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DIGITAL TRANSFORMATION OF RETAIL INVENTORY

BIG MARKET INVENTORY INTELLIGENCE

Improving inventory visibility and stock decision-making in a supermarket environment

Submission detail	Information
Institution	[Insert institution name]
Programme / Course	[Insert programme and course]
Faculty / Guide	[Insert name]
Group	Group 7
Project members	Saral Kudesia · Nagesh Palang · Chhavi Satija · Arpit Poriya · Shruti Sharma
Individual report prepared by	[Confirm name, roll number and individual role]
Academic year / submission date	[Insert details]
Live application link	[Insert deployed application URL]

Declaration and Acknowledgement

Declaration

[Insert individual name and roll number] declares that this report, Digital Transformation of Retail Inventory — Big Market Inventory Intelligence, prepared for the Digital Business Strategy course, records the work of Group 7 (Saral Kudesia, Nagesh Palang, Chhavi Satija, Arpit Poriya and Shruti Sharma) and the individual contribution described in Chapter 27. Generative AI tools were used as analysis and drafting assistants; their use is disclosed in Chapter 28 and every output was reviewed and challenged by the team. All other sources are listed in the References.

Signature: _____ Name: [Insert] Roll number: [Insert] Date: [Insert] Place: [Insert]

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Abbreviations

Abbreviation	Meaning
AS-IS / TO-BE	Current state / designed future state
DBS(P)	Digital Business Strategy (Project)
DIKW	Data–Information–Knowledge–Wisdom
FEFO	First Expired, First Out
GenAI	Generative artificial intelligence
KPI	Key performance indicator
MAE / MAPE / WAPE	Mean absolute error / mean absolute percentage error / weighted absolute percentage error
POS	Point of sale
RCA	Root-cause analysis
RENO	Big Market's existing inventory-management software
RFID	Radio-frequency identification
ROP	Reorder point
RPC	Remote procedure call (database function invoked from the application)
SKU	Stock-keeping unit
SME	Subject-matter expert (here, the Big Market store manager)
TAM	Technology Acceptance Model

Executive Summary

This is a digital business project looking at the ability of a supermarket or large retail environment to gain more insight into their stock control. This has been presented through a decision-making dashboard and controlled counting process to help staff and managers understand the current state of stock and identify any exceptions. The business problem is identified by looking at how stock outs, surplus, or slow moving stock, expiry risk, incorrect data, poor decision making and lack of joined up data can effect the business.

The solution involves using a decision-making dashboard alongside a counting and discrepancy process. This dashboard should provide staff and managers with an idea on the current state of inventory in their company. The DIKW model is used to move from raw data (stock) to information, knowledge and decisions. The report also links to accurate stock, reorder point/safety stock, FEFO expiry, governance and auditing based on roles.

Evidence gathered for this project includes using a React front end, Supabase/PostgreSQL database to handle the counting and discrepancies and Vercel to deploy. The counting process ensures the user is authenticated and checks that the correct user is attempting to count. It then locks the row within the inventory table, compares the actual count with the expected count. It then updates the verification fields and adds an audit entry. The manager review has added a self approval to ensure the correct process has occurred. An important piece of evidence to note is that the status added during the count process must match the expected status within the manager review queue.

This project is a prototype and evidence based. Screenshots and testing evidence have been provided to show the behaviours the system exhibits but does not prove any increase of reducing stock outs, accurate stock, waste, sales or costs. The quantitative section shows the calculations however this is not based on a representative data set. The project has plans for interviews, formulas for KPIs, testing requirements and a roadmap to help with future validation.

Evidence convention:

Claims have been made regarding the context of this, the process, design and future validation. There has been no claims of a business impact without measure.

This report discusses the difference between the AS-IS and TO-BE. The example of the current prototype shows how it can provide physical submission of stock, tracking discrepancies and having controls for auditing. It does not show proof that it can integrate with RENO, POS, purchasing or supplier systems. The Prototype Review shows how it can forecast demand and recommend replenishment. However, it only uses demonstration/simulation data meaning there is no validation that it can forecast accurately and has an impact on the business. We propose to test it against real data from Big Market using a transparent moving average baseline.

Current System and Stakeholder Evidence. Big Market currently use RENO to track inventory. Stock is depleted automatically when sold however new stock must be manually added. There are no active alerts for low stock. During the discussion section in the project presentation, the Store Manager mentioned that they use the RENO data to make decisions on reordering. They do not look at previous sales/historical demand when ordering and do not formally forecast. The Store Manager mentioned that overstocking, wastage due to expiry and theft were the biggest issues. Stock outs rarely occurred and only for a few items. The stock in RENO does not always match the actual stock. This means that the Inventory Intelligence will provide an additional layer of decision support rather than replacing RENO.

Options, Scope and Prototype. The group discussed the options of adding a visibility layer, forecasting and replenishment and intelligent verification. We decided to go with option C. The project scope was limited to 4 main issues; forecasting demand, recommending replenishment, ensuring accurate stock and reducing risk of expiry/overstocking. We have created a working prototype which has been reviewed on 6th October 2026. It includes an Executive Dashboard, SKU level stock with verification, forecasting demand, recommending replenishment, making decisions based on manager approval/edits/rejection, a simulation of time and a reports and audit trail page. It uses demonstration/simulation data meaning it needs validation to ensure it can forecast accurately, provide a financial impact and user acceptance. This can be done using real data from Big Market.

Project at a glance

Element	Summary
Business setting	Supermarket / retail inventory operations
Categories named in project materials	Dairy, Groceries, Kitchen Items and Cosmetics
Core challenge	Timely, accurate and actionable stock information
Solution direction	Inventory dashboard, risk visibility, count verification and manager exception review
Technology context shared	React, Supabase/PostgreSQL and Vercel
Primary validation priority	Align database statuses, manager-review RPC, permissions and UI workflow
Evaluation principle	Measure outcomes only after definitions, baseline and data quality are confirmed
Existing system	RENO inventory-management software; no active low-stock alerts reported
Stakeholder evidence	SME discussion with the store manager, plus staff observations reported in the project presentation
Selected solution option	Option C — integrated intelligence and verification, with manager-in-the-loop decisions
Prototype status	Working prototype on demo/simulated data (review held 6 October 2026); validation with real data pending
Top four scoped issues	Demand forecasting; replenishment recommendation; inventory accuracy; expiry/excess risk

How This Report Maps to the Project Steps

The project was developed in eight steps plus a working prototype. The table shows where each step is covered in this report.

Project step	Where covered
Step 1 — IKIGAI and sector selection	Chapters 2 and 3
Step 2 — Stakeholder voice and stakeholder map	Chapter 8, including Section 8.4 (SME interview findings)
Step 3 — 5W1H and problem statement	Chapters 9 and 10; Section 9.3
Step 4 — AS-IS digital business components and process	Sections 4.6 and 7.4
Step 5 — RCA: 5 Why + 1H, fishbone, Pareto, gap analysis	Sections 9.3 to 9.7; Section 23.3
Step 6 — IS information flow, layer-wise architecture and blueprint	Chapters 13 and 14; Sections 14.6 and 17.7
Step 7 — Solution options, simulation and stress testing	Sections 16.4 and 16.5
Step 8 — Strategic scoping: top four core issues	Section 16.6
Working prototype, feasibility and validation	Sections 17.8 to 17.10, 22.5 and 24.5
KPIs, SWOT and risks	Sections 16.3, 25.3 and 25.4
GenAI evidence	Chapter 28
Individual and team contribution	Chapter 27
Introduction, background and need for digital transformation	Chapter 1
Objectives, scope and success criteria	Chapter 11, including Section 11.4
Theory and frameworks (operations management, DIKW, information system, digital components)	Chapters 12 to 15
Conclusion and key lessons	Chapter 26

1. Introduction

1.1 Background

Digital transformation is the application of digital technologies to improve processes, decision making and customer and employee experiences. It is very rarely a complete overhaul of processes. Where inventory is concerned, more commonly it will be the addition of a digital layer to areas where information is fragmented, delayed or not easy to take action upon. For example, a supermarket has lots of SKUs with varying shelf life, demand and supplier lead times. Every day they will ask, what do I need to order? What do I need to move? What do I need to check? And what should I be worried about?

1.2 Need for digital transformation

The current system in Big Market stores (see section 8.4) is to log stock transactions in RENO. When a sale is made a reduction is automatically made to the stock. Additional stock is manually added. There is no alert system for low levels of stock, past sales are not used to determine what to order, there is no formal forecasting system and there are inconsistencies between actual and recorded stock. A decision support and validation system is needed which will take the data currently being logged and provide forecasting, recommendations and alerts. The store manager will make the final decision.

1.3 The problem in brief

Big Market holds inventory data, but the data is not converted into timely, accurate and actionable decisions. The primary problem is demand-driven replenishment; the secondary problem is inventory accuracy when physical and recorded stock differ (Section 9.3). Chapter 9 traces the causes and Chapter 10 states the problem formally.

1.4 Objectives and scope in brief

The overall aim of this project is to give managers and staff more knowledge on stock risk, to recommend re-ordering of stock and give a documented process for dealing with discrepancies (see chapter 11). Initially there will be four main areas to look at, forecasting demand, recommending re-ordering, ensuring accurate inventory and identifying risk of expiry/overstocking (see section 16.6). This will be an analytical tool that can be used with the RENO system..

1.5 How this report is organised

The report moves from context, through diagnosis and theory, to the solution, its evaluation and the recommendations. The table below shows the parts and the chapters in each.

Part	Chapters	Purpose
Context and orientation	2 to 5	IKIGAI, sector analysis, organization and scope, methodology and evidence base
Diagnosis	6 to 10	Problem scouting, current-state process, stakeholders and SME findings, problem definition and root cause, problem statement
Objectives and theory	11 to 15	Objectives and success criteria, operations-management concepts, DIKW, future-state information system, digital business components
Strategy and solution	16	Transformation strategy, solution options, stress testing and strategic scoping
Design and build	17 to 20	Application architecture and prototype, risk modules, discrepancy and manager-review workflow, governance
Evaluation	21 to 23	Testing and validation, findings and discussion, quantitative analysis

Part	Chapters	Purpose
Recommendations and closure	24 to 28	Recommendations and roadmap, benefits-limitations-risks, conclusion, individual and team contribution, GenAI evidence

1.6 Use of generative AI

Generative AI was used as an analysis and drafting assistant. Its prompts, responses and the team's counter-questions are recorded in Chapter 28, and every output was treated as a draft to be checked and challenged against the application, the database and the source materials (Section 28.4).

1.7 Data sources and limits

This report has been based upon the groups project presentation, code extracts, screenshots of the database and implementation. We should also take into consideration that the prototype is using data that is well organised and is therefore only demo/simulation data which cannot have any impact on actual business. The responses from the Big Market store manager are only from one person and one store so they should not be seen as representative of all stores. This report is based upon the method used to gather data as covered in chapter 5 and the limitations of the data found in section 25.2.

2. Orientation and Interest Mapping — IKIGAI

The project presentation uses an IKIGAI-style orientation exercise to connect team interests and capabilities with a real business need and a feasible area of value creation. In the project framing, this is not a claim of formal psychological assessment; it is a structured way to explain why the team selected a retail inventory problem.

2.1 What the team likes

The presentation identifies technology, retail, analytics, problem-solving and practical innovation as interests. These interests fit a project where the business problem is visible in day-to-day operations and can be explored through digital tools.

2.2 What the team is good at

The presentation lists business analysis, teamwork, digital tools, research and structured thinking. These capabilities can be applied to map a process, identify pain points, organize requirements, design a dashboard workflow, test application behaviour and communicate findings.

2.3 What the market needs

The stated needs are reliable product availability, efficient stock control and data-driven decisions. They connect the technical project to operational outcomes: having the right products available, avoiding avoidable holding and expiry exposure, and making decisions using consistent information.

2.4 Where the project can create value

Areas of opportunity were identified around greater visibility, analytics, forecasting and improving workflow. These will be used as our value hypotheses for the project. The dashboard and exception workflow gives us a starting point but forecasting and improvement requires verified data to measure.

IKIGAI element	Project interpretation
What we like	Technology, retail, analytics, problem-solving and practical innovation.
What we are good at	Business analysis, teamwork, digital tools, research and structured thinking.
What the market needs	Reliable product availability, efficient stock control and data-driven decisions.
Where we can create value	Inventory visibility, analytics, forecasting opportunities and workflow improvement.

2.5 Why this orientation matters

A digital project should connect team capability to a real operational need rather than select technology first and search for a problem later. The IKIGAI exercise provides that alignment: retail inventory is a bounded domain with identifiable users, repeatable processes, operational metrics and potential for digital support.

3. Sector Analysis — Retail / Supermarket

3.1 Sector rationale

Stock management is vital in a supermarket. Products should be available for customers to ensure a good experience and avoid affecting sales. Stock management can also impact working capital, storage, stock replenishment effort and expiry risk. Supermarkets have a large amount of SKUs, high turnover and regular restocking so quick information is important.

Products will vary in their shelf life, demand pattern, lead time and storage requirements. You may need to have strict expiry and rotation management for a dairy product whereas there may be different handling and cover rules for a durable kitchen product. Everything needs to be managed through one stock process but with general management controls and specific controls within each category.

3.2 Why digital transformation is relevant

- Inventory decisions are made between:
- Store/warehouse employees, purchasing, management, point of sale and billing and suppliers.
- This can cause issues with data silos. This is a problem mentioned in the project presentation.
- If the reordering is done manually or based on past experience it can be hard to keep processes consistent and auditable.
- Stock taking helps ensure there are no discrepancies in the records, however this will depend on how discrepancies are investigated and resolved.
- Any inventory that has an expiry date will need accurate product/batch data and correct rotation methods in place.

3.3 Project boundary within the sector

The presentation deliberately scopes the project to inventory rather than attempting to transform the entire supermarket. Customer loyalty, HR, finance and unrelated store operations are out of scope. This narrower scope makes it more feasible to investigate a process, develop a digital workflow and define measurable success criteria.

3.4 Sector-level opportunity and caution

The opportunity is to connect inventory records to better operational decisions. The caution is that a dashboard alone cannot guarantee accuracy: records must be current, business rules must be suitable, users must follow the process, and integration assumptions must be validated.

3.5 Published evidence on stock-outs and record accuracy

Two well known studies have been used in this section to show the importance of having good visibility of stock. Gruen et al. (2002) performed a worldwide study using 40 studies. They found that on average around 8.3% of stock was out of stock. When customers could not find stock they would go to another store to purchase the product 31% of the time and 9% of the time they would not purchase anything. DeHoratius and Raman (2008) performed a study on 370,000 + products in 37 stores for one retailer. They found that around 65% of their stock levels did not match up with the actual stock levels.

The studies have been taken from a variety of retailers and times. I have included them to give some background information to the problem. As the evidence is used in the report it does not reflect how well Big Market are

doing. However, the manager mentioned that stock outs were rare however it was difficult to manage overstocking, expiry and theft (Section 8.4). The best thing to do would be to measure all of these issues whilst undertaking the pilot.

3.6 Digital maturity ladder

A digital maturity ladder describes how far an operation has moved from paper-based work towards data-driven decisions. The five rungs below are the team's framing for this project and are not a published standard. They help place Big Market today and show what the prototype is intended to change.

Rung	Description	Big Market today	Prototype target
1. Manual records	Paper or memory-based stock tracking	Left behind	—
2. Digital transaction record	Purchases and sales captured in a system such as RENO	Current position: RENO records transactions but gives no active low-stock alerts	Retained as the system of record
3. Connected visibility	System stock, verified counts and batch expiry shown together	Not available	Delivered by inventory, expiry and reconciliation views
4. Decision support	Risk flags, recommendations and exception queues with a manager decision	Not available	Delivered as prototype on demo data
5. Predictive / automated	Validated forecasting and automated ordering	Not available	Out of scope until data quality and forecast validity are proven

3.7 Customer expectations and competitive pressure

Supermarkets are competitive and look to provide fast and available products at low prices. Customers are now comparing local stores with online and quick commerce grocery services. This means that they expect the product to be available and fresh. A stock out or stale product will lead to a decrease in customer confidence. The size and growth of the market have not been looked up to ensure they are accurate. If added please reference the source.

Using a qualitative analysis of the Five Forces we can see why stock visibility within stores is the controllable factor for one store

Force	Pressure on a supermarket	Implication for stock decisions
Rivalry	Nearby supermarkets and online grocers compete on availability and price	Stockouts push shoppers to alternatives; excess stock forces markdowns
Supplier power	Lead times and minimum order quantities	Reorder points must reflect supplier lead time (Section 12.2)
Buyer power	Customers switch easily	Availability and freshness protect repeat purchase
Substitutes	Quick-commerce and home delivery	Raises the bar for in-store availability
New entrants	Online and discount formats	Efficient inventory is a cost-defence, not a differentiator on its own

4. Organization and Project Scope

4.1 Target organization

The supplied presentation defines the target as a large or medium-to-large supermarket or retail market. The business context is used to examine receiving, storage, shelf replenishment, sales-linked stock updates, purchasing and reordering.

4.2 In-scope processes

- Receive (check items have been delivered and record the amount received)
- Stock Recording (recording SKUs and stock)
- Storage and restocking of stock (ensuring the product is available)
- Sales related stock updates (updating stock if there is a link to POS/inventory)
- Purchase and reorder (Reviewing stock and decide what to order)
- Stock Count (physically counting stock and checking against the system)
- Review discrepancies (record any discrepancies and allow authorised manager to make a decision)

4.3 Out-of-scope areas

- Full customer-loyalty transformation.
- Human resources and payroll.
- Finance transformation unrelated to inventory control.
- Unverified POS, ERP, supplier, barcode or forecasting integrations.
- Claims about enterprise-wide performance improvements without measurement.

4.4 Access and evidence needed

Access to a manager/ops, at least one inventory/procurement/store staff member, interview notes and observation of processes, along with non-sensitive information from the systems/processes are all useful pieces of evidence. If any of these aren't completed they should be included within your validation plan.

[Note: A conversation with the Big Market Store Manager has now been included within the project presentation (see section 8.4). The additional interviews have been left as validation activities.]

4.5 Project deliverables

Deliverable	Description
Problem framing	Inventory pain points, 5W1H definition and project scope.
Process mapping	Current-state process and identified hand-offs to investigate.
Digital solution	Dashboard-oriented application and inventory exception workflow.
Data controls	Validation, discrepancy audit record and manager-review rules where implemented.
Testing evidence	Documented positive, negative, permission and status-mapping test cases.
Final report	Analysis, figures, recommendations, individual contribution and appendices.

4.6 Existing system and AS-IS digital business components

Big Market's existing digital base is RENO, which the store manager identified as the software used for inventory management. The table separates what has been reported from what still needs verification, so that no technology is claimed for the current state without evidence.

Component	AS-IS (as reported)	Verification status
Hardware	POS/store computers and operational devices; shelf and godown/storage environment	Exact devices to be confirmed
Software	RENO for inventory transactions and stock records; stock decreases automatically on sale; new stock entered manually; no active low-stock alerts	Any other POS/software to be confirmed
Network	Store connectivity supports use of digital systems	Network architecture not verified
Data / database	Inventory transactions, stock records and historical sales data are reported as available	Database structure not verified
People / process	Store supervisor or manager decides replenishment; staff receive, record, store, display and sell products; damaged products recorded manually in a book or flagged in RENO	Roles to be confirmed with the SME

The project does not claim a specific RENO database, API, cloud architecture or RFID deployment in the current state unless verified by Big Market. Those elements belong to the proposed TO-BE architecture (Section 17.7).

5. Methodology and Evidence Base

5.1 Approach

The report has been created by analysing the 15 slides. Through looking at the code snippets that were used to create the inventory discrepancy process, the database screenshots that showed the data constraints, test data and screenshots of the application showing the manager modal and self approval block. The documentation based approach was used with the prototypes to provide evidence of the Q&A with the SMEs, solution options, stress testing, screenshots of the prototype and prompts given to the GenAI. The Prototype Review Deck (6 th October 2026), Steps 1-6 Deck and Final Steps 1-8 Deck were used.

5.2 Evidence sources and limits

Source	Supports	Does not prove alone
Project presentation	Problem framing, scope, stakeholder plan, DIKW, future-state logic, digital components and transformation stages.	That all listed integrations or benefits are already implemented.
SQL function excerpt	Visible count validation, row locking, discrepancy calculation and audit insert logic.	Correctness of every related RPC, trigger, permission policy or end-to-end path.
Database screenshots	Visible constraints and a small set of audit records.	Representative store performance or complete production history.
Application screenshots	Visible dashboard/modal state and a self-approval error.	Successful completion of all manager resolution paths.
Vercel screenshot	A deployment reached Ready after author-email correction.	That every production user journey and database operation is correct.
SME question-and-answer record	Reported RENO use, ordering practice, expiry/overstock handling, discrepancy causes and forecasting practice at the store.	Findings from other stores or stakeholders, or measured frequencies.
Prototype Review deck and screenshots	Prototype scope, modules, forecast, replenishment and decision workflow on demo data.	Forecast accuracy, financial impact or user acceptance with real data.

