound movements, can see which SKUs are aging, and can locate inventory faster due to standardized rack codes. Cycle counts are used to keep the system aligned with physical stock, reducing disputes with sales about what is "actually in stock."

D. Accounting and Management

Accounting benefits from more accurate and granular inventory valuation. Management can answer strategic questions such as:

- Which categories tie up the most capital?
- How much inventory sits idle beyond 120 days?
- How do fill rates and stockouts trend for key motel clients?

VI. Results and Impact

A. Stockout Reduction (Figure 1)

After six to nine months on the centralized system, analysis showed noticeable reductions in stockouts across major categories:

- LED bulbs: ~26% reduction.
- Panel lights: ~21% reduction.
- Exit signs: ~19% reduction.
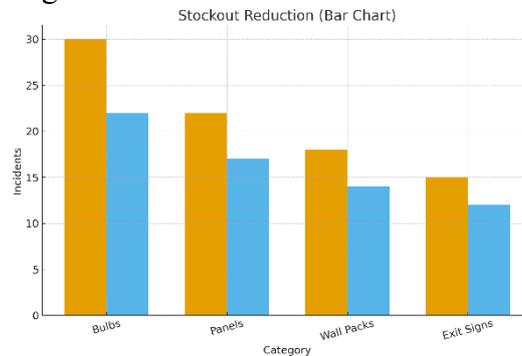- Wall packs and can lights: ~18% reduction.

Figure 1 plots stockout incidents before and after centralization, showing a clear downward shift in both frequency and severity.

B. Inventory Accuracy (Figure 2)

Physical versus recorded accuracy improved from roughly 72–78% to around 90–94% for major categories. Barcode-based receiving, standardized SKUs, and cycle counts reduced discrepancies.
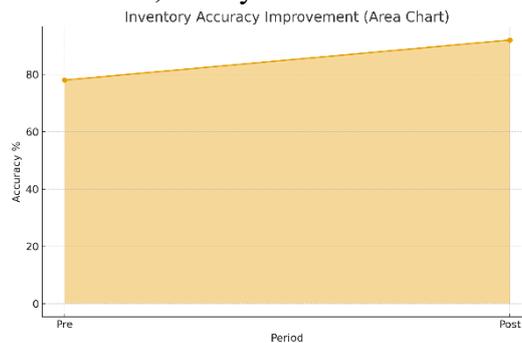

Figure 2 compares accuracy by category before and after centralization, highlighting gains for high-turn items and compliance-critical SKUs like exit signs.

C. Forecasting Error Reduction (Figure 3)

Because demand data was consolidated across categories, forecasting models became more reliable. Mean absolute percentage error (MAPE) for key SKUs fell from about 32% to roughly 14%. Consistent baseline products (e.g., A19 bulbs, 2×2 panels) benefited the most, while project-specific decorative items still showed some volatility.
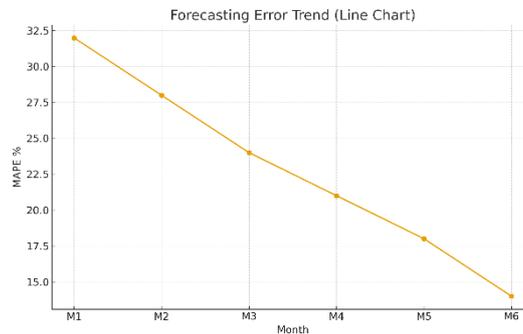

Figure 3 presents error rates before and after centralization for a sample of core SKUs.

D. Deadstock Trend (Figure 4)

Centralization helped reduce deadstock—items idle for more than 120 days. With aging reports and deadstock flags, USA LEDs:

- Reduced deadstock from about 14.8% of inventory value to ~8.1%.
- Identified items to bundle, discount, or repurpose.
- Avoided reordering slow movers simply because they appeared in siloed category sheets.
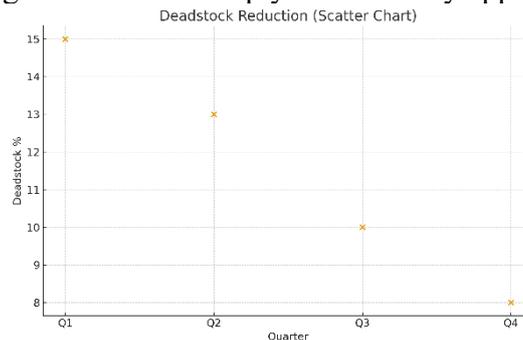

Figure 4 shows deadstock as a percentage of total inventory value over time, with a clear downward trend after targeted interventions.

VII. Discussion

Beyond the numeric improvements, centralization drove a cultural shift from department-centric to system-centric thinking. Teams stopped defending separate spreadsheets and instead collaborated around a shared platform. This is particularly important in hospitality lighting, where tight project timelines and inspection deadlines leave little room for repeated errors.

Centralized inventory management made it easier to support multi-property clients who expect consistent product availability and standards. USA LEDs could coordinate bulk purchasing for multiple motel projects, leverage volume pricing, and reduce last-minute scrambling. The project also reinforced the importance of data discipline: centralization is an ongoing practice that depends on clean inputs, consistent processes, and regular communication.

VIII. Limitations

Despite its success, the system has limits:

- Forecasting remains challenging for irregular, project-driven SKUs and one-off custom fixtures.
- Data quality still depends on timely warehouse scanning and adherence to processes.
- Very low-volume categories may not generate enough data for automated rules, requiring manual judgment.
- The initial rollout required significant time for data cleaning, rack mapping, and staff training.

Future work can include integrating external signals such as upcoming construction projects, regional renovation cycles, and macroeconomic indicators to further refine procurement strategies.

IX. Conclusion

Centralizing inventory for all lighting categories enabled USA LEDs to move from fragmented, error-prone processes to a unified and efficient supply chain. By consolidating data, automating updates, and providing role-specific dashboards, the company reduced stockouts, improved inventory accuracy, and strengthened coordination across departments.

For hospitality lighting suppliers managing diverse SKUs, centralization is less a technical upgrade and more a strategic foundation. Organizations that invest in a single source of truth for inventory are better positioned to respond quickly to motel client needs, protect margins, and free their teams from constant firefighting. The experience documented here offers a practical blueprint for achieving that transition.

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