5.3 Research limitations

The data provided includes one SME recording and therefore does not have a full multi-stakeholder interview transcript, sample of store transactions, baseline KPI's and end-to-end testing report. Further information can be added to support this report by the team providing data and therefore evidence based conclusions can be made..

5.4 Ethical reporting

The report distinguishes project proposal from implemented feature and test observation from business outcome. It does not invent interview results, business metrics, savings or performance improvements. Any new evidence should be incorporated with its source and limitations stated.

6. Problem Scouting

The presentation outlines 6 issues with inventory management. If you have incorrect inventory it can cause bad stock reordering. Too much stock on hand increases the risk of expiry. If there is no unified record then it can cause delays. And if you see no actual stock availability you may experience stock outs.

6.1 Stock-outs

A stock-out occurs when a product is unavailable despite customer demand. It may be caused by insufficient replenishment, inaccurate records, delivery delays, demand changes or a failure to move stock to the shelf. The project's stockout-risk direction is intended to make potential shortages more visible.

6.2 Overstock and slow-moving stock

Excess or slow-moving stock ties up working capital and may increase storage, handling, markdown or obsolescence exposure. A useful excess-stock rule needs a clear basis, such as target stock, days of cover or movement over a defined period.

6.3 Expiry risk

Limited visibility of near-expiry products can make rotation and markdown decisions harder. Accurate expiry dates and, where applicable, batch quantities are prerequisites for meaningful expiry-risk prioritization.

6.4 Data accuracy

The system quantity may differ from the physical quantity because of missed movements, receiving errors, damage, theft, counting error or timing differences. The discrepancy workflow aims to record the count and route a difference for review.

6.5 Reordering

Manual or experience-heavy decisions may be difficult to standardize, explain or repeat. A dashboard can support review, but any reorder recommendation should disclose the threshold or calculation used.

6.6 Fragmented information

Sales, inventory, purchasing and supplier information may sit in separate places. The presentation proposes a more connected information flow; the actual systems and integration feasibility must be confirmed.

Problem	Possible operational effect	Evidence / data to investigate
Stock-outs	Lost sales, substitution, customer dissatisfaction	Stockout events, demand, on-hand stock, replenishment lead time
Overstock	Capital tied up, storage and markdown cost	Stock value, movement, days of cover, target levels
Expiry	Write-offs, markdowns, waste	Expiry/batch records, rotation checks, write-off data
Data accuracy	Poor reorder decisions, manual reconciliation	Physical counts, system quantities, movement history
Reordering	Delay or inconsistent order quantity	Reorder history, thresholds, supplier lead times
Fragmentation	Duplicate entry, delays, inconsistent versions	Systems used, hand-offs, manual reports, refresh timing

7. Current-State Process to Investigate

The presentation maps a typical process from supplier delivery through receiving, inventory recording, shelf/store availability, POS/sales and the manager's reorder decision. This should be treated as the current-state process to investigate, not as a fully verified description of a particular store's actual operating procedure.

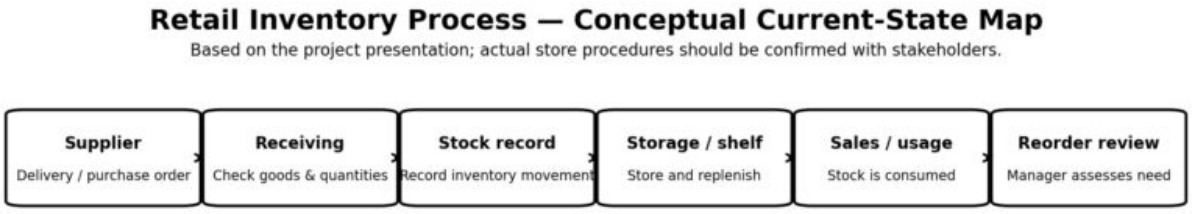


Figure 1. Conceptual retail inventory process; confirm actual store steps with stakeholders.

7.1 Process stages

Stage	Core activity	Questions to validate
Supplier / delivery	Goods arrive against purchase or delivery information.	Are orders, quantities and delivery times recorded consistently?
Receiving	Staff check goods and quantities.	How are shortages, damage and substitutions documented?
Inventory	Stock is recorded in the relevant system or record.	Is the SKU unique? When is the stock record updated?
Shelf / store	Products are stored and made available for sale.	How are backroom and shelf quantities distinguished?
POS / sales	A sale or transaction occurs.	Does sales data update stock automatically or through another process?
Reorder	Manager decides whether and how much to order.	What thresholds, reports, supplier lead times and judgement are used?

7.2 Hand-offs and potential failure points

- Duplicate entries between receiving documents and inventory records.
- Time delay between movement and update
- Unclear ownership of inventory discrepancy.
- Inconsistency in units or SKU codes.
- Limited insight on supplier lead times or product expiry dates.
- Review of reorders manually and no consistent method of calculation.

7.3 Current-state investigation questions

The team should identify which systems are currently used, whether they communicate, where manual entry occurs, how staff handle exceptions, and which information managers need but cannot easily access. The report should not state that a specific bottleneck was observed unless interview notes or observations support it.

The following AS-IS map reproduces the process sequence in the presentation. It is an investigation model, not a claim that the team has completed field observation at a named supermarket.

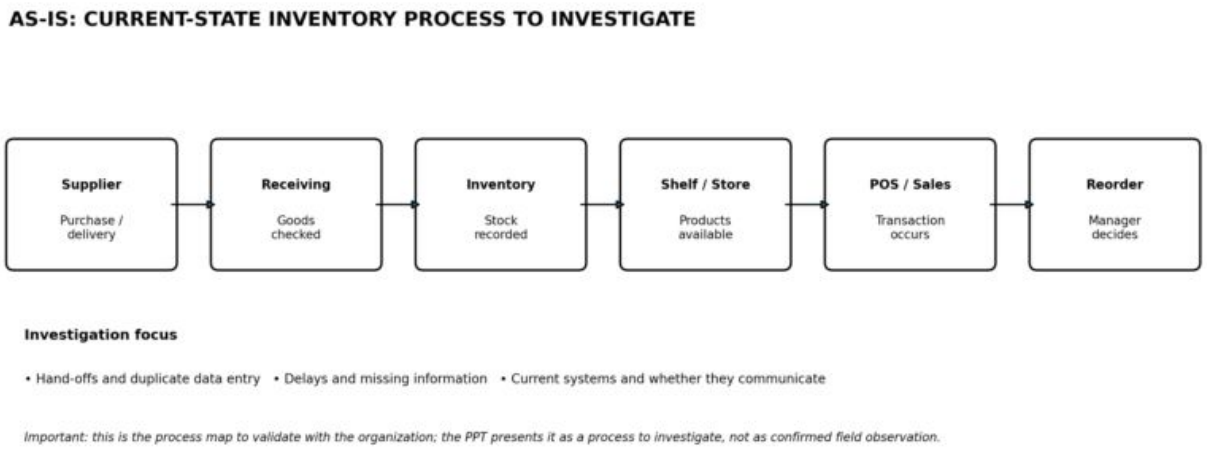


Figure 2. AS-IS inventory process to validate with the target organization.

7.4 AS-IS process as described in the SME discussion

- Based on the SME discussion and staff observations below is the process currently being followed. This can be further validated by directly observing the process.
- Supplier/distributor ➔ Receiving
- Receiving ➔ New stock manually added into RENO
- Stock ➔ Shelving/Display & Godown/Storage
- Customer purchase ➔ Stock automatically reduced in RENO
- Manager/Store Supervisor checks stock levels in RENO ➔ Decision on restocking
- Risk points – Delayed supply (1-2 days), wrong items, damaged/returned items, near expiry items, stock discrepancy
-

8. Stakeholder Map and Interview Plan

Inventory control is cross-functional. The presentation identifies manager/operations, procurement, store/warehouse, POS/billing, suppliers and customers as stakeholders or affected parties. Their information needs differ, so the solution should make responsibilities clear rather than assume that one dashboard serves every user identically.

Stakeholder	Role in inventory decision	Information / questions
Manager / operations	Owns policies, priorities, exceptions and performance decisions.	Which KPIs matter? Who can approve adjustments? What triggers escalation?
Procurement	Plans orders, manages supplier relationships and replenishment.	How are quantities and order timing decided? What are lead times and minimum order quantities?
Store / warehouse	Receives goods, counts stock, stores products and replenishes shelves.	Where do counts differ? How are damage, expiry and shelf availability handled?
POS / billing	Records sales transactions and may provide stock-movement data.	How quickly are sales reflected in inventory? Are returns and voids handled?
Suppliers	Provide products and delivery information.	What delivery reliability, substitution and lead-time information is available?
Customers	Experience product availability and substitutions.	Which availability failures are visible through feedback or demand signals?

8.1 Interview plan

The presentation recommends access to a manager/operations contact and at least one inventory/procurement or store employee. Interviews should be short, structured and focused on actual examples rather than general opinions. Ask participants to describe the last occurrence of a problem, how they detected it, what data they used, who acted, and what happened next.

8.2 Interview questions from the presentation

1. Can you walk me through your entire process from the point of receiving the delivery to having the product ready to sell?

2. How do you know how much stock you currently have on hand?

3. What systems do you use for invoicing and stock management?

4. How do you determine when and how much to order?

5. What are the most common issues you have with managing your stock?

6. How do you manage slow moving stock or close to expiry stock?

7. How often is there a discrepancy between your stock on hand and stock in your system?

8. What information would you like to have instantly available to help with your stock management?

9. Where are the bottlenecks or manual processes in your current stock process?

10. If you could improve one area of your stock management what would it be?

8.3 Interview evidence template

Field	Record during interview

Participant role	[Manager / procurement / store / POS / other]
Date and context	[Date; in-person/online; relevant process]
Example problem	[Specific recent example described by participant]
Current method	[Systems, records and manual steps used]
Impact	[Time, cost, availability, waste or customer impact—only if stated]
Suggested improvement	[Participant's recommendation]
Follow-up evidence	[Report, process document or observation to validate]

Do not invent interview quotations, participants or findings. If interviews were not completed, label this as a proposed interview plan.

8.4 SME interview findings (completed discussion)

The project presentation records a structured question-and-answer discussion between the group and the Big Market store manager. The answers below are reproduced from that record. They represent one manager's view at one store and should not be generalised without further interviews; they replace the blank interview template (Section 8.3) only for the evidence they cover.

Theme	Question asked	Manager's answer
1. Current system	What systems do you currently use to manage inventory and stock?	We use software called RENO for inventory management.
	How is stock updated when products are purchased by customers?	The RENO system automatically decreases the stock level upon purchase, updating the inventory.
	How is newly received stock entered into the system?	New stock is entered manually using the RENO software.
	Does the current system provide any low-stock or stock-related alerts that you actively use?	No, the system does not provide active low-stock alerts.
2. Replenishment	Who takes the final decision about when and how much stock to reorder?	Reordering decisions are made by the store supervisor or manager, utilizing data from the RENO software.
	Do you use previous sales or historical demand when deciding how much to order?	No.
	Are there particular products that need to be reordered more frequently than others?	Yes, items such as dairy products, fresh fruits, vegetables, milk, and bread require frequent reordering.
	Does the replenishment process differ between dairy, groceries, kitchen items, and cosmetics?	Yes, the replenishment process varies across these categories depending on their sales velocity.
	What happens when a product goes out of stock?	It is either reordered or remains unavailable for a few days.
	How often do you face situations when a product is unavailable when customers want it?	It is a rare occurrence. Only a few specific products, like certain cosmetic items, present availability issues, while common brands and fast-moving products are readily available.
3. Overstock and expiry	Do you face situations where you have more stock than required?	Yes. Overstocking non-sold items leads to expired stock, which either must be destroyed or sold at a discount.
	What happens when products approach their expiry date?	They are either offered a discount or discarded.

Theme	Question asked	Manager's answer
4. Accuracy and discrepancies	Does the physical quantity of a product always match the quantity shown in RENO?	No. Discrepancies occur due to theft, expiry, and product damage.
	What are the common reasons for the difference between physical and system stock?	Common reasons include theft, product expiry, transit damage, and human error during data entry in the software.
	How often do you physically check or count inventory against the system?	Not frequently, as the stock is actively managed by the RENO software.
	How are damaged products recorded and handled?	Damaged products are recorded manually in a book or flagged in the RENO system, and they are either replaced by distributors or recorded as a loss.
5. Challenges and impact	Among stockouts, excess stock, expiry loss, and inventory discrepancies, which problem creates the most difficulty for the store?	Excess stock, expiry losses, and theft create the most difficulty.
	Are there products where demand is difficult to predict?	Yes, high-cost items and specific products within the cosmetic or household sectors are challenging to predict.
	Do you use any formal forecasting method or software for inventory planning?	No.

Additional observations reported in the project presentation.

Stock is kept on RENO.

Stock can be taken which will result in discrepancies between actual stock and stock on the system.

No automatic re-ordering occurs when stock is running low.

Items that are nearing their expiry date can be sold at a large discount. When they have not been sold they can be classed as a loss and therefore thrown away.

Items that are damaged are sent back to the supplier/distributor which can sometimes take a while.

Deliveries can be late (by up to 1-2 days).

There are no regular stock takes. Stock levels are mainly based on the information that is stored on the RENO system. The store manager decides when to re-order. Historical sales data is available.

Stakeholder voice summarised from the SME discussion.

Stakeholder	Pain point or concern
Owner / manager	Replenishment decisions are ultimately managerial; uncertainty arises when current stock does not fully explain future demand.
Store worker	Products can be picked and left in other locations, so physical quantity and location can differ from the system view.
Supplier / distributor	Damaged or returned products and delayed deliveries can affect replenishment timing and availability.
Customer	Stockouts or unavailable products reduce the ability to meet immediate demand.
Delivery personnel	Receiving quantities and delivery timing are operational points where inventory records can be affected.

Stakeholder	Pain point or concern
Surroundings / community	Product availability and responsible handling of unsold or expired inventory matter to the local retail environment.

8.5 What the interview evidence implies

The manager confirmed:

No active out-of-stock alerts exist within the RENO system. Sales data is not used. No formal forecasting is carried out. Stock is only physically counted occasionally. Discrepancies occur due to stock theft, stock expiring, stock damage during delivery and data entry errors.

Whilst this is the case there are nuances. The manager said that they rarely experienced out-of-stock situations and only had a few items that were out of stock. The main issues they have are having too much stock, stock expiring and stock theft. This means we have four risk modules and out-of-stock is not the only issue we need to consider. We need to look at how much stock is expiring, too much stock and discrepancies.

One of the reasons for discrepancies is due to stock theft. The system will alert them to discrepancies which they can investigate (see section 15.3). It will not automatically tell them why.

It is most difficult to forecast demand for high cost items and some cosmetics/household items. Therefore we need to look at forecasting per SKU and category.

9. Problem Definition — 5W1H

The 5W1H framework helps convert a broad theme such as 'inventory problems' into a defined and investigable business problem. It asks who experiences the problem, what happens, when and where it occurs, why the current process contributes to it, and how the effect appears in cost, availability, staff time or customer experience.

Dimension	Guiding question	Application to this project
Who	Who experiences the issue and who owns the decision?	Store/warehouse staff, procurement and managers; confirm actual responsibilities.
What	What specific failure or inefficiency occurs?	Stockout, excess stock, expiry exposure, stock mismatch, manual reorder or fragmented information.
When	When does it occur?	Receiving, replenishment, peak demand, physical count or expiry periods.
Where	Where in the process/system does it occur?	At a hand-off, stock record, shelf, POS update or manager review.
Why	Why does the process produce the issue?	Potential causes include delayed updates, missing information, inconsistent identifiers or unclear rules; validate with evidence.
How	How does it affect outcomes?	Potential effects include cost, availability, staff time, waste and customer experience; quantify only with data.

9.1 From symptom to root cause

A visible mismatch is a symptom, not necessarily the root cause. For example, a system quantity of zero and a physical count of ten units establish a difference in the test record, but they do not explain whether the cause was receiving, an unrecorded transfer, sales synchronization, counting or a prior adjustment. The discrepancy workflow should record the facts and support investigation rather than automatically imply blame or a single cause.

9.2 Problem framing discipline

Use evidence to separate observed facts from hypotheses. A statement such as 'the system and physical stock differed in the displayed test record' is supported by the screenshot. A statement such as 'the store loses a fixed percentage of stock due to poor records' requires business data and should not be asserted without it.

9.3 Final problem statement (Step 3)

How will Big Market improve their ordering of stock within their 4 key product areas (Dairy, Groceries, Kitchen Items & Cosmetics)? They currently record their stock within RENO, therefore ordering is based on current stock held, management decisions and historical sales data is available but not used.

How will Big Market improve their accuracy of stock within their 4 product areas? There can be differences between stock actually held, received and in RENO.

Main: Ordering based on demand. Secondary: Accuracy of Stock. Items can be picked and stored in different areas. Differences can occur between received stock and actual stock. Damaged items and items being returned can cause issues with stock. The staff mainly work off the data from RENO and there is no set process for checking stock. This can be seen in section 8.4. It would be best to confirm with SMEs that the wording is accurate.

9.4 Root cause analysis — 5 Why + 1H (Step 5)

The root issue is not simply low stock; it is the gap between transaction recording and decision intelligence.

Level	Finding
Problem	Replenishment and inventory control can be reactive rather than systematically data-driven.
Why 1	Decisions depend heavily on current stock information and manager judgement.
Why 2	Historical sales are available but not systematically converted into demand forecasts.
Why 3	No identified decision-support layer connects sales history, stock and lead time into one recommendation flow.
Why 4	Physical movements, receiving differences, delayed supply and returns create uncertainty.
Why 5	The current process is centred on recording transactions rather than integrated prediction plus verification.
1H — How?	Add an Inventory Intelligence layer alongside RENO to turn records into forecast, recommendation and verification signals.

9.5 Ishikawa / fishbone — cause families

The six cause families that can be identified in this scenario which lead to uncertainty in the inventory decisions are People (subjective manager decisions, employee handling), Process (receipts, returns, movement on the shelf/godown, little actual verification) Technology (RENO as the base to transactions but no prediction or verification), Data (past sales not used to forecast, discrepancy between system and actual stock, varying lead times), Supply (late delivery, broken and returned items) and Product (varying demand, movement and shelf life dependant on item category). A lack of low stock alerts, low rate of actual verification and data entry errors were highlighted in the SME discussion. These will be hypothesised as the cause, and should be validated using data. They are not the actual cause..

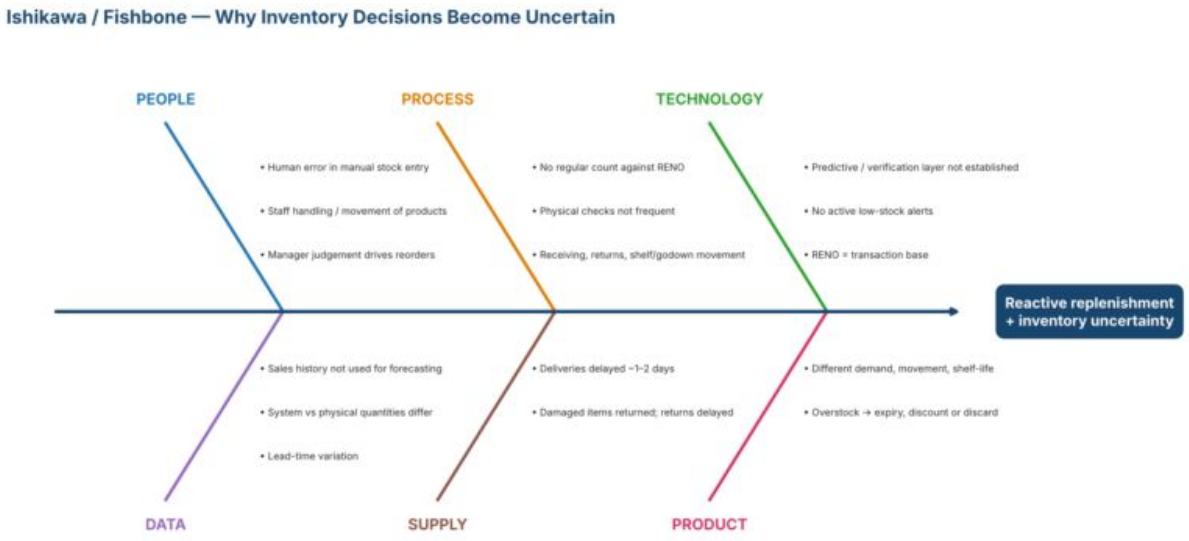


Figure 3. Fishbone (cause-and-effect) analysis of hypothesised causes of reactive replenishment and inventory uncertainty; causes are to be validated, not confirmed.

9.6 Pareto analysis — evidence-ready design

There is no validated set of data available and therefore the Pareto percentages are not claiming any real numbers. The chart shown in section 23.3 is for example purposes only. To create a valid Pareto chart you will

need to: (1) Count how many times each cause occurs within a set time frame (stock outs, overstocks/understocks, expiry losses, errors, late deliveries and damages/returns). (2) Rank the causes based on their frequency or impact and calculate the % contribution. (3) Create a bar chart with a cumulative chart (optionally grouped by product family). (4) Focus on the top few causes which have the biggest impact.

9.7 Gap analysis — AS-IS → TO-BE

Dimension	AS-IS	TO-BE
Data	Records exist across operational activities	Unified analytical dataset across the four product groups
Forecasting	Historical sales available but not systematically forecast	SKU-level demand forecast
Replenishment	Manager-led and reactive interpretation	Reorder point, safety stock and suggested order quantity
Visibility	Records require manual interpretation	Dashboard, alerts and reports
Accuracy	Physical and system stock can differ	Verification workflow; barcode/RFID as a future capability
Decision	Manual decision with limited predictive support	Recommendation with manager approval

9.8 Problem tree — causes and business effects

The problem tree arranges the evidence gathered so far from visible business effects down to root causes. It is built only from findings already reported in Chapters 6 and 8 and does not add new data.

Level	Content
Business effects	Lost sales from empty shelves; capital tied up in slow or excess stock; write-offs from expired products; staff time spent reconciling stock; reduced confidence in system data
Core problem	Replenishment and stock decisions are reactive and are not based on verified, timely information
Direct causes	No active low-stock alerts in RENO; historical sales not used when ordering; no formal forecasting method; physical counts not frequent; physical stock not always matching RENO (theft, expiry, transit damage, data-entry error); limited visibility of expiry-risk products
Root causes	Fragmented information across processes; no verified-stock record beside system stock; no exception-management workflow with manager approval

10. Problem Statement and Rationale

10.1 Problem statement from the presentation

A supermarket may face difficulty obtaining timely, accurate and actionable inventory information across sales, stock, purchasing and replenishment processes, which can make stock decisions less efficient and contribute to avoidable availability, excess-stock or expiry risks.

10.2 Project-specific interpretation

Big Market Inventory Intelligence responds by organizing inventory-related information and exception workflows in a dashboard-oriented application. Its discrepancy workflow is a concrete example of turning a physical count into a recorded, reviewable event. Other modules should be assessed against their actual rules and data sources.

10.3 Rationale for the digital approach

- Visibility: users need to see stock conditions and exceptions without reconstructing them from multiple records.
- Consistency: repeatable validation and status rules can reduce ambiguity in the discrepancy process.
- Accountability: audit records can preserve who submitted a count and what decision was recorded.
- Decision support: risk indicators can help prioritize human attention, provided their formulas are transparent.
- Measurability: a structured workflow can make it easier to capture timestamps and calculate process KPIs.

10.4 Business value hypothesis

Potential value includes improved product availability, more efficient working-capital use, reduced expiry/wastage exposure, and faster decisions. These are hypotheses to test—not benefits already demonstrated by the screenshots or code.

11. Project Objectives, Deliverables and Success Criteria

11.1 Objectives

1. Improve visibility of inventory conditions and risk indicators.
2. Support physical-count submission and calculate differences between physical and recorded quantities.
3. Maintain an audit record for inventory verification and discrepancy information.
4. Provide a structured manager-review workflow for eligible pending discrepancies.
5. Align frontend labels, server-side rules and database status constraints.
6. Create a foundation for future operational measurement using defined KPIs.

11.2 Functional success criteria

- Valid counts will cause appropriate changes to be made to the database. It will also create a record for audit.
- Invalid counts and missing stock records will be denied with clear error messages.
- Users without permission can't call secure functions within the manager directly.
- Self approval will be denied by secure logic on the server.
- Approved and denied will reflect the database constraints and labels on the UI.
- Stock that needs adjusting will be identified.
- The production pages, login and database functions will operate on the live URL.

11.3 Operational success criteria

Operational success should be assessed only after the application is piloted with a defined process and reliable data. Candidate measures include discrepancy resolution time, completeness of audit records, count mismatch frequency, stockout rate, expiry write-off value and forecast error where forecasts exist.

11.4 Scope of the prototype: included and excluded

The first release is deliberately narrow. The table below separates what the prototype includes from what is left out or deferred.

Included in the prototype	Excluded or deferred
Executive dashboard with inventory KPIs, demand trend, category value and critical alerts	Replacing RENO
SKU-level inventory view: system stock, verified stock, days of cover, risk status and a Verify action	Fully automatic purchasing
Demand forecast by SKU (transparent baseline on demo data)	CRM and customer loyalty
Replenishment recommendation: reorder point, recommended quantity and reason	Delivery-speed optimisation
Manager approve / modify / reject decisions with comments	Barcode/RFID hardware (Phase 2)
Physical-count submission, discrepancy recording and audit trail	Production-grade machine learning
Reports and analytics, including manager decision history	Unverified live integration with POS, ERP or supplier systems; guaranteed-savings claims

Justification. This scope follows the four core issues (Section 16.6) and the manager's evidence (Section 8.4). It addresses the major problems while keeping the manager in control of ordering, and it allows staff usability, data quality and recommendation acceptance to be evaluated before any further investment.

12. Operations Management Concepts and Frameworks

12.1 Inventory accuracy

The basic calculation is the difference between physical stock and current stock. If the answer is a positive number then more units have been found than what was in the system. If it is a negative number, then less units have been found. This can help identify exceptions but does not show why.

As an example, if the current stock is 0 units and the physical stock is 10 units. Then the difference would be +10 units. This is just an example using a development/test screen. It is not an actual figure that would be used to measure the accuracy of stock in the store.

12.2 Reorder point and safety stock

This is a frequent equation used within planning. It takes the form: Reorder Point = Demand (Expected) during lead time + Safety Stock. The safety stock protects against uncertainty in demand or lead time. This is a general equation used within Operations Management. If the code, data and testing proves that this is what was done within this project then this should be stated.

12.3 FEFO and expiry control

FEFO (First Expired, First Out) prioritizes stock with the earliest expiry date. A system needs reliable expiry/batch information and a corresponding shelf or warehouse process for FEFO to be effective.

12.4 Exception management

An exception workflow should record the event, make the difference visible, identify the submitter, preserve the review note and decision, and restrict changes to authorized users. Auditability supports investigation and accountability.

12.5 KPI formulas

Measure	Illustrative formula / definition	Required data
Unit discrepancy	Physical count − recorded stock	Count and matching inventory quantity.
Absolute discrepancy	|Physical count − recorded stock|	Count and matching inventory quantity.
Discrepancy rate	Mismatch count events ÷ total eligible count events × 100%	Complete count event log.
Stockout rate	Stockout events or product-periods ÷ defined eligible total	Availability/stockout observations.
Inventory turnover	Cost of goods sold ÷ average inventory value	Reliable COGS and inventory valuation.
Forecast error	A named error measure comparing forecast and actual demand	Time-stamped forecasts and actual demand.

All KPI definitions must specify period, population, units, exclusions and data owner before being used for evaluation.

12.6 Technology adoption: Technology Acceptance Model

2

The Technology Acceptance Model (Davis, 1989) states that when users believe a technology to be useful and easy to use they will accept it. For Inventory Intelligence this means store staff and managers. Recommendations give high perceived useful as they justify why you would reorder. Risk indicators show where the most focus

should be placed. The recommendations are easy to use as the user can easily input their counts and have them reviewed. As the recommendation has to be approved by the manager they will only approve them if they trust them. This means the acceptance rate of recommendations could be one of the KPIs (See section 16.3).

13. DIKW — From Inventory Data to Better Decisions

The presentation uses the Data–Information–Knowledge–Wisdom (DIKW) model to explain how raw inventory records can be converted into useful operational decisions. The model emphasizes that collecting data is only the first step: the information must be organized, interpreted in context, and connected to a decision.

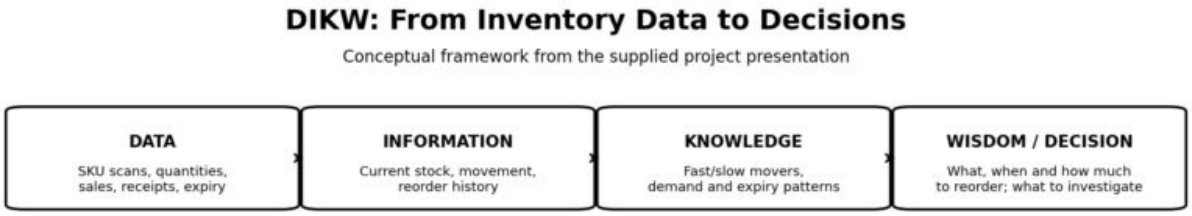


Figure 4. DIKW model adapted from the project presentation.

13.1 Data

Data are individual records such as SKU scans, quantities, sales, receipts, expiry dates and stock counts. At this level, a number has limited meaning unless its product, unit, timestamp and source are known.

13.2 Information

Information is organized data: current stock, daily movement, reorder history and supplier status. For information to be useful, the system must define when it was refreshed and how missing or conflicting records are handled.

13.3 Knowledge

Knowledge is drawn from patterns such as fast/slow moving items, changing demand, perishable items and reliable suppliers. Knowledge must be derived from historical context and valid assumptions NOT an individual record..

13.4 Wisdom / decision

Decision-making uses information and knowledge to choose what to reorder, when to reorder, how much to order, and what to prioritize for investigation or rotation. Managers remain accountable for the decision, especially when data is incomplete or the operational cost of error is high.

13.5 DIKW applied to the discrepancy workflow

Physical stock take provides a source of raw data. By comparing this against the recorded stock figure you can gain an understanding of discrepancies. Looking at the history of the stock take and considering why the count was performed, plus looking at the recent stock movement may give some insight into the knowledge of the cause. An authorised manager will decide if there should be an adjustment made based on the physical stock take. This process ensures there is evidence to show why an adjustment has been made, or why it has been rejected.

14. Information System — Proposed Future-State Logic

The presentation proposes a future-state information system with five conceptual layers: inputs, integration, analytics, decision layer and action. This is a target-state model; not every source system listed in the presentation is confirmed as connected to the current application.



Figure 5. Proposed future-state information flow based on the presentation.

14.1 Inputs

Potential inputs include POS sales, receiving records, stock counts, purchases, supplier data and product/expiry information. Each input should have a defined owner, refresh frequency, data format and validation rule.

14.2 Integration

By having a central inventory database or integrating with business systems you can avoid duplicate entries and ensure you have a single source of truth for your SKUs. This will involve some decisions on how to handle unique identifiers, units of measure, when transactions happen, error handling and who owns the master record. Just because Supabase/PostgreSQL is being used within this project it doesn't necessarily mean the POS/supplier systems are integrated.

14.3 Analytics

The analytics layer may apply stock rules, trends, alerts and exception reporting. Each indicator should have a documented definition and source fields. Where demand history, lead times or expiry data are missing, the system should state that the signal is incomplete rather than present false precision.

14.4 Decision layer

A manager dashboard can bring together current stock, risk indicators and review tasks. The design should prioritize actions, show the reason for an alert, indicate data freshness, and make clear which actions require manager authorization.

14.5 Action

Actions to take. These may be to buy, restock, research, rotate and/or adjust. These actions should be logged where appropriate and any changes to the inventory can be traced back to the authorised user and reason.

The solution will follow the same logic as presented in the future state of the presentation. Data will be captured relating to inventory. This data will then be integrated into a standardised data layer. Rules and analysis will be applied to provide decision support. Finally actions will be logged to ensure accountability at an operational level. The diagram represents a conceptual view of the future state and how it will be implemented in practice within the physical counting/audit process. This does not mean that POS/supplier/purchasing integrations or forecasting will be live

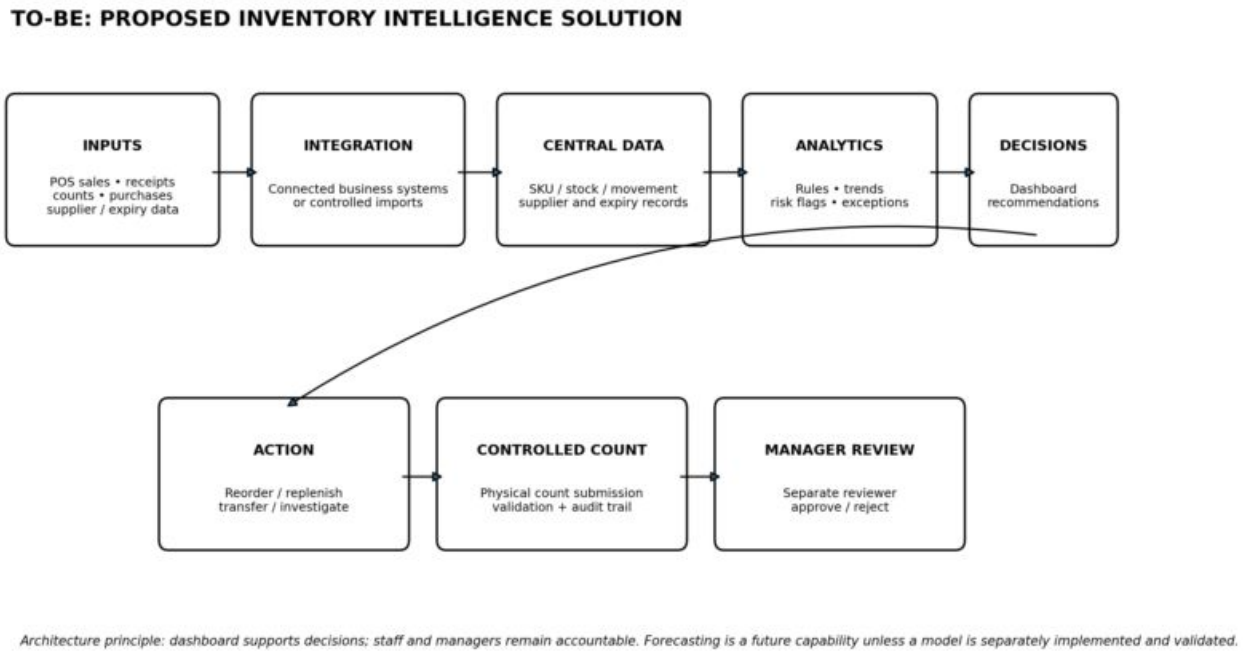


Figure 6. Proposed TO-BE inventory intelligence solution and control loop.

14.6 AS-IS → TO-BE information flow and IS blueprint (Step 6)

AS-IS: supplier delivery → receive and enter in RENO → store on shelf/godown → customer sale → RENO stock position → manager restock decision. **TO-BE:** the blueprint below connects transaction data to prediction, recommendation, verification and managerial action.

Stage	Function	Output
RECORD	Capture transaction, sales, stock, purchase and receiving data (RENO/POS)	Operational records
UNDERSTAND	Combine current stock, demand pattern, lead time and product attributes	Context for each SKU
PREDICT	Estimate future demand by SKU	Demand forecast and range
RECOMMEND	Calculate reorder point, safety stock and recommended quantity	Order recommendation with reason
VERIFY	Compare system stock with physical verification	Discrepancy queue
DECIDE	Manager reviews and approves, modifies or rejects	Recorded decision and audit trail

Design principle: the system recommends and the manager decides. AI and analytics support recommendations; they do not independently place orders.

15. Digital Business Components

Component	Role in proposed solution	Implementation caution
Systems: POS / ERP / inventory management	Source operational transactions and stock records.	Only describe as integrated if the connection is verified.
Data	Consistent SKU, stock, sales and supplier records.	Define data ownership, freshness and units.
Dashboard	Inventory visibility and KPI presentation.	Show metric definitions and avoid ambiguous status labels.
Alerts	Low-stock, excess-stock and expiry-risk signals.	Validate thresholds, data completeness and false-positive behaviour.
Analytics	Fast/slow movers, trends and inventory performance.	Require sufficient historical data and reproducible calculations.
AI opportunity	Demand forecasting and reorder recommendations.	Treat as future opportunity unless a model, data, evaluation and outputs are verified.

15.1 Dashboard as a decision interface

A useful dashboard will answer the following questions very quickly. What's wrong? Why is it wrong? What should you do? If there's no visible reasoning behind the risk indicator, it can cause distrust. Include the relevant stock quantity (or threshold or difference), the time of last update and the recommendation whenever possible

15.2 Human-in-the-loop decisions

There are financial and customer implications. For instance, with the manager review process on the inventory module of this project, the difference will be recorded within the application but an authorised reviewer will decide what to do. This is especially important if there is a possibility that the physical count may be incorrect or the system count has changed..

15.3 Barcode / RFID verification — proposed TO-BE capability

Future functionality

This is not currently available within Big Market. This is not part of the core prototype.

For example, the RENO system will have an expected stock amount of 40. When physically checking the stock it has been found that there is only 37 in stock. An inventory alert is raised.

This would trigger an investigation to be carried out. It shouldn't be assumed that the reason for the difference is theft. It could be that the items were not placed correctly, there was a shortage when receiving, damage to items, items not being recorded, scanning or reading issues or actually stolen.

The choice of technology should be determined by the value of the products, amount of products and how feasible it is. Within the stress test it was argued that RFID increases costs and complexity. Therefore it should be a phase 2 functionality, once the forecasting and replenishment have been implemented (see section 16.5).

16. Digital Transformation Strategy — Initial Direction

The presentation sets out a five-stage strategy: Diagnose, Connect, Visualize, Optimize and Scale. This sequence is useful because it begins with the real business process and data quality before expanding toward advanced analytics or broader deployment.

Stage	Purpose	Activities	Exit condition
1. Diagnose	Understand the current process and validate pain points.	Map process, interview stakeholders, inspect available records, establish baseline.	Problem and data gaps documented.
2. Connect	Make relevant inventory information consistent and available.	Review SKU identifiers, source systems, refresh frequency and integration feasibility.	Data ownership and interfaces agreed.
3. Visualize	Make conditions and exceptions understandable.	Build dashboard, alerts and exception reporting with clear definitions.	Users can interpret signals and know next action.
4. Optimize	Improve rules and workflows.	Validate thresholds, forecasting/reorder opportunities and exception process.	Rules are tested and measured against baseline.
5. Scale	Sustain adoption and continuous improvement.	Train users, monitor KPIs, manage releases and review feedback.	Governance, monitoring and improvement cycle established.

16.1 Feasibility considerations

Costs

Integration (including development, hosting, support, training etc.)

Current Systems

Compatibility (existing APIs, licences, permissions)

Data Quality

Data completeness, accuracy, timeliness and uniform definition of SKU codes.

User Adoption

Ease of use, clarity of role, training and user engagement with the workflow.

Implementation Effort

Migration, testing, downtime and maintenance.

16.2 Business value considerations

The presentation identifies availability, working-capital efficiency, reduced waste and decision speed as potential sources of value. The project should translate each into a measurable indicator and test whether the change is attributable to the new workflow rather than demand variation, supplier changes or other operational factors.

16.3 Candidate KPIs from the presentation

KPI	Why it matters	Measurement caution
Stock-out rate	Tracks product availability failures.	Define stockout event, eligible product set and

		time period.
Inventory accuracy	Tracks agreement between records and physical counts.	Define unit-level or line-level accuracy and count sampling.
Inventory turnover	Indicates how frequently inventory is sold/replaced.	Requires reliable cost of goods sold and average inventory value.
Expiry / wastage	Tracks time-sensitive stock losses.	Use consistent write-off categories and valuation.
Reorder cycle time	Tracks elapsed time from need identification to order/replenishment.	Define start/end timestamps and include supplier lead time only if intended.
Forecast accuracy (MAE / MAPE)	Tracks how closely forecast demand matches actual demand.	Needs time-stamped forecasts and actual sales; demo accuracy metrics are not evidence.
Recommendation acceptance rate	Shows how often managers approve, modify or reject recommendations.	Record each decision with the final quantity and reason.
Excess / slow-moving inventory	Tracks capital tied up in stock that is not moving.	Define the basis: target stock, days of cover or movement.
Inventory discrepancy rate	Tracks count mismatches between RENO and physical stock.	Use complete count logs; define eligible events and period.
Supplier lead-time variance	Tracks delivery reliability (the SME reported delays of around 1–2 days).	Requires ordered, promised and received dates.
Manager decision time	Tracks the speed of replenishment decisions.	Define start and end timestamps.
Alert effectiveness	Tracks whether alerts lead to useful action.	Define true and false positive criteria.
Inventory availability / service level	Tracks product availability to customers.	Define eligible products and period.

16.4 Solution options generated and simulated (Step 7)

Three distinct paths were considered before the implementation scope was narrowed. The simulation was a qualitative narrative comparison; no quantified savings are claimed.

Option	Scope	Strength	Trade-off
A — Visibility layer	Dashboard, inventory status, alerts and reports	Fast to implement	Improves visibility but leaves forecasting and recommendation largely manual
B — Forecasting + replenishment	Demand forecasting, reorder point, safety stock and recommended order	Directly improves planning	Depends on clean historical sales and lead-time inputs
C — Integrated intelligence + verification	Forecasting, replenishment, risk alerts, physical verification and manager decision trail	Addresses both planning and inventory accuracy	Broadest scope; data quality is the main dependency (Section 16.5)

Chosen direction. Option C was selected as the prototype direction because it connects the two core problem dimensions — data-driven replenishment and inventory accuracy — while keeping the manager in control.

16.5 Stress testing the assumptions — market, cost and risk (Step 7)

Vector	Assumption	Challenge	Response
Market dynamics	Inventory availability and responsiveness matter.	Different product groups behave differently.	SKU-level logic, category filtering and configurable thresholds.

Vector	Assumption	Challenge	Response
Cost structure	Better forecasting reduces avoidable inventory costs.	Poor data quality can create bad recommendations.	Demonstrate first, validate data quality, keep manager approval.
Risk parameters	System stock represents reality.	Physical/system mismatch, delayed supply, expiry and returns.	Verification workflow, alerts and a decision trail.

Stress-test conclusion. The prototype is not an autonomous purchasing system. It is a controlled decision-support layer that makes uncertainty visible, quantifies demand and gives the manager an auditable recommendation.

The group also challenged its own design through a series of GenAI counter-questions (screenshots in Chapter 28). The table summarises the questions, the team's answers and the resulting design effect.

Stress-test question	Team's response (summarised)	Effect on the design
Q1 Market — why not simply keep using RENO plus experience?	The layer helps decide how much to reorder so that products are not wasted; the manager reported excess products being thrown away or sold cheaply near expiry.	Focus on faster, structured reorder decisions that reduce waste.
Q2 — what new information does the layer provide beyond RENO?	Purchase history and a prediction of when to reorder, so orders stay within a limit that reduces waste.	Recommendations must show forecast, reason and reorder logic.
Q3 — system says order 100 but the manager says 40 are already in stock and sales are low	Similar past cases let the model learn from data and predict, so such disagreements should become less frequent over time.	Manager approve / modify / reject with the final decision recorded.
Q4 — a new product has no similar history	Order according to similar fast- or slow-moving products and adjust.	Cold-start and low-history cases need manager review (limitation).
Q5 Cost — what is the minimum viable scope on a limited budget?	RFID should not be in the initial implementation; focus on forecasting, excess/expiry risk and reorder quantities using RENO and sales data; RFID as Phase 2.	RFID/barcode deferred to a future phase.
Q8 Data quality — what if RENO stock is wrong?	A mismatch is not treated as normal; the item is flagged for verification before relying on it.	Data-quality exception workflow (Section 17.10).

16.6 Strategic scoping — top four core issues (Step 8)

No.	Core issue	First-release focus
01	Demand forecasting	Use historical sales to estimate near-term SKU demand.
02	Replenishment recommendation	Convert demand, lead time and safety stock into actionable reorder guidance.
03	Inventory accuracy	Compare RENO/system stock with verified physical stock and surface discrepancies.
04	Expiry / excess risk	Identify near-expiry, excess and slow-moving items for manager action.

16.7 Traceability: problem, feature and KPI

The table below links each problem identified in Chapter 6 to the prototype feature intended to address it and to the KPI (Section 16.3) that would show whether it is improving. The KPIs are to be measured only after definitions and a baseline have been agreed.

Problem	Prototype feature	KPI
Stock-outs	Stockout-risk module; days of cover; reorder alerts	Stock-out rate; inventory availability / service level
Overstock and slow-moving stock	Excess / slow-moving risk module; replenishment recommendation	Excess / slow-moving inventory; inventory turnover
Expiry exposure	Expiry-risk module supporting FEFO attention	Expiry / wastage
Inaccurate stock records	Physical count, Verify action, discrepancy workflow and audit trail	Inventory accuracy; inventory discrepancy rate
Inefficient reordering	Demand forecast; reorder point; recommended quantity; manager approve / modify / reject	Reorder cycle time; forecast accuracy (MAE / MAPE); recommendation acceptance rate; manager decision time
Fragmented information	Dashboard and reports built on one analytical view of stock	Manager decision time; alert effectiveness

16.8 Strategic intent — digitise visibility, not the whole business

The focus of this project is to improve visibility and decision making around stock. It is not intended to replace or automate the current process. RENO will still be used as the source of truth for the transactional data and the new layer will use this alongside additional checks, batch expiry and risk factors to recommend an action. The solution has been kept as simple as possible to ensure that the existing process is unchanged. This project has focused on solving the 4 key issues identified in section 16.6.

16.9 AI & automation only where applicable

Areas of automation were implemented where there were clear rules to follow. This was evident with threshold levels, cover days and FIFO ordering/status workflow. Forecasting has been created as a prototype and is not an audited area. All recommendations for re-stocking require the manager to make a decision (see section 17.9), and they will need to provide a reason. Generative AI has been used to help with writing and challenging the content (see chapter 28). The store data was not sourced from generative AI. Where there is insufficient evidence, this should be highlighted.

17. Application Design and Technical Architecture

The code excerpts and deployment context shared in the conversation describe a React frontend, a DataContext store, Supabase/PostgreSQL functions and a Vercel-hosted web application. This section reflects those shared details at a high level; it does not assume unverified POS or supplier integrations.

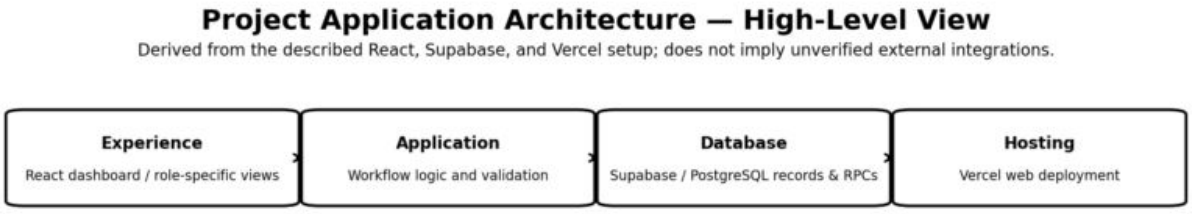


Figure 7. High-level architecture based on the described implementation.

17.1 Frontend application

The shared code identifies an Inventory Discrepancy page that opens a manager-resolution modal. The modal shows the target SKU, system stock, physical count, variance, and an audit-trail note, and presents separate actions to reject/dismiss or approve/adjust. The handler displays processing state and reports errors.

17.2 DataContext and application state

The common data context method will search for a product based on the SKU, get the most recent pending audit row, validate the proposed decision and then update React state upon successful RPC call from the server. This should only be used to reflect that the DB operation was successful. If the DB operation fails we should not show the stock change as being successful in the UI.

17.3 Database function for physical count

This SQL function is marked with the SECURITY DEFINER tag. It gets the authenticated user using auth.uid(), and will return an error for any unauthenticated users, as well as any negative/null physical count values. It will lock the relevant inventory row using FOR UPDATE, calculate the difference and update the verification fields, whilst inserting a new entry into the inventory_discrepancy_audit table.

The function shown will set the audit status to RESOLVED if there is no difference (difference = 0) and OPEN if there is a difference. However, the screenshots also show that there is a constraint on the status field. This includes a PENDING_REVIEW status and final statuses for when the manager makes their decision. If there isn't a trigger or intermediary function which will change the status of OPEN to PENDING_REVIEW then discrepancies may not appear in the manager queue. This needs to be tested using the actual deployed schema.

17.4 Manager review function

The frontend sends decision inputs APPROVE_ADJUST and REJECT_DISMISS. The intended audit outcomes described in the supplied helper are APPROVED_ADJUSTED and REJECTED_DISMISSED. Confirm that the database RPC accepts exactly these decision inputs and writes exactly the permitted status values.

The shared validation helper checks manager role, allowed decision, presence of a pending record, self-approval and stale stock for approvals. Because browser-side JavaScript can be bypassed, critical authorization and stale-stock checks must also be enforced inside the trusted server/database operation.

17.5 Vercel Deployment

The screenshots demonstrate a deployment being blocked due to not being able to match the commit author's email address to an account on GitHub. This has then been resolved by updating the git author email address and now shows a status of Ready. This shows that the build/deployment has successfully completed. However, this does not replace a full smoke test in production for signing in, role specific pages, reading and writing to the DB and secure actions.

17.6 Technical Deployment Checklist

Check that the live deployment is pointing to the correct GitHub repo/branch/commit

Check that environment variables are set up correctly for the Vercel environment

Use different test accounts (Staff/Manager) to check role specific pages

Look at function signatures, grants and row level security policies in the DB

Ensure that secret keys/secrets for service roles are not in the client bundle or in the public repo

Check failure scenarios and ensure that the DB is in the correct state after every attempt.

17.7 Layer-wise IS architecture (Step 6)

The proposed architecture adds intelligence without replacing the existing RENO transaction base.

Layer	Contents
1 — Experience	Manager dashboard, alerts, reports and the approve/modify/reject workflow
2 — Application / business logic	Forecasting, reorder point, safety stock, expiry/slow-moving rules and the discrepancy workflow
3 — Data & integration	RENO/POS, sales history, purchasing/receiving, product master and physical verification; API/ETL where available
4 — Cloud & infrastructure	Central database, application hosting, secure access, backups and monitoring

The Working Prototype Review (Group 7) of 6th October demonstrates how a working example of the decision support aspect can be implemented with clearly labelled data. The process is one way meaning it flows from original operational data to management action. The data flow is as follows: RENO Stock, Sales History, Purchases, Expiry, Verification (Data Input) → Forecast, Movement Classification, Risk Engine (Analysis) → Re-order Level, Quantity Recommendation & Reason (Decision Support) → Approve, Edit, Reject, Comment (Management Process) → Updated Stock, Waiting Orders, Reports, Audit Trail (Output)

Below you can see screenshots of the live application from big-mraket.vercel.app. This replaces the screenshots taken from local builds. Both roles are shown (Store Manager & Staff Associate). All data is simulated data using the official simulation clock of the application. This shows evidence of the process within the application and does not represent any data within the store.

17.8 Working prototype — implemented scope

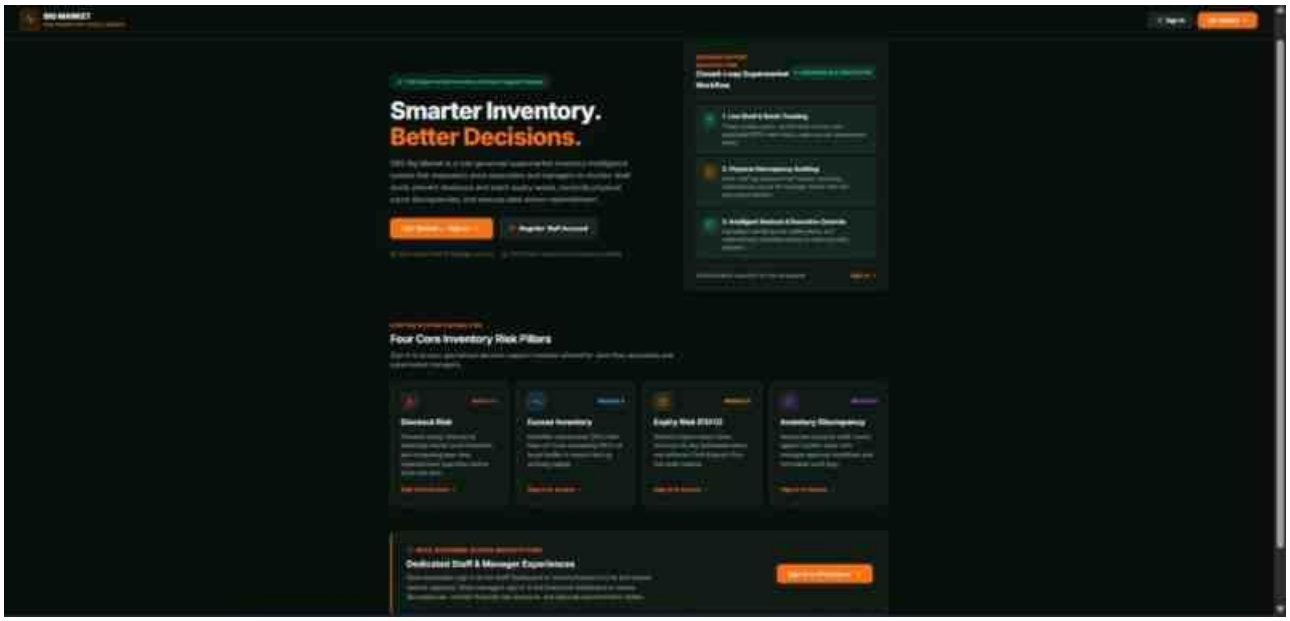


Figure 8. Public landing page of the deployed application: the four core inventory risk pillars (stockout, excess, expiry, discrepancy) and role-based sign-in for staff and managers.

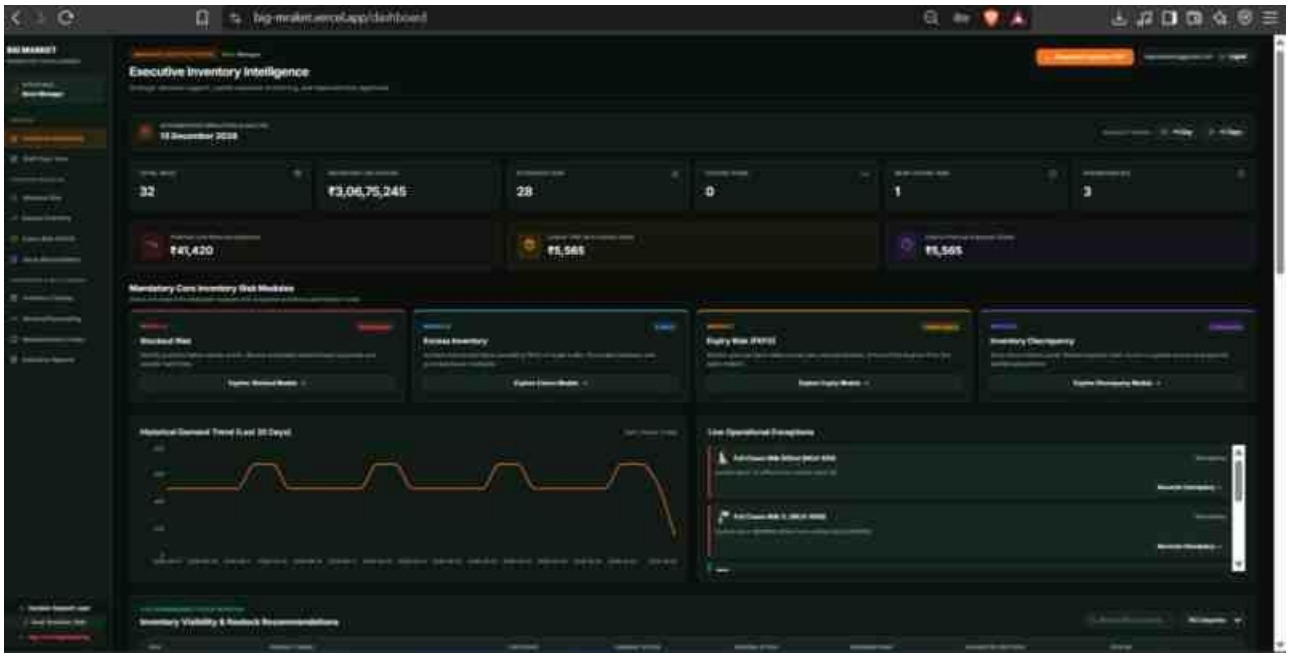


Figure 9. Executive Inventory Intelligence dashboard (Store Manager role): simulation clock, inventory valuation, risk KPIs, the four core risk-module entry points, 30-day demand trend and live operational exceptions.

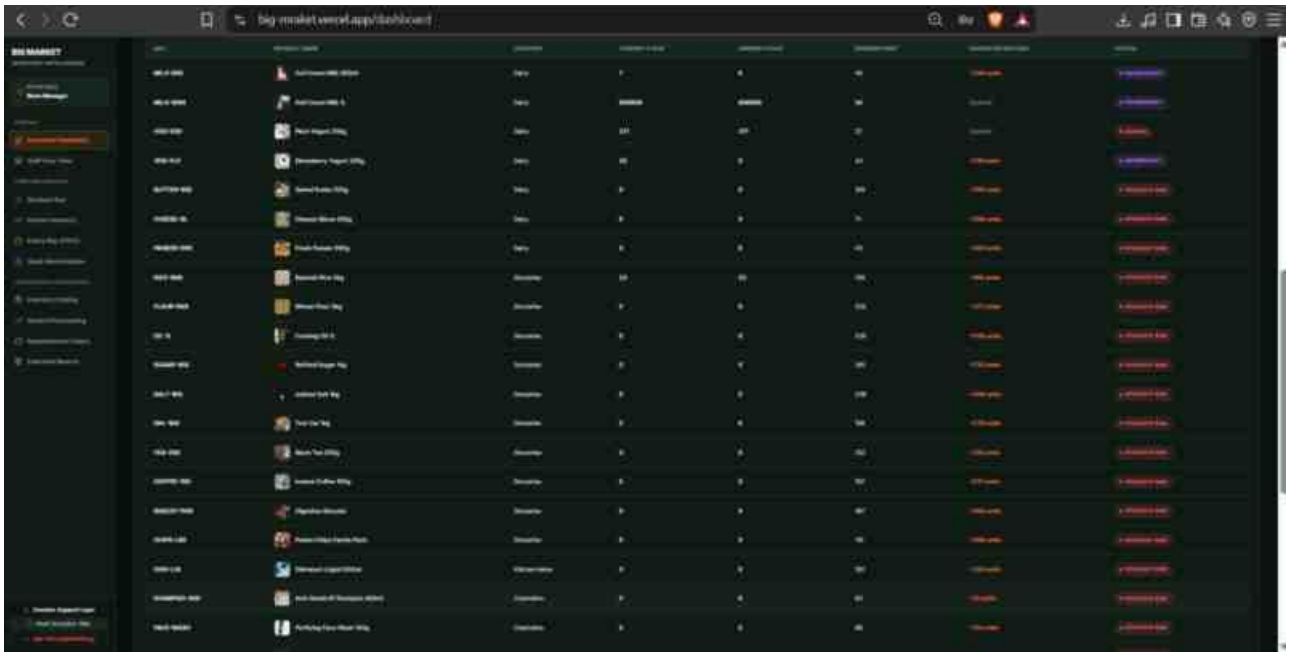


Figure 10. Executive dashboard (lower section): inventory visibility and restock-recommendation table showing system stock, verified stock, reorder point, suggested restock and status for every SKU.

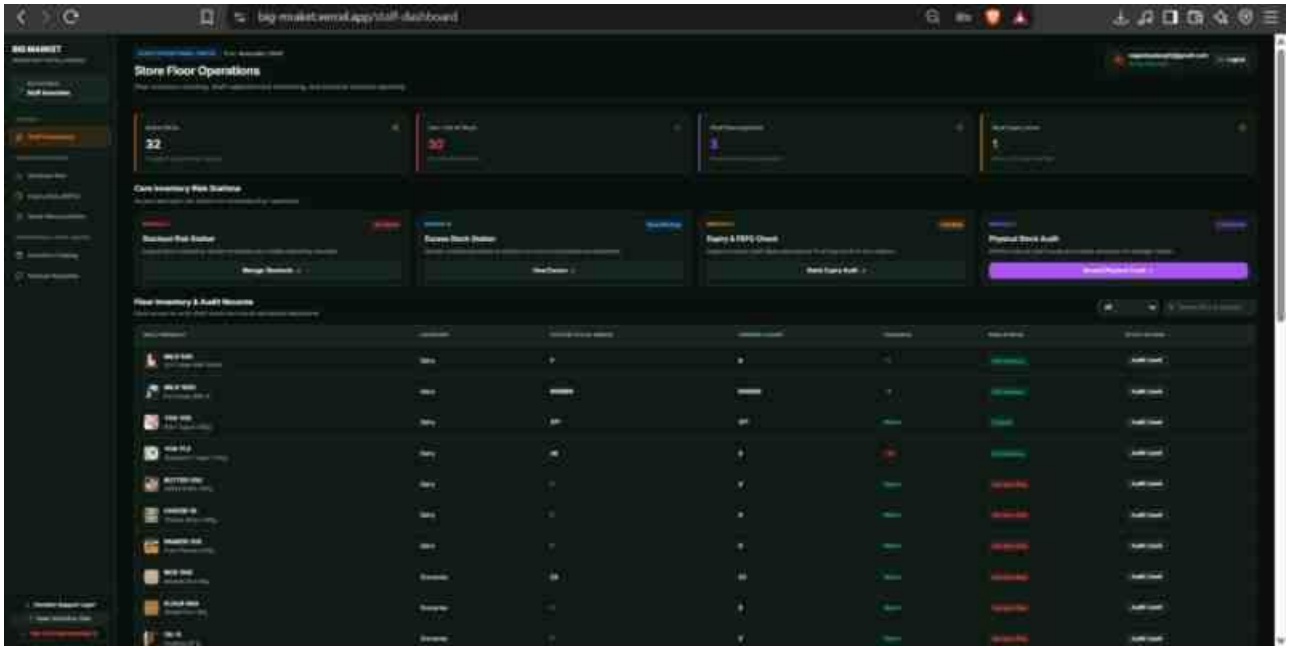


Figure 11. Staff Associate portal (Store Floor Operations): core risk stations, floor inventory and audit records with the Audit Count action.

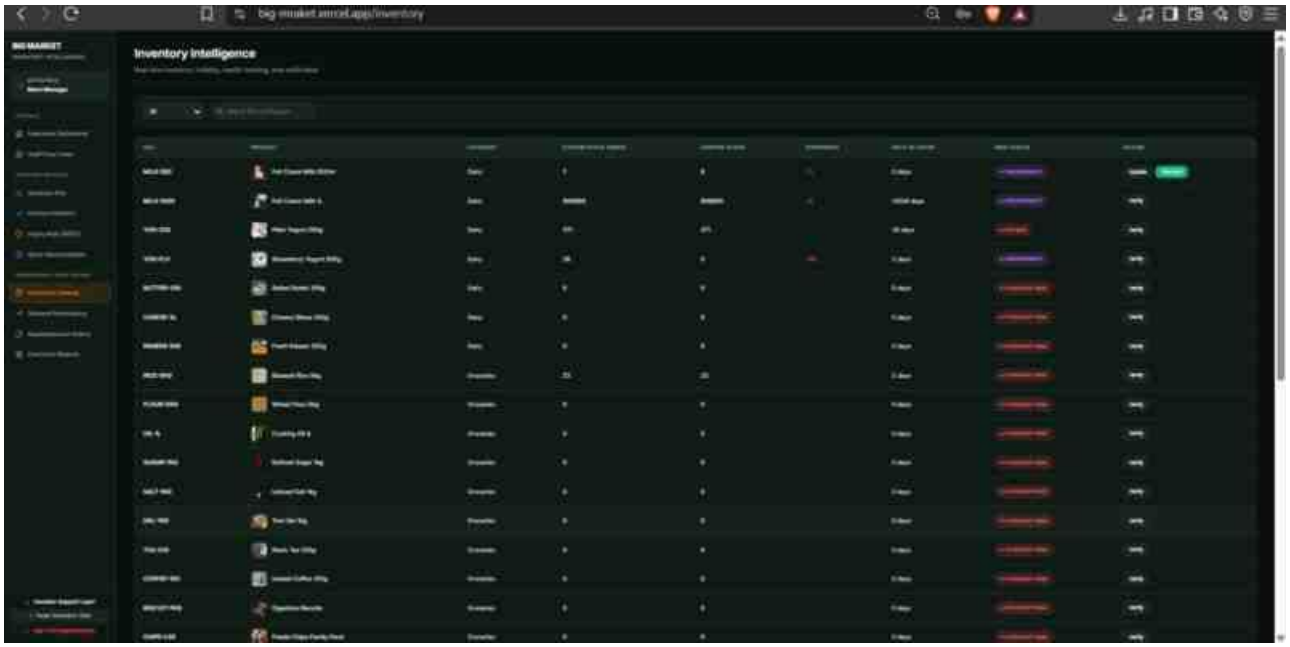


Figure 12. Inventory Intelligence, Store Manager view: system stock, verified stock, difference, days of cover and risk status, with Update, Resolve and Verify actions.

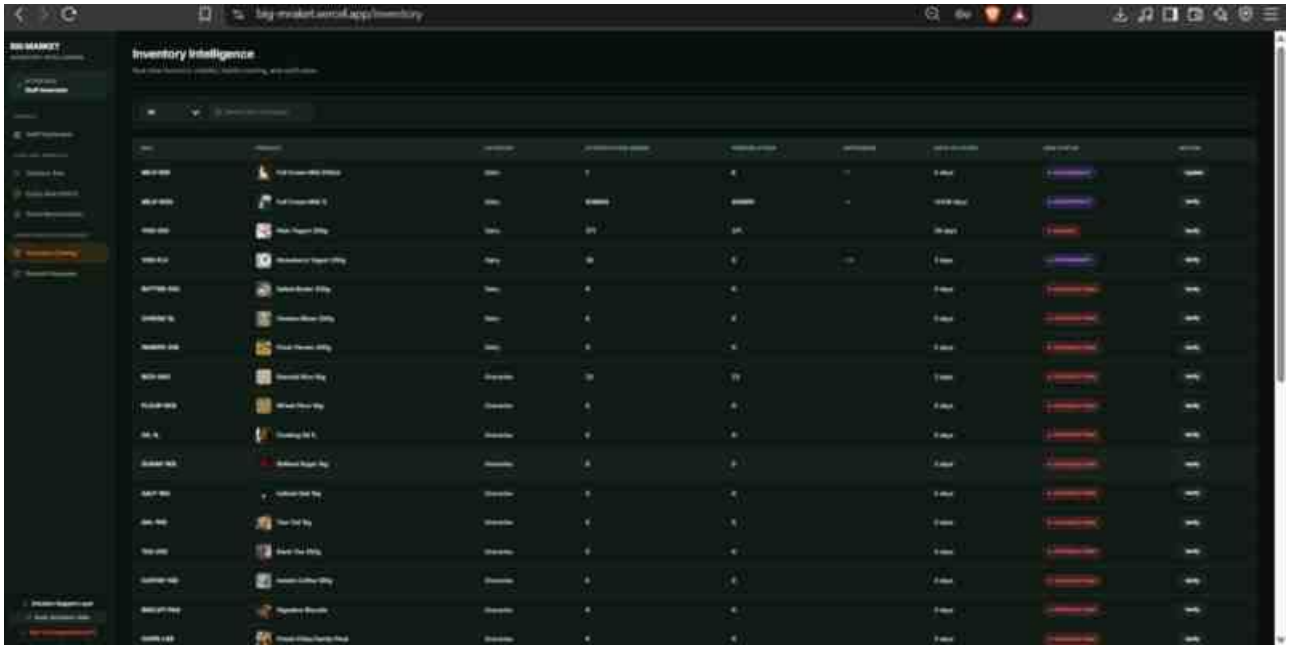


Figure 13. Inventory Intelligence, Staff Associate view: the same catalogue with the Resolve action not offered to staff.



Figure 14. Demand Forecasting view for MILK-500 (next 14 days), labelled "Prototype Forecast — Demo Data", with the forecast range and demonstration accuracy metrics.

Looking at the screenshots we can see the dashboard has 32 SKUs, an inventory value of ₹3,06,75,245, and 28 SKUs that have risk of stockouts. There are no over stocked items, but there are 1 items going out of date, 3 discrepancies and a potential revenue loss of ₹41,420. The date shown on the simulation is 13th December 2026. Looking at the inventory table and dashboard, it can be seen there are 27 of the 32 SKUs with a stock level of 0 within the system. This is because this is the starting point of the simulation. The inventory section has different options available for the staff member and manager. The staff members have options to Update and Verify whilst the manager has the additional option to Resolve discrepancies. Within the forecasting section it can be seen that it uses 30 days of past sale data with variation in demand and weekly seasonal trends. This needs to be checked by the manager. It also shows that the demonstration has an accuracy of 87.5%, MAE = 4.76 and MAPE = 12.5%. These values are based on the demonstration so aren't accurate. On these screens there are some inconsistencies in the numbers. For example the quantity of MILK-1000 is very high. These issues are discussed in section 22.2.

Live navigation and Access control using roles. We can see from the address bar that the following routes are available. The sidebar for the staff member only has links to Stockout, Expiry, Stock Reconciliation, Inventory and Restock Request. The manager has additional links to Executive Dashboard, Overstock, Demand Forecasting, Replenishment Orders and Executive Reports. This is an example of access being controlled by roles as described in chapter 20.

Screen	Route / location	Available to	Note
Landing page	big-mraket.vercel.app	Public	Sign In / Register Staff Account
Executive dashboard	/dashboard	Store Manager	Simulation clock, KPIs, restock table, Download Executive PDF
Staff dashboard	/staff-dashboard	Staff Associate	Risk stations, floor audit records
Stockout risk (Module A)	/risks/stockout	Both roles	Manager: Reorder Now; staff: Request Stock
Excess inventory (Module B)	Sidebar: Excess Inventory	Store Manager	Markdown / Pause PO actions

Screen	Route / location	Available to	Note
Expiry risk (Module C)	/risks/expiry	Both roles	Financial exposure restricted to manager
Stock reconciliation (Module D)	/risks/discrepancy	Both roles	Manager resolves; staff submits counts
Inventory catalogue	/inventory	Both roles	Resolve action for manager only
Demand forecasting	Sidebar: Demand Forecasting	Store Manager	Prototype forecast on demo data
Replenishment orders	/replenishment	Both roles	Staff sidebar label: Restock Requests
Executive reports	/reports	Store Manager	Decision history and audit trail

Module	What it shows
Executive dashboard	Inventory KPIs, historical demand trend, category inventory value and critical alerts; a simulation-date control (Simulate Next Day / +7 Days)
Inventory intelligence	SKU-level system stock, verified stock, difference, days of cover, risk status and a Verify action
Demand forecasting	Historical demand and forecast by SKU, forecast range and demo accuracy metrics
Replenishment intelligence	Current stock, reorder point, recommended order and manager review
Reports and analytics	Inventory summary, replenishment decisions, discrepancy report, expiry/health view, manager decision history and simulated business impact

17.9 Replenishment logic and the manager-in-the-loop decision loop

This prototype will give a recommendation based on the predicted demand and available stock. The re-order point is calculated by multiplying the forecast demand by the lead time of the product, and adding the safety stock. The recommended amount of stock is the desired stock level minus the stock currently on-hand. These are general planning methods that have been implemented clearly within this prototype however have not been tested using real data from Big Market.

Step	What happens
Data	RENO and historical sales supply stock and demand history
Forecast	Expected demand and forecast range are estimated
Calculate	Reorder point and safet stock are calculated
Recommend	Order quantity is suggested with an explanation
Review	The manager reviews context and exceptions
Action	The manager approves, modifies or rejects; SKU, recommendation, final quantity, decision and timestamp are recorded

A worked example of this can be seen below. The system would suggest ordering 100 units. However, the manager has decided to change this quantity to 40 due to unusually low recent sales. The risk indicators (Stockout, Excess, Near Expire and Discrepancy) will give priority to areas that the manager should be focusing on but will not override their decision.

Within the live build, on the Replenishment Intelligence screen, each SKU will have information regarding stock level, re-order point, recommended order quantity and decision status. If the manager has made a decision they will have a status of Approved, Modified or Rejected. If they have yet to make a decision it will be listed as Manager Review and there will be an option to Review. On the Reports & Audit Trail screen all decisions will be recorded. It will show what the recommended quantity was, the final quantity ordered, the reason/comment and order status.

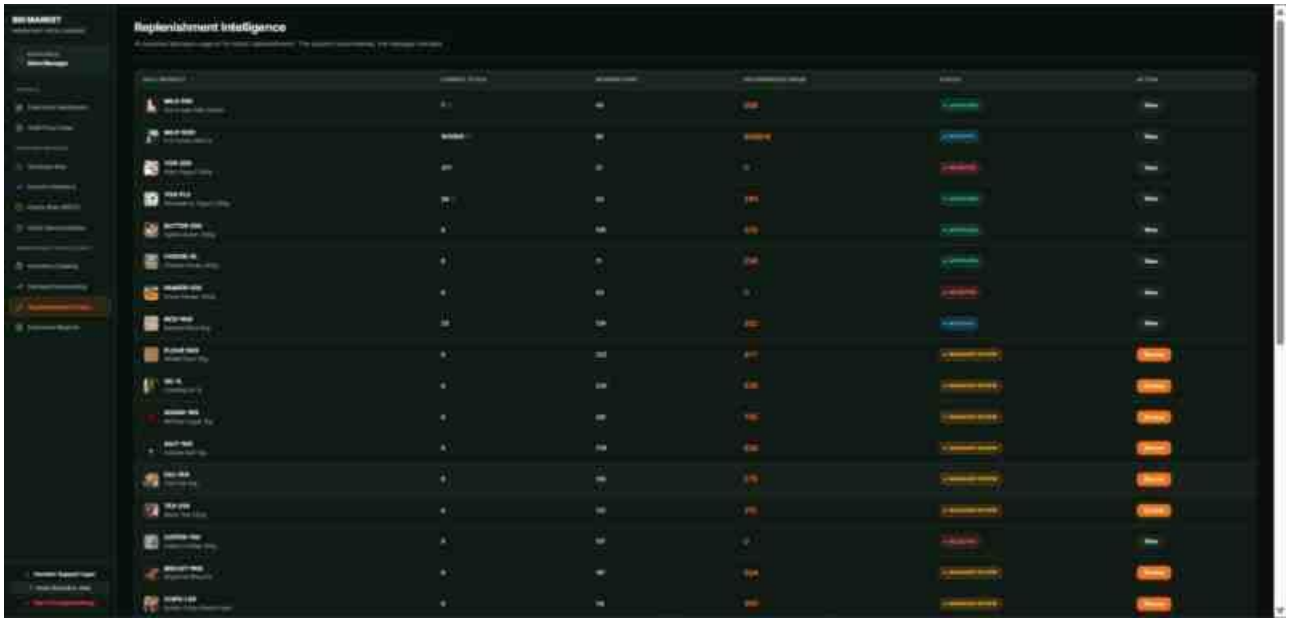


Figure 15. Replenishment Intelligence, Store Manager view: recommended orders with Approved, Modified, Rejected and Manager Review statuses.

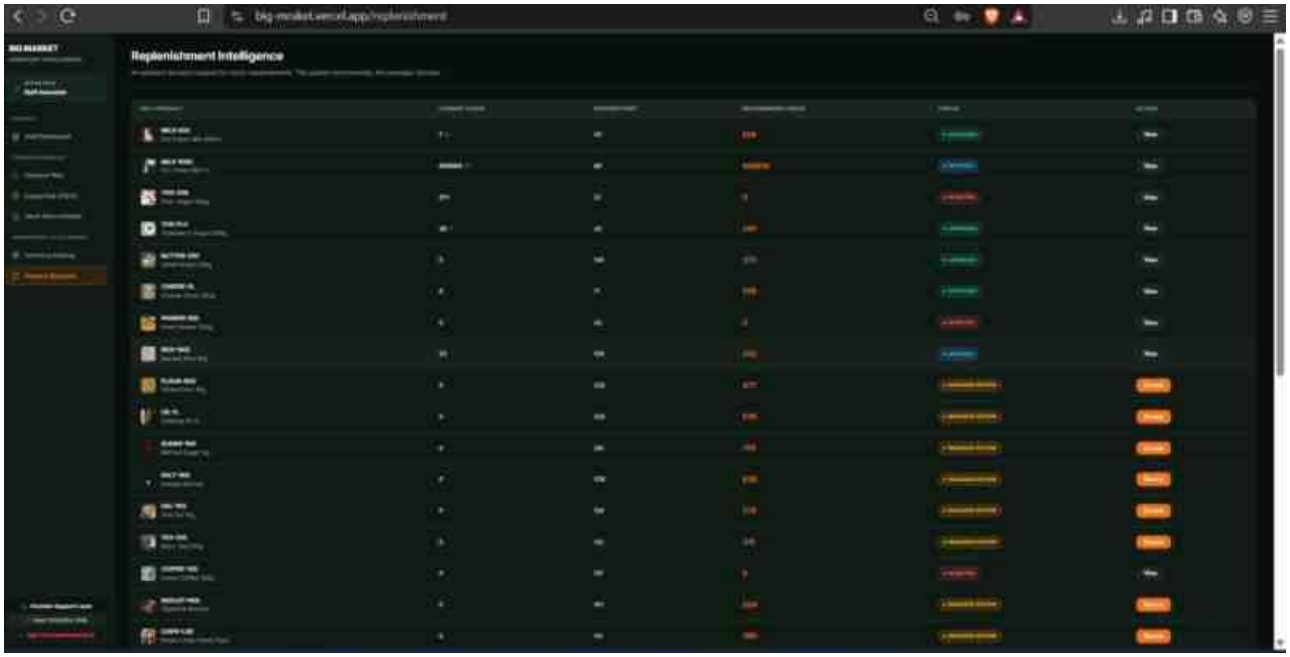


Figure 16. Replenishment Intelligence as shown to the Staff Associate role (sidebar label "Restock Requests").

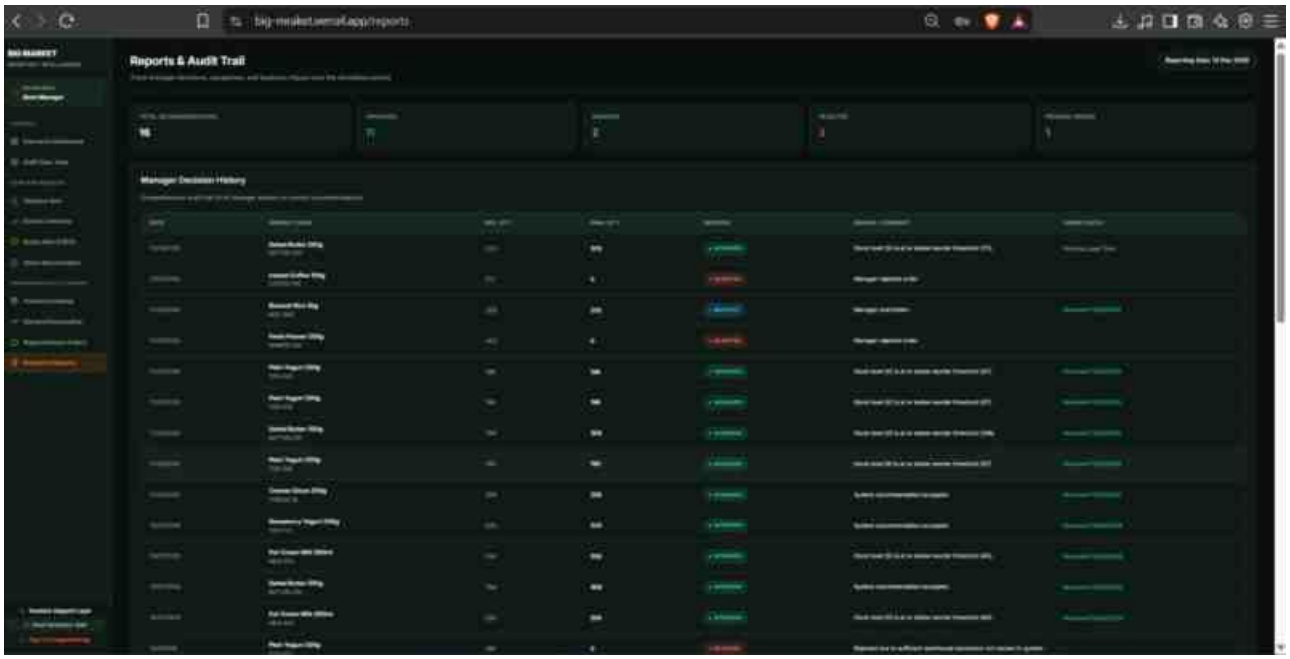


Figure 17. Reports & Audit Trail: manager decision history with recommended and final quantity, decision, reason and order status.

Reviewing Decisions: The report page shows a summary of the recommendations for the 16 SKUs at the time of reporting on 13 th December 2026. This includes 11 recommendations accepted, 2 recommendations amended and 3 recommendations rejected. There is also one recommendation still awaiting lead times. For example, Salted Butter 250g was recommended as 370, completed as 370 and accepted. This is because the stock level (0) is equal to or less than the re-order point. Basmati Rice 5kg had a recommendation of 209 but was amended by manager override to 202. Fresh Paneer 200g was recommended as 403 however it was rejected. The reason there is a difference between the recommendation and what was completed is because an audit has been performed, therefore it is clear that a decision has been made by the manager.

17.10 Data-quality and exception management

Incorrect stock data should trigger verification rather than blind replenishment. The flow is RENO recorded stock → manager physical check → discrepancy flagged for investigation → resolution and better decision data. If the manager identifies that physical stock and RENO stock do not match, the inventory can be flagged so the replenishment layer does not rely blindly on the questionable quantity. This connects directly to the count-submission and manager-review workflow in Chapter 19

17.11 Technology choices and why

Layer	Choice	Reason
Front end	React single-page application with a shared DataContext for application state	Role-specific views and fast interaction on one code base
Data and rules	Supabase / PostgreSQL with row-level security and database functions for count submission and manager review	Transactional integrity, row locking and an audit record close to the data
Hosting	Vercel deployment from the source repository	Public link for review and repeatable releases
Existing system	RENO retained as the transaction source	Avoids disruption to billing and stock posting
Forecasting	Transparent historical-demand baseline on demo data	Explainable to a store manager; no claim of validated accuracy

These reasons record the team's design logic and should be confirmed against the final build before submission.

17.12 Designing for adoption

1

Adoption depends on perceived usefulness and ease of use (Technology Acceptance Model, Section 12.6). The deployed interface reflects this through the following design choices:

- Separate Staff Associate and Store Manager portals so that each user sees only the pages and actions that fit the role.
- Colour-coded status chips (red for stockout, amber for reorder due, green for safe cover, purple for discrepancy) so that urgency can be read at a glance.
- Search and category filters on every table, and one-step actions such as Request Stock, Reorder Now, Audit Count and Verify.
- Explicit human-in-the-loop wording on the replenishment screen: the system recommends, the manager decides.
- Visible “Demo Data” and “Prototype Forecast” labels and a Reset Simulation State control, so the prototype can be demonstrated safely without overstating results.

17.13 Iterative build and refinements

The prototype evolved between early local builds and the deployed version. The early captures showed 32 SKUs at stockout risk, an inventory value of ₹60,762, no discrepancies and no recorded manager decisions at a reporting date of 4 October 2026. The deployed version adds the items below.

Area	Early local build	Deployed build
Time control	Fixed reporting date	Authoritative simulation clock (13 December 2026) with +1 Day and +7 Days controls
Expiry	No near-expiry items shown	Batch-level FEFO table with Quarantine and Inspect actions
Excess stock	No excess items	Excess module with 150% buffer rule, capital tied up and holding cost
Discrepancy	No discrepancies	Count form, manager resolution queue and reconciliation table
Decisions	No manager decisions recorded	16 recommendations with approve / modify / reject history
Roles	Single view	Separate staff and manager portals

18. Inventory Risk Modules

18.1 Stockout risk

This risk is where there are products that are not available because they have run out of stock. This can be mitigated by having a low stock alert/risk of reordering. To verify this module check what triggers the stock out risk, does it have a reorder point, how is the reorder level set and is the source data up to date?

Test scenarios could include: stock less than reorder level, stock equal to reorder level, stock greater than reorder level, no reorder level, and out of date or no demand data. It should indicate why there is a risk and what the next step is.

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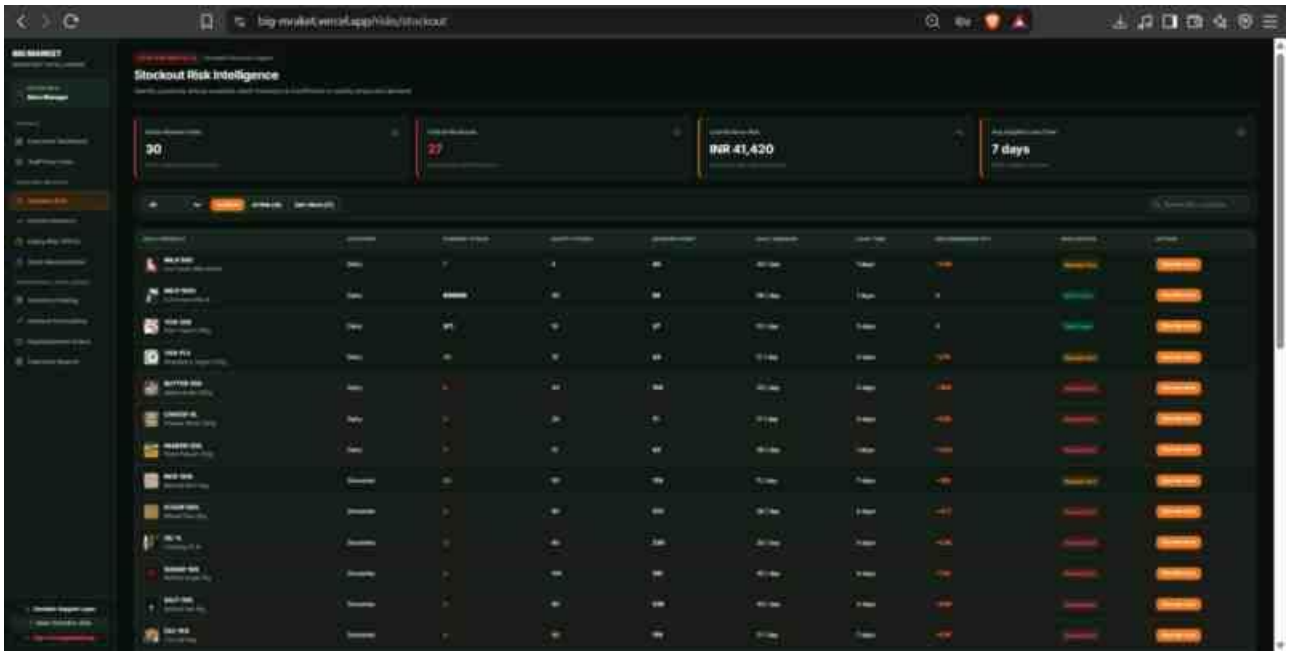


Figure 18. Stockout Risk Intelligence (Store Manager): KPI tiles and per-SKU safety stock, reorder point, daily demand, lead time, recommended quantity and risk status.

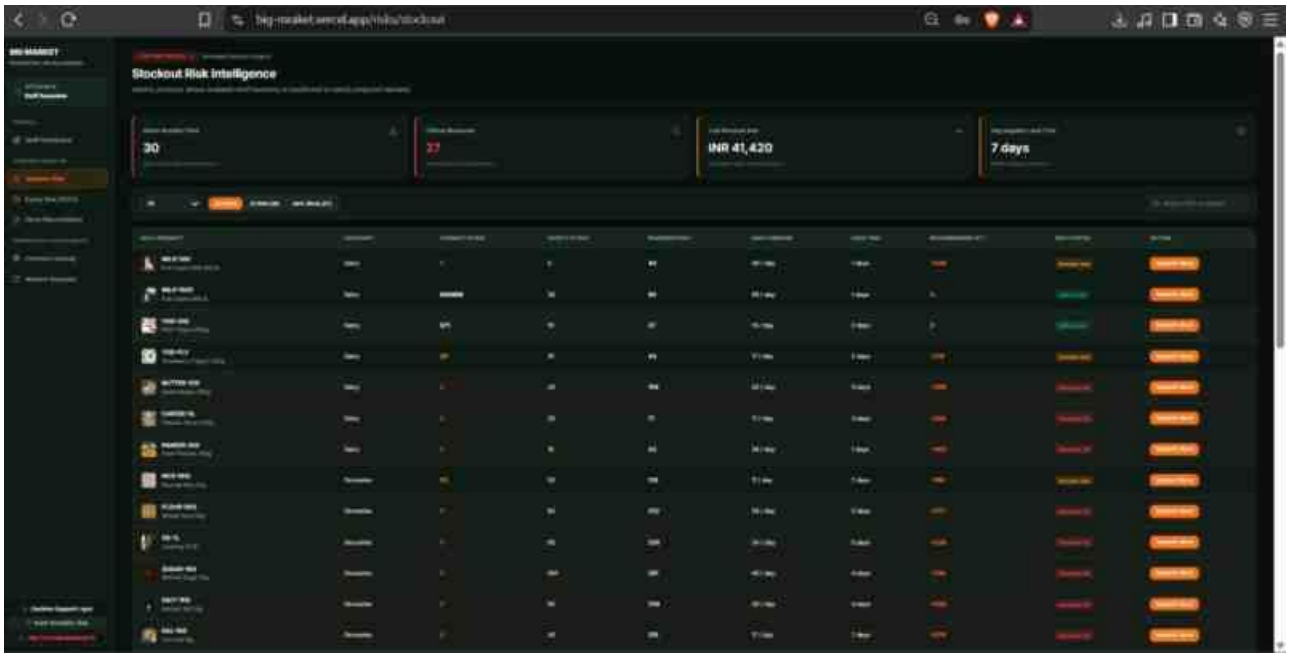


Figure 19. Stockout Risk Intelligence (Staff Associate): the same module with the action labelled Request Stock instead of Reorder Now.

The deployed build has the following insights for the module. There are 30 items that are under re-order level, 27 items with critical stock-outs (0 on shelf), revenue at risk of INR 41420 and the average lead time from the supplier is 7 days. The table below shows the safety stock requirement for each item, the re-order level, daily demand, lead time and suggested order quantity. It also indicates if the item requires re-ordering, is covered by safety stock or if it is out of stock (0). In this module, MILK-500 currently has 7 items in stock but the re-order level is 40. It has a daily demand of 40 and a lead time of 1 day. This item needs to be re-ordered (+549)

18.2 Overstock / slow-moving stock

Define what you consider slow moving stock. You should have an intelligent rule here such as target stock levels, days of stock cover or stock turned over within a set time frame. Try some scenarios to see how this module will affect products with no sales, seasonal demand and products with no history.

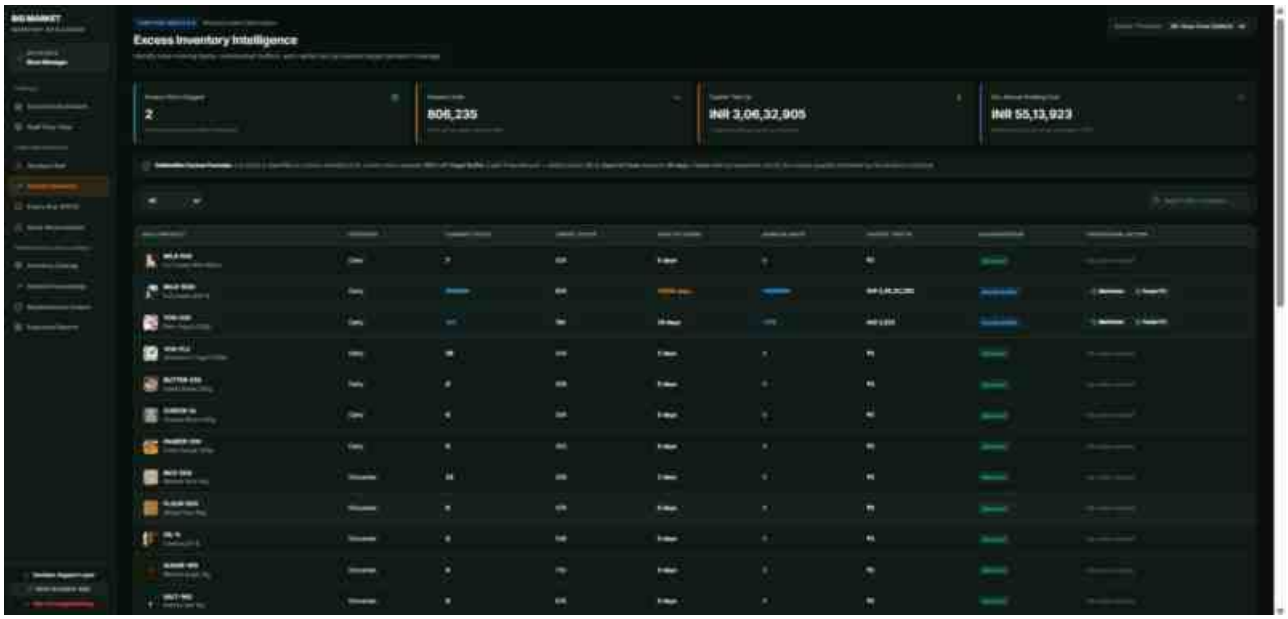


Figure 20. Excess Inventory Intelligence (Store Manager): surplus units, capital tied up, estimated holding cost and the defensible excess formula.

This can be seen in the deployed build. The module uses the rule that if the current inventory level is more than 150% of the target buffer (lead time demand + safety stock) or the number of days of cover is greater than 30 then there is excess inventory. The amount of capital tied up is calculated as the amount of surplus units x cost price. The SKUs identified are MILK-1000 with an excess of 806,869 units (Target = 809, Days of Cover = 14,506) resulting in capital tied up of INR 3,06,30,280 and YOG-200 with an excess of 371 units (Target = 196, Days of Cover = 28) resulting in capital tied up of INR 2,625. Overall there is 806,235 units of excess inventory resulting in capital tied up of INR 3,06,32,905. This would cost approximately INR 55,13,923 per annum to hold (approx 18%). Recommendation: Markdown and Pause PO. The vast majority of the capital tied up is in just one record (MILK-1000) suggesting a data quality issue rather than any business outcome (see Section 22.2).

18.3 Expiry risk

The project identifies limited visibility of expiry-risk products To accurately calculate expiry we need date expiry values (plus batch/lot values if applicable). We need to be able to test expiry dates that are nearly expired, expired and no expiry date along with multiple batches. We should also ensure that we can differentiate between expiry dates being calculated versus being added manually or on a static label.

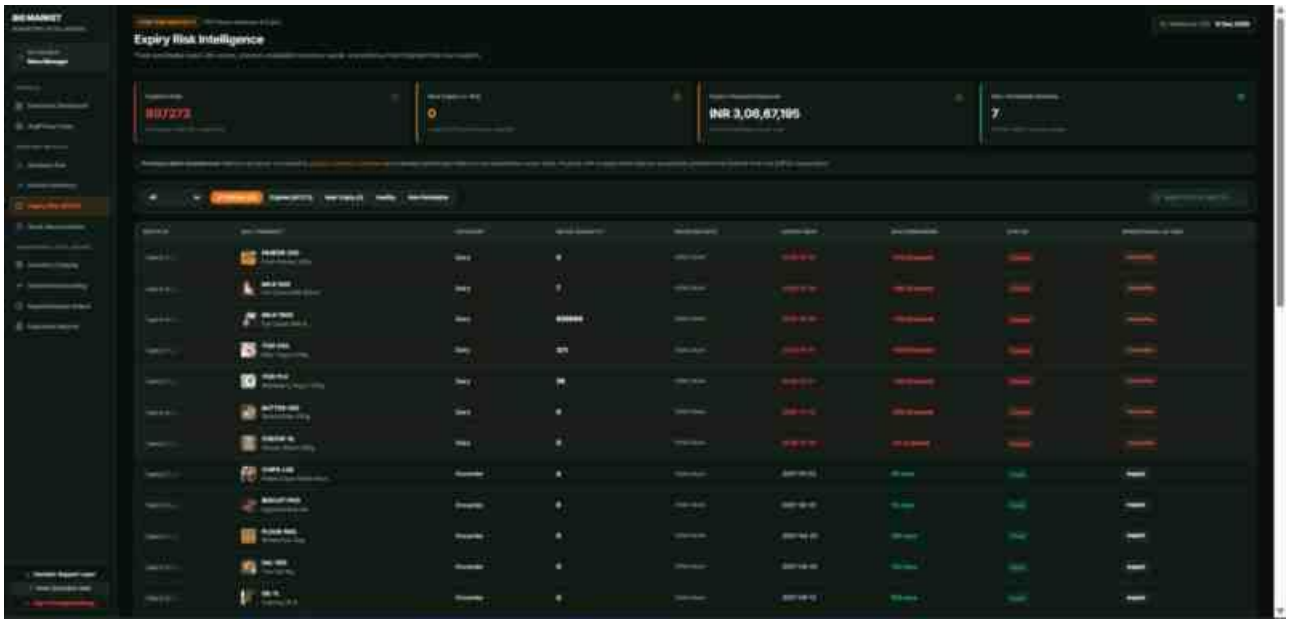


Figure 21. Expiry Risk Intelligence (Store Manager): batch-level FEFO table with received date, expiry date, days remaining, status and operational action.

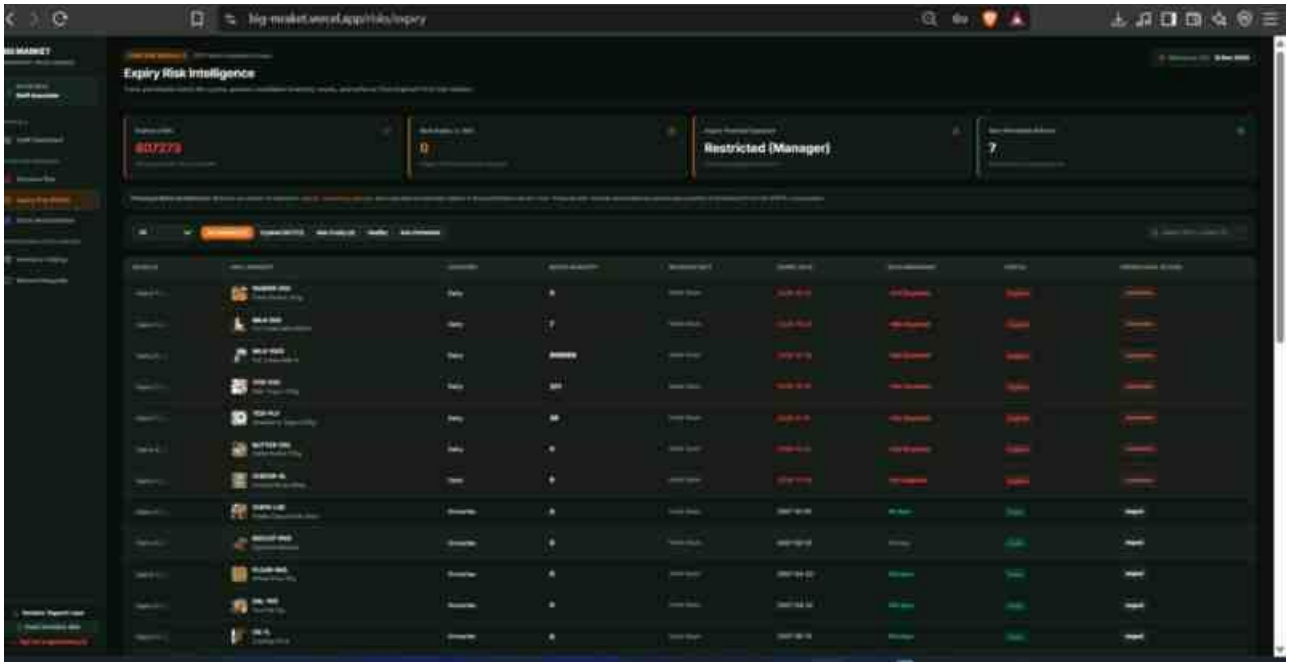


Figure 22. Expiry Risk Intelligence (Staff Associate): the same batches, with the financial exposure tile shown as "Restricted (Manager)".

Observed in the deployed build. The module evaluates 32 batches against a reference date of 13 December 2026. It reports 807,273 expired units, 0 batches within 14 days of expiry, 7 non-perishable batches and a financial exposure of INR 3,06,67,195, which only the manager can see. All seven dairy batches have expiry dates between 27 October and 8 December 2026 and are therefore shown as expired (−47 to −5 days) with a Quarantine action, while grocery batches are Fresh with 40 to 150 days remaining and an Inspect action. Hiding the exposure figure from staff is direct evidence of role-based access control.

18.4 Inventory discrepancy

This process creates an audit trail by comparing the actual stock levels. When entering a count and resolving discrepancies, these should be seen as two different processes. The count is entered to create evidence and discrepancies are resolved by the manager.

As shown in the live build, the Stock Reconciliation module (see figures in sections 19.1 and 19.3) has one discrepancy to be approved by the manager. There are 31 units of variance overall, 4 audits have been resolved and 4 out of 32 SKUs have been verified. There is just one discrepancy to be resolved, MILK-500. This shows that there is a discrepancy between the system level (7) and the verified count (8) giving one surplus unit (+1). The reasons for this discrepancy is Routine Shelf Audit. Examples of resolved discrepancies include MILK-1000 (806,869 recorded and 806,865 verified giving a total of -4) and YOG-FLV (26 recorded and 0 verified giving a total of -26). Counts can be entered by staff but only a manager can resolve the discrepancy.

18.5 Module comparison

Module	Primary question	Inputs needed	Human action
Stockout risk	Could the product become unavailable?	Stock, thresholds and potentially demand/lead-time data.	Review replenishment or investigate data.
Overstock	Is quantity high relative to expected need?	Stock, movement, target levels or days-of-cover rule.	Review purchase pause, transfer or markdown options.
Expiry risk	Which stock needs rotation or action soon?	Expiry dates, batch quantities and date rules.	Prioritize FEFO, markdown or removal per policy.
Discrepancy	Does physical stock match the record?	Recorded stock, physical count, user and note.	Investigate and resolve with authorization.

Demand Forecasting is described within the project presentations as an essential part of the prototype. Within the Prototype Review (6th October 2026), the Demand Forecasting module takes historical sales data and creates a forecast for future demand. The module uses historical sales patterns over 30 days to create a forecast that accounts for demand variance and weekly seasonality. This forecast is labelled as a ‘prototype’ and therefore ‘not a real forecast, using demo data’. This also provides decision support for the manager to decide what safety stock and re-order points they may want to have. There is no mention of any forecasts using trained models, only forecasts using demo data. This means that although there is a forecast in the prototype, it has not been validated. There is also no mention of any machine learning being used at Big Market. It is out of the main scope.

It would be recommended that a simple model is created using a transparent trailing moving average for each SKU on a daily basis. This can then be used to create a recommendation for replenishment based on expected demand during the supplier lead time. A documented safety stock policy should be included

18.6 Demand forecasting: current status and proposed baseline

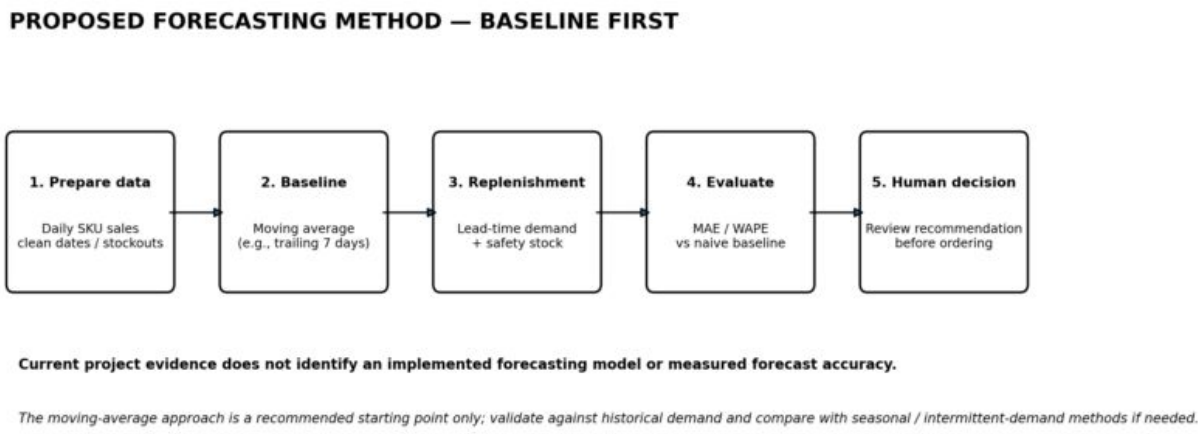


Figure 23. Proposed forecast-to-replenishment evaluation path; the prototype forecast uses demo data only and is not a validated model.

You will need historical data, with date information, by SKU. Any periods of stockouts to avoid confusion with zero demand. You may also have promotion and seasonality information. You will need to know the lead time from the supplier, any ordering restrictions and whether the product has an expiry date or perishable nature. You will then need to split your data into train and test sets (in chronological order). Compare your moving average model to a simple naive model. Report the MAE/WAPE by SKU or category. Only implement recommendations after considering model performance, bias, data quality and business restrictions.

If there is strong seasonality in the demand then you should compare to a seasonal naive or seasonal moving average baseline. If there are SKUs with intermittent demand then you should consider using an intermittent demand model like Crostons method (if there is enough history). The model used must be based on the data characteristics and back testing.

19. Inventory Discrepancy and Manager Review Workflow

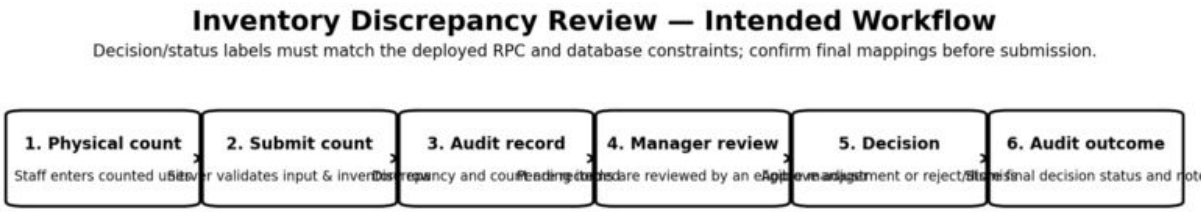


Figure 24. Intended discrepancy review workflow; exact statuses must be confirmed against the deployed RPC and constraints.

19.1 Physical count submission

This common functionality verifies the user is authorised, validates the quantity and selects the Inventory record for the product with a row lock. The difference is then calculated, and verification fields updated. An audit record is inserted. This ensures data integrity and reduces the possibility of conflicts when updating the Quantity.

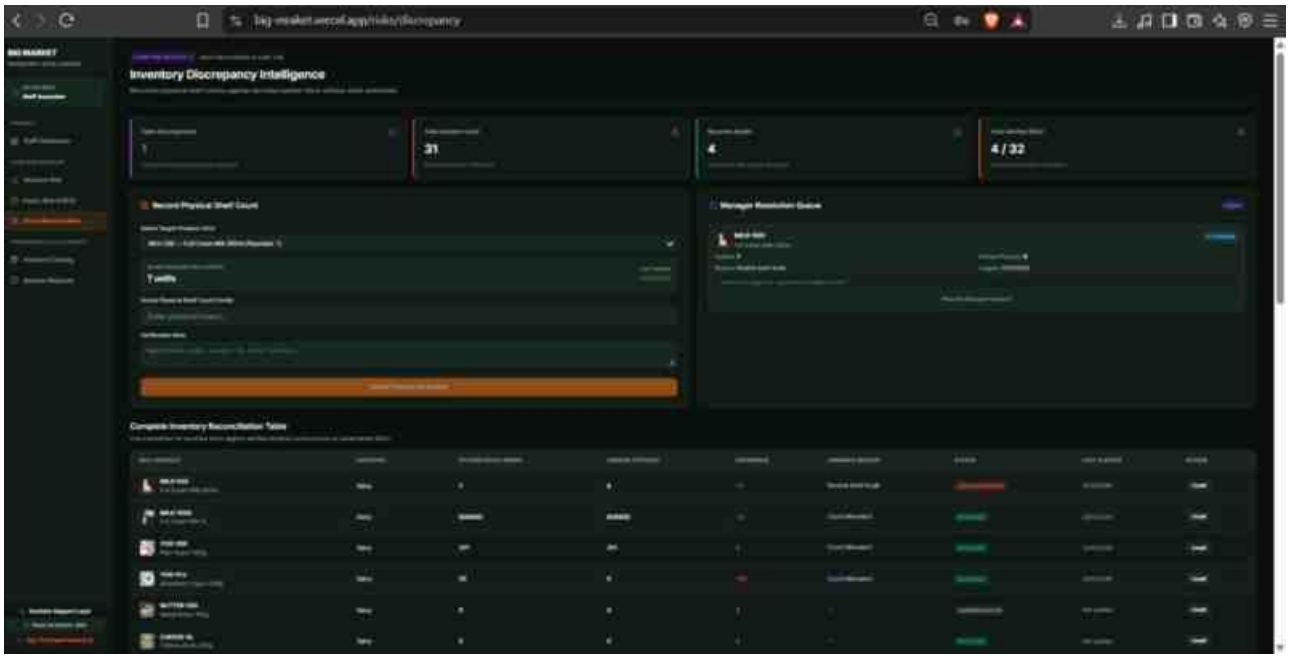


Figure 25. Stock Reconciliation (Staff Associate): Record Physical Shelf Count form, resolution queue showing "Requires Manager Approval", and the complete reconciliation table.

19.2 Meaning of the audit fields

The shared insert includes product_id, submitted_by, previous_current_stock, physical_count, discrepancy_units, new_current_stock, discrepancy_reason, verification_note, status and created_at. The semantics of new_current_stock need particular care: in the supplied function, the field is assigned the physical count, but the function does not update the inventory row's current_stock to that value. The field may therefore represent a proposed/reconciled quantity rather than the actual current system stock. Confirm the schema and intended meaning.

19.3 Manager resolution

The inventory manager will retrieve the latest audit record with status PENDING_REVIEW for the given product, check who is reviewing it, what their decision was and execute review_inventory_discrepancy. Once the RPC has succeeded, the frontend will update its local state and add a new simulated event. The critical part is that the RPC must be trusted and ensure that the actual transaction occurs on the authoritative database, with the same security constraints.

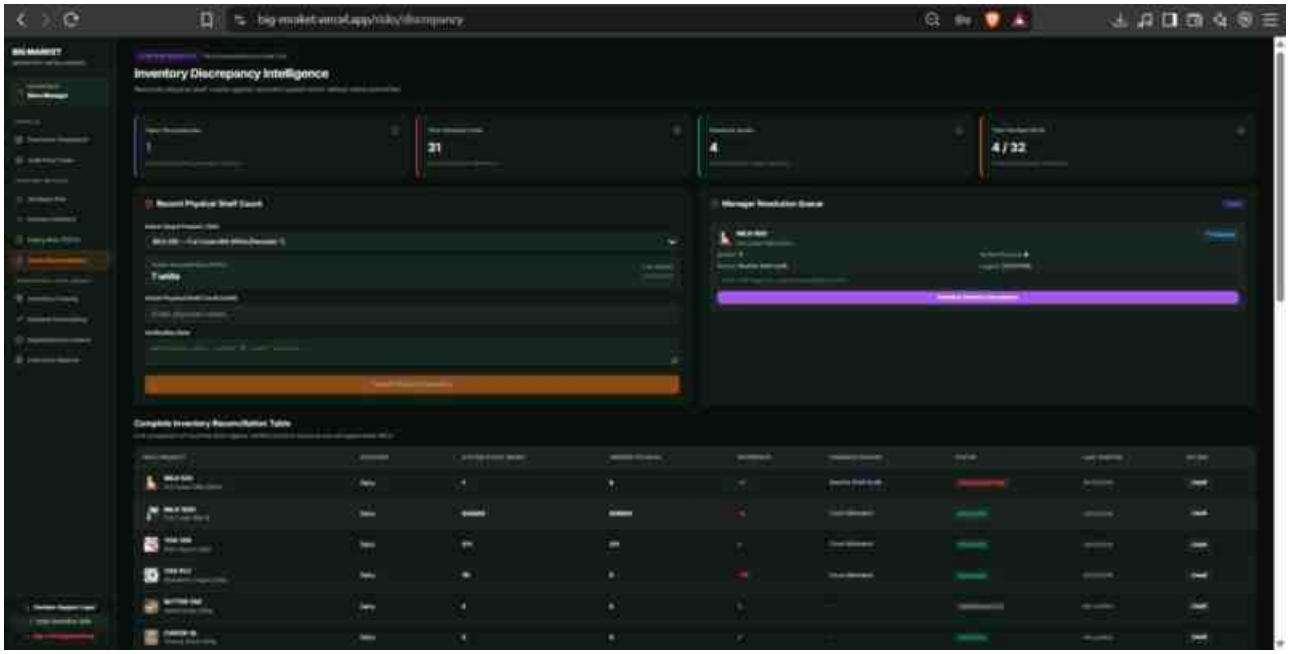


Figure 26. Stock Reconciliation (Store Manager): the Manager Resolution Queue offers the Review & Resolve Discrepancy action for the open MILK-500 exception.

19.4 Self-approval control

The screenshot displays 'Error: Cannot approve your own discrepancies. Please have a different manager check them'. This shows that the self approval validation has been triggered. To fully test this control, create a second user ID (with valid login details). Have one user enter the number and the second manager check. This will ensure that when trying to approve with the same user it will not allow them to and if an authorised user checks then it will allow through

19.5 Status vocabulary integration check

Workflow point	Status / decision value	Must verify
Count submission	OPEN or RESOLVED in supplied SQL excerpt	Whether a trigger or separate operation moves non-zero discrepancies to PENDING_REVIEW.
Manager queue lookup	PENDING_REVIEW	Whether new discrepancy records actually reach this status.
Frontend decision input	APPROVE_ADJUST / REJECT_DISMISS	RPC accepts exact decision values.
Audit final outcome	APPROVED_ADJUSTED / REJECTED_DISMISSED	Values are permitted by the audit table CHECK constraint.

19.6 Safe end-to-end test sequence

1. Create or find a test item with known current stock value.

2. Submit a physical count using a staff account. Take note of the audit_id and audit status.
3. Confirm it has been added to the correct manager's queue.
4. Attempt to resolve it as the same user. Confirm you're unable to approve your own audit.
5. Attempt to resolve it using a different manager account.
6. Confirm the RPC response is exactly as expected. Check the audit status, current_stock, verified_stock and audit note.
7. Repeat using stale stock and rejected/dismissed.
8. Confirm in the UI that only successful results are shown if the database transaction was successful.

20. Data Governance, Security and Auditability

20.1 Access Control

Ensure Role Based Access. Whilst it is great to hide/disable the button for UX, it isn't an actual security measure. If someone isn't a manager, they shouldn't be allowed to make the request. Even if they attempt to call the RPC directly.

20.2 Transaction Locking

- This needs to be locked into an atomic transaction so when updating the stock and audit status any errors will not leave the system in an inconsistent state. The resolve function should validate the correct related records and update them all in one transaction. If it can't be completed, display a clear error.

20.3 Audit Trail

- An audit log should have information about what product was being adjusted, previous stock level in the system, quantity submitted, difference, who submitted it, time of submission, why it was submitted, who reviewed it, what decision was made and any notes. Ensure the fields are not misleading. Make sure the audit rows can't be changed by normal users.

20.4 Privacy and Password Security

- Do not include actual user emails, customer information or private business documents in any public screenshots (ensure they're redacted).
- Do not push Supabase service role keys or any other secrets to GitHub.
- Ensure only the minimal amount of grants are given to the database.
- Review Vercel environment variables and database policies before public sharing.
- Use synthetic or approved test records for screenshots and demonstrations.

21. Testing and Validation Plan

ID	Test scenario	Expected result	Evidence
TC-01	Valid count on existing inventory row.	Count processed; intended audit record created.	Before/after inventory and audit row.
TC-02	Null or negative count.	Rejected; no successful count transaction.	Error and unchanged state.
TC-03	Missing inventory row.	Clear error; no audit row for invalid operation.	RPC error and database query.
TC-04	Unauthenticated count submission.	Access denied.	Authentication state and response.
TC-05	Same user submits and resolves discrepancy.	Self-approval blocked.	Submitter/reviewer IDs and exact message.
TC-06	Different authorized manager resolves pending record.	Authorized path succeeds if all conditions hold.	RPC response, audit status and stock values.
TC-07	Non-manager calls manager RPC directly.	Server rejects operation.	Direct RPC result and role.
TC-08	Stock changes after count but before approval.	Stale adjustment rejected or revalidated.	Before/after stock and RPC result.
TC-09	Reject/dismiss pending discrepancy.	Final audit outcome matches policy; stock not incorrectly adjusted.	Audit and inventory rows.
TC-10	Zero-difference count.	Status and queue behaviour match documented design.	Audit status and queue query.
TC-11	Open production deployment.	Authentication, page routing and database calls work.	URL, commit, console/network logs.
TC-12	Status constraint integration.	All inserted and final values are permitted and consistent.	Constraint definition and function source.

21.1 Evidence-based pass/fail rules

Only if the visible outcome and database are as expected should a test pass. There must be some evidence that shows that the transaction has actually been committed. If a self approval is blocked then there will be evidence to show that this particular control has been applied. However, this will only be true if the user's identity and server side enforcement has been confirmed.

21.2 Defect log template

Field	What to record
Defect ID / date	Unique reference and date found.
Environment	Local, test or production; commit and URL.
Steps to reproduce	Exact actions and test identities used.
Expected vs actual	What should happen and what happened.
Error evidence	Full error message, RPC response and console/network details.
Database evidence	Relevant audit row, inventory row and constraint/function definition.
Severity / owner	Impact, assigned person and target fix.
Retest result	Pass/fail after correction and evidence.

22. Observations, Findings and Discussion

22.1 Findings supported by the current evidence

The main business problem within this project was identifying the inventory visibility and stock management decisions.

The project involves processes such as receiving, storing, restocking, updating stock based on sales, purchasing and reordering.

The code for the application includes an entry form to enter physical stock. It has validation, row locks, calculating discrepancies and adding entries to the audit table.

The manager process had a validation to stop them approving themselves. This was triggered during testing (shown below).

The database screenshots have many statuses, this will mean that having a CHECK constraint will mean that the statuses can be mapped properly.

The application is deployed using Vercel. It shows this deployment as Ready due to fixing the previous issue where the authors email was blocked.

The store manager mentioned that there are no active alerts for low stock within RENO. They also mentioned that they do not use past sales when ordering and there is no official forecast method.

They also mentioned that the physical stock does not always match with RENO as there can be issues with theft, expiry, damage in transit and data entry errors. The stock is not counted often.

They said that they rarely have out of stock issues. However, they said that having too much stock, stock expiring and theft were the biggest issues they have (Section 16.3).

The group discussed the three possible solutions and decided to go with option C. A prototype was developed and tested using demo data on 6th October 2026.

The screenshots below show the deployed application. There are two portals, one for the Staff Associate and one for the Store Manager. The navigation and processes differ. On the expiry page there is a tile showing financial exposure however this is only available to the manager (Section 17.8) (Section 18.3).

The deployed reports page shows that there are 16 recommendations. This includes how much should be recommended and the final amount. 11 were approved, 2 were changed and 3 were denied. This shows the human element of the decision making process (Section 17.9).

The reconciliation module shows there is one discrepancy to approve and a total of 31 units of variance. This proves that the counting and reviewing process can be seen (Section 18.4) (Chapter 19).

22.2 Main technical issue to resolve

The most important issue to implement is how the statuses are moved from what was inputted at the time of counting (OPEN/RESOLVED as shown in the SQL code below) to what is expected to be in the manager queue (PENDING_REVIEW). The screenshots also show some end statuses (APPROVED_ADJUSTED & REJECTED_DISMISSED). These could be linked to another function or trigger and should be checked.

Issues with data consistency within the deployed system: There are several issues with data inconsistency within the deployed screenshots:

Quantity outliers. MILK-1000 has a value of 806,869 units (verified quantity of 806,865) which has caused a large amount of issues with the rest of the data. As it has a daily demand of 56 units, it will cover 14,506 days. This one line has caused the majority of the surplus capital (INR 3,06,30,280 out of INR 3,06,32,905), the majority of expired units (807,273) and has given an inventory value of ₹3,06,75,245. This looks like a mistake was made when entering the data or seeding the data and should be fixed or explained before any data is displayed.

Dashboard vs Module. The Executive Dashboard shows 28 SKUs at risk of stock outs, 0 surplus items, surplus capital of ₹5,565 and expiry risk of ₹5,565. However the module pages show 30 SKUs are at risk, 2 surplus SKUs (INR 3,06,32,905) and 3,06,67,195 of expiry risk. The Staff Dashboard shows 1 item nearing expiry however the expiry module shows 0. This is due to the definitions and/or time of capture differing.

Incorrect recommended quantity. MILK-500 has a recommendation of +549 from the stock out module but 556 from the replenishment screen. BUTTER-250 has a recommendation of +358 from the stock out module and 370 from the replenishment screen. MILK-1000 is present in the replenishment section with an adjusted quantity of 809,819. The rules for quantity should be consistent across all screens (Target Stock - Current Stock, see section 17.9).

Roles. Within the Staff Replenishment screen, the Review button is present in the same way as it is in the Manager View for the Manager Review rows. This should be checked to see if the staff can actually approve.

22.3 What cannot yet be concluded

- The available evidence does not establish that stockout or expiry risk is calculated from complete live business data.
- It does not demonstrate a measured reduction in stockouts, expiry loss, staff time or inventory holding cost.
- It does not prove that the complete manager approval/rejection flow passes end-to-end.
- It does not prove that POS, ERP or supplier systems are connected to the deployed application.
- It does not establish forecast accuracy or the quality of any AI model.

22.4 Discussion

The project's strongest immediate value is a more structured information and exception-handling process. A discrepancy audit workflow can support traceability, but the overall solution depends on consistency across

database constraints, server-side functions, frontend state and role configuration. Once those foundations are stable, the dashboard can be evaluated as an operational decision-support tool.

22.5 What the prototype demonstrates and what still requires validation

The prototype demonstrates	Requires validation
An integrated inventory decision workflow	Real Big Market historical data
Forecast and risk logic	Actual forecast accuracy
Explainable replenishment recommendation	Actual stockout and expiry outcomes
Manager-in-the-loop decisions	Real supplier lead-time variation
Simulation of replenishment arrival	Measured financial impact
Data-quality exception workflow	User acceptance in daily operations
Reports and audit trail	Future RFID integration

The reports page shows the potential impact on business of simulated scenarios. These include potential unfulfilled demand, blocked capital due to excess inventory, near expiry stock values and approve/change/reject actions. These are not real results but simulation results.

23. Quantitative Analysis and Graphical Interpretation

23.1 Discrepancy arithmetic from the test screenshot

The screenshot shows an example of the development/test screen. The milk stock record has a current stock value of 0 and a physical stock of 10. Physical stock minus current stock = 10 - 0 = stock variance of +10.

Example SKU visible	Current stock shown	Physical / verified count shown	Calculated difference
MILK-1000	0 units	10 units	+10 units
MILK-500	0 units	10 units	+10 units

Note: These are examples taken from a test screen. This is not a sample of a live audit in a verified store.

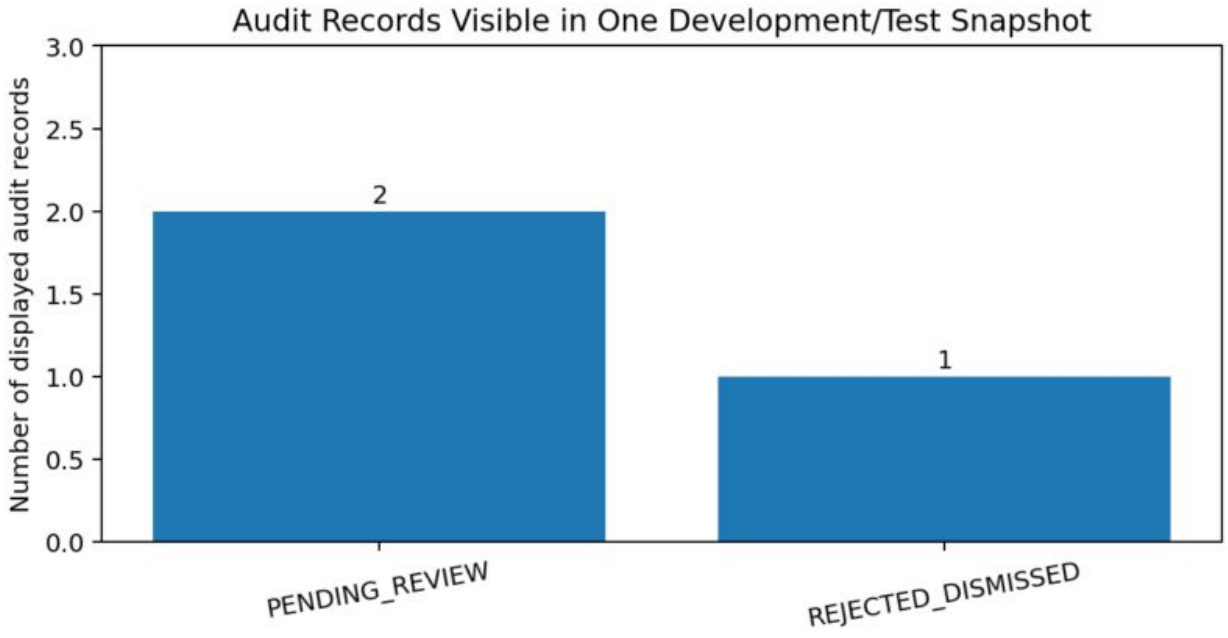
Live Application Calculations

Stock Reconciliation screen: In our deployed application there is a more complex example. Using the same method (verified physical stock - system stock):

SKU	System stock	Verified physical	Difference	Status
MILK-500	7	8	+1	Open exception (surplus)
MILK-1000	806,869	806,865	−4	Resolved
YOG-FLV	26	0	−26	Resolved
Total absolute variance			31	Matches “Total Variance Units” tile
Net variance			−29	(+1) + (−4) + (−26)

Verification coverage is 4 of 32 SKUs, or 12.5%. Only one of the three non-zero variances remains open (+1 unit, about 14% of the MILK-500 system quantity of 7). These values are simulated demonstration records, not an audit sample from a real store.

23.2 Audit status snapshot



This is a small application screenshot snapshot, not a representative business KPI or production performance measure.

Figure 27. Small development/test snapshot: two pending-review records and one rejected/dismissed record shown in a supplied screenshot. Not a business KPI.

23.3 Pareto analysis — method demonstration

There is no Pareto Chart or category of discrepancies in the source presentation. The chart below has been created using 100 example cases to illustrate how this tool would be used. This is not an actual finding from Big Market (a real supermarket) or the test data from the project. If you are submitting this please make sure it is clear that this is not actual observations.

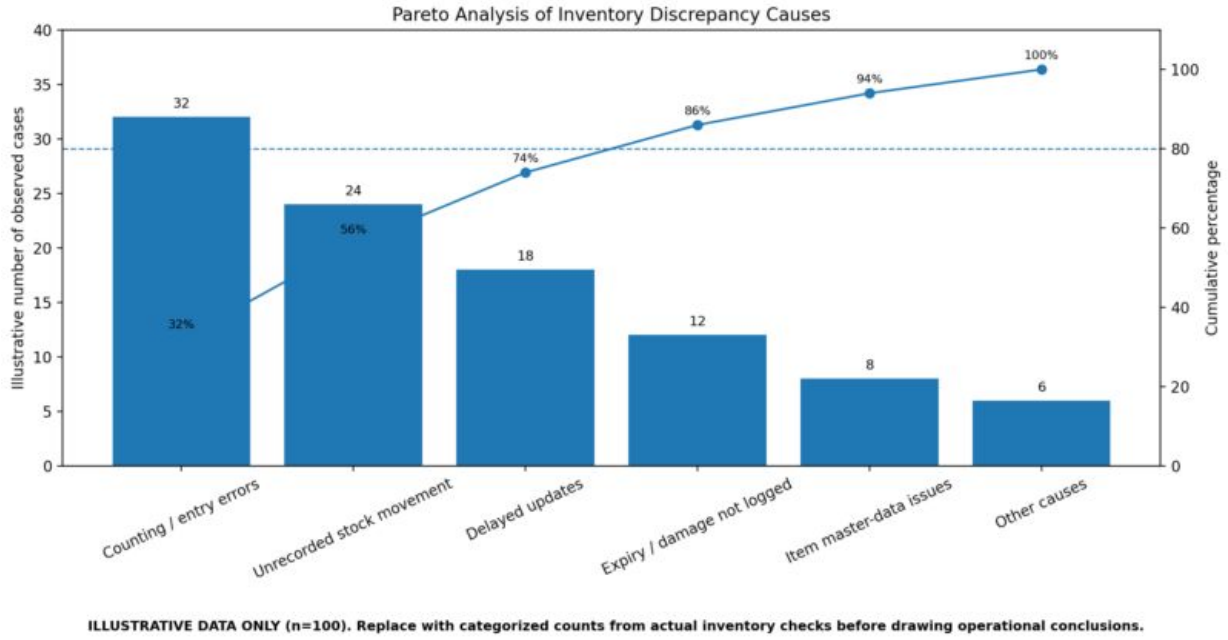


Figure 28. Illustrative Pareto chart of discrepancy causes (n=100 example cases only).

In this example only, the first four categories sum to 86 of 100 cases (86%). The result demonstrates prioritization logic, not actual root-cause distribution. For a valid project analysis, classify each verified discrepancy once using an agreed primary cause, define the store and observation period, count each category, sort descending, and calculate cumulative percentage = cumulative count ÷ total count × 100.

23.4 Appropriate graphs for a later pilot

- Weekly stockout events or stockout rate, with a defined eligible product population.
- Expiry/wastage units or value by category and month, using verified write-off records.
- Discrepancy rate and absolute discrepancy units by product/category, based on complete count logs.
- Resolution time distribution from count submission to manager decision, using reliable timestamps.
- Forecast error by week only if dated forecasts can be matched to actual demand.
- Before/after comparisons only when periods and operating conditions are sufficiently comparable.

The report intentionally does not present invented savings, accuracy improvements or forecast scores. A graph should be added only when the source data, period, denominator and calculation can be explained.

24. Recommendations and Implementation Roadmap

24.1 Immediate technical priorities

1.Ensure statuses are consistent between count submissions, manager queue lookup, reviewing RPC and CHECK constraint for audit table.

2. Confirm manager review RPC is validating role, preventing self approvals, checking stock has not been expired and updating inventory and audit tables on the server.

3. Define what new_current_stock means. This should be either a new value or updated value.

4. Test full process with both staff and manager accounts.

5. Confirm that if rejected/dismissed stock is not updated as per policy.

6. Confirm success messages on frontend are only shown if successfully updated in database.

7. Smoke test live version on Vercel URL after each release.

24.2 Process recommendations

- Standardize how counts are performed and how reason/note fields are completed.
- Define thresholds for low stock, excess stock and expiry alerts with business owners.
- Create an escalation rule for repeated or high-impact discrepancies.
- Make the dashboard show the reason behind a risk flag and when the data was last updated.
- Introduce data-quality checks for missing SKU, quantity, expiry, movement and lead-time information.
- Provide short role-specific training and a quick reference for staff and managers.

24.3 Phased roadmap

Phase	Activities	Exit criteria
1. Diagnose	Map process, validate pain points, document system/data gaps.	Agreed problem statement and process map.
2. Stabilize	Align statuses, RPC signatures, permissions and audit semantics.	All critical discrepancy tests pass in a safe environment.
3. Connect / validate data	Review SKU consistency, stock units, timestamps and source freshness.	Data owners, gaps and integration feasibility documented.
4. Visualize / pilot	Use dashboard with a limited authorized user group.	User journeys completed and feedback/defects recorded.
5. Optimize	Refine thresholds and measure KPIs against baseline.	Reproducible KPI calculations and evidence.
6. Scale	Training, monitoring, governance and continuous improvement.	Release process and ownership established.

24.4 Feasibility and business value review

Before scaling, assess development and support cost, existing system compatibility, data quality, staff adoption and implementation effort. Compare these costs with measured or credibly estimated benefits such as improved availability, lower expiry loss, better working-capital use and faster decisions. Keep assumptions visible and avoid presenting an unmeasured benefit as a realized saving.

24.5 Feasibility and validation plan

Feasibility	Approach
Data feasibility	Use validated historical sales, stock, receiving and product-master data; label all demo data until SME validation.
Technical feasibility	The React prototype with centralised state demonstrates the workflow; production would require secure data integration and hosting.
Operational feasibility	Keep manager approval, the verification workflow and exception handling so the system supports existing roles rather than replacing them.

24.6 Next steps after the prototype review

- **SME data:** collect relevant RENO, sales and inventory evidence.
- **Validate:** compare system recommendations with manager judgement.
- **Refine:** improve thresholds, forecasts and exception rules.
- **Evaluate:** measure the agreed KPIs using validated data.

Final prototype message: RENO records → Intelligence interprets → System recommends → Manager decides → Business insight.

25. Expected Benefits, Limitations and Risks

25.1 Expected benefits (hypotheses)

- Clearer visibility of inventory exceptions and stock conditions.
- More consistent physical-count recording and manager review.
- Improved traceability of submitter, note, decision and audit status where fields are populated correctly.
- Better prioritization of staff attention if risk rules are valid and explainable.
- Foundation for operational KPI tracking and future analytics.

25.2 Limitations

- The materials do not establish full live integration with POS, ERP, purchasing or supplier systems.
- Risk alerts depend on accurate, current data and suitable rules.
- Development screenshots do not reflect actual metrics.
- Forecasting uses past demand and has been appropriately assessed. The prototype forecast uses demonstration data and is not a validated model.
- Deployment does not guarantee that all permissions, database functions and user scenarios are correct.

25.3 Risk and mitigation table

Risk	Potential consequence	Mitigation
Mismatched status strings	Manager queue misses records or RPC update fails.	Shared constants, database constraints and integration tests.
Client-only access checks	Protected operation may be called outside the UI.	Enforce authorization in trusted server/database code.
Stale stock at review	Adjustment is based on an outdated count context.	Re-check stock inside the resolution transaction.
Poor source data	Alerts are misleading or stale.	Validate inputs, show freshness and handle missing data.
Unclear audit semantics	Reports confuse proposed stock with applied stock.	Document fields and test before/after database values.
Credential exposure	Unauthorized data access.	Use environment variables, minimal grants and repository secret checks.
Overstated report claims	Academic conclusions exceed evidence.	Label proposals, test observations and measured outcomes separately.

25.4 SWOT analysis of the solution

STRENGTHS (internal)	WEAKNESSES (internal)
• Can be used with RENO • Manager can approve, change or refuse proposals. There is a history of decisions. • Recommendations can be explained with reasoning, cutoff points and calculations. • Audit friendly with row locking and self approval. • Logical at SKU level with 4 product groups.	• Prototype is based on simulated data. • Accuracy of forecasting and impact has not been tested against real data. • Integration with RENO, POS or supplier systems not verified. • Barcode/RFID not verified. • Mapping of status between count upload and manager queue needs to be verified.
OPPORTUNITIES (external)	**THREATS (external)**

STRENGTHS (internal)	WEAKNESSES (internal)
• Pilot with real RENO sales, stock and receiving data • Phase-2 barcode/RFID physical verification • Extend KPI tracking: forecast error, discrepancy rate, expiry loss • Extend the SKU-level logic to further categories • Better visibility of supplier lead times	• Poor data quality producing bad recommendations • Staff and manager adoption of the workflow • Delayed supply and lead-time variation • Demand shocks or new products with no history • Overstating results beyond the evidence

25.5 Challenges identified

- **Status alignment.** The status written by count submission must match the status expected by the manager-review queue before the workflow can be treated as validated (Sections 19.5 and 22.2).
- **Testing privileged actions.** The self-approval safeguard can only be tested properly with separate staff and manager identities (Section 19.6).
- **Data quality.** Recommendations and risk flags are only as reliable as the stock, sales, expiry and lead-time data behind them (Section 17.10).
- **Evidence.** The prototype uses demo/simulated data and the interview evidence comes from one manager, so forecast accuracy and business impact remain unvalidated.
- **Adoption without extra workload.** The workflow has to fit existing store routines so that counts and reviews do not become an additional burden on staff.

25.6 Future scope

- **Verification technology:** barcode or RFID-assisted counting as a later phase (Section 15.3).
- **Validated forecasting:** evaluate the transparent moving-average baseline against real RENO sales history before considering more advanced models (Section 18.6).
- **Integration:** verified links to RENO, POS, purchasing and supplier data, once access and data ownership are agreed.
- **Supplier lead-time visibility:** record ordered, promised and received dates so lead-time variance can be measured.
- • Expand coverage of the solution to additional product categories at SKU level
- • Execute as a pilot and scale. Measure success against agreed KPIs using validated data. Only scale once a governance process is in place plus monitoring and ownership (section 24.3)

26. Conclusion

Big Market Inventory Intelligence solves the issues around visibility of stock status and exceptions. This presentation details business context, boundaries, an audience plan, DIKW model, information system design and digital business elements. The application has also provided some evidence of discrepancies and the process to get managers involved.

Most importantly we need to ensure that the application has the correct settings in place to record if the count has been submitted, if it is in the managers queue, review RPC, and audit restriction. We also need to ensure that the self approval and stale stock prevention is handled by trusted logic on the server. We will need to have two different users, one for staff and one for managers.

Once the process is running smoothly we can do a controlled trial to measure how well the application is working. We can measure the stockout rate, accuracy of inventory, expiry/wastage, turnover and reorder cycle time. Without this evidence we can only expect to see improvements in availability, less waste and faster decision making. This project will provide a structure for controlling inventory, but further validation is needed.

26.1 Key lessons from the project

Decision Intelligence is the main problem. We are already recording data in RENO. The issue was how do we take the transactional data and turn it into predictive analysis, recommendations and validation (Section 9.4).

We have clean data. Only once the stock records are correct can we start adding any extra value by predicting and providing alerts. Validation and exception handling has been included.

Manager involvement. All recommendations have explanations and all decisions are logged.

No business impact from the prototype. There are no improvements being claimed until we had real data, clear definitions and a baseline.

Controlled scope. By limiting the scope of the first release to four key problems we were able to create a functional prototype to review.

27. Individual and Team Contribution

27.1 Team contribution context

The supplied presentation lists Group 7 and the following members: Saral Kudesia, Nagesh Palang, Chhavi Satija, Arpit Poriya and Shruti Sharma. The project framing spans problem scouting, process analysis, stakeholder considerations, digital solution design and inventory workflows. The team should confirm the allocation of each deliverable before final submission.

27.2 Individual contribution — draft for personalization

The wording below is based on work and evidence shared in this conversation. Keep only the statements that accurately reflect the individual's actual contribution.

- Participated in developing and integrating the Big Market Inventory Intelligence application and progressing the source code through GitHub and Vercel deployment steps.
- Worked through the inventory discrepancy workflow, including physical-count submission, audit records, manager review and validation of database status constraints.
- Investigated the self-approval restriction and reviewed the observed error message, database rows and constraint definitions during debugging.
- Worked with React frontend behaviour and Supabase/PostgreSQL logic as part of the implementation or validation of inventory workflows.
- Contributed to the explanation of the inventory problem, proposed solution, testing requirements and operational relevance of stock visibility and discrepancy control.

Personalize this section with exact files/modules, specific commits, test cases, diagrams or analysis you personally completed. Do not claim sole ownership of teammates' work.

27.3 Learning outcomes

The project connects operations-management concepts with software delivery. It requires translating a business problem into a repeatable process, defining states and decision rules, validating data, protecting privileged actions, maintaining an audit trail, testing failure paths and separating technical functionality from measurable business impact.

27.4 Evidence of contribution

The table below shows where the evidence for each area of work can be found in this report. Keep only the rows that reflect the individual's actual contribution.

Area	What was done	Where to find the evidence
Application and deployment	Developed and integrated the application; progressed the source code through GitHub and Vercel deployment	Chapter 17; Section 17.5; Appendix A
Discrepancy workflow	Physical-count submission, audit records and manager review	Chapter 19; Figure 24 and Figure 27
Self-approval safeguard	Investigated the restriction, error message, database rows and constraint definitions	Sections 19.4 and 19.5
Testing and validation	Test cases, defect log and evidence log	Chapter 21; Appendix C
Problem and solution explanation	Problem definition, solution options and rationale	Chapters 9, 10 and 16
GenAI use	Prompts, counter-questions and verification	Chapter 28

27.5 Demonstration plan

If a live demonstration is required, follow one flow through the prototype and show only behaviour that has been tested. The table below is a suggested script to adapt to the demonstration slot.

Step	Screen	What to show	Note
1	Executive dashboard (Figure 9)	Inventory KPIs, demand trend, category value and critical alerts; simulation-date control	Demo / simulated data
2	Inventory intelligence (Figure 12)	System stock, verified stock, days of cover and risk status; use the Verify action	Demo / simulated data
3	Physical count	Submit a count that differs from system stock; show the recorded discrepancy and audit entry	Run after status values are aligned (Section 19.5)
4	Demand forecasting (Figure 14)	Historical demand and forecast by SKU	State that it is a prototype forecast
5	Replenishment	Reorder point, recommended quantity and reason; approve, modify or reject	Manager decides (Section 17.9)
6	Reports and audit trail (Figure 17)	Manager decision history and simulated business impact	Simulated impact only
7	Self-approval control	Show that a user cannot approve their own count; approve with a separate manager account	Section 19.4

28. Generative AI Evidence and Responsible Use

The project presentation includes a GenAI evidence component. This chapter records how generative AI can support the project's research, structuring, explanation and documentation while keeping the project team responsible for validating every claim against the application, database and source materials. The exact prompts, generated outputs and evidence images should be inserted from the original presentation or project records; they should not be reconstructed or represented as screenshots that were not supplied.

28.1 Purpose of the GenAI evidence

The GenAI evidence section should demonstrate the use of AI as a supporting tool during project development, rather than as a substitute for primary evidence. In this project, appropriate support tasks include organizing the problem statement, developing stakeholder and interview questions, explaining inventory concepts, drafting report sections, preparing test scenarios, and helping interpret code or database errors. Only activities actually performed by the team should be claimed as completed.

28.2 Evidence to include from the presentation

Use the GenAI evidence slide(s) from the supplied presentation as the primary source for this section. Transfer the original prompt text, relevant response excerpts and screenshots without changing their meaning. For each item, add a short caption describing what the prompt asked, what output was used, and how the team checked or adapted it.

Evidence item	What to capture in the report	Validation / reflection
Prompt or task	Paste the exact prompt shown in the presentation or project record.	Confirm it is an authentic prompt used by the team.
AI output excerpt	Include only the relevant generated response or recommendation.	Check technical and business claims against code, SQL, screenshots or credible sources.
Application of output	Explain whether it informed the problem framing, workflow, report or test plan.	State what the team changed, rejected or implemented.
Human verification	Record the validation step and outcome.	Do not treat AI output alone as proof that a feature works.
Limitations	Mention missing data, assumptions, uncertainty or unsupported suggestions.	Keep proposals separate from implemented features and measured results.

28.3 GenAI use within this project

The project materials shared during preparation show AI-assisted discussion of the Supabase physical-count RPC, product UUID handling, audit records, manager review, self-approval prevention, deployment troubleshooting and report structure. These interactions can be documented as development-support evidence if they correspond to the team's actual workflow. They do not independently establish that the code was deployed, that a database transaction succeeded, or that operational performance improved.

28.4 Verification protocol

- Code suggestions: compare with the actual source file and run the relevant build or test.
- SQL suggestions: inspect the deployed function definition, table constraints, grants and row-level security policies before applying changes.
- Workflow claims: test using separate staff and manager accounts and inspect the resulting database rows.
- Deployment claims: verify the live URL, deployment commit, browser console and critical user journeys.

- Business claims: use valid operational data and documented KPI definitions; do not infer savings from a prototype screenshot.

28.5 Academic integrity and limitations

Generative AI should be disclosed in accordance with the institution's policy. The team remains accountable for the accuracy, originality, citations and final wording of the report. AI-generated text should be reviewed, edited and supported with evidence. Do not fabricate prompts, screenshots, interview results, sources, test outcomes or performance metrics. If the original presentation contains specific GenAI prompts or screenshots, include them in this chapter as figures and cite them as project evidence.

28.6 GenAI prompt and response evidence

The figures below are taken from the project presentation. Prompts 1 and 2 cover the IKIGAI and sector-selection exercise; Prompts 3 to 6 cover the 5W1H problem statement, root-cause analysis, solution options and expected outcomes; Prompts 7 and 8 cover stress testing and strategic scoping. The stress-test counter-question screenshots show how the team defended its design. In each case the output was treated as a draft and checked against the SME findings and the project evidence.

Step	Prompt purpose	How it was used and checked
1	IKIGAI (need, capability, flexibility, monetization) and sector-selection lenses without inventing Big Market facts	Structure only; market-size figures left uncited and flagged for a cited source
2	Organise SME findings into stakeholder voices and pain points	Kept to what the SME reported; nothing invented
3	5W1H and a "How might Big Market…" problem statement from verified findings only	Problem statement written without embedding the solution
4	AS-IS digital business components, with unverified items marked for SME verification	Hardware, network and database details left as "to be confirmed"
5	5 Why + 1H, Ishikawa, Pareto framework and gap analysis; no fabricated percentages	Pareto kept evidence-ready; illustrative chart labelled as such
6	Information flow, layer-wise architecture and blueprint; RFID as TO-BE only	Architecture adds a layer alongside RENO; RFID not claimed as existing
7–8	Solution options, simulation, stress test and top four issues	Option C selected; scope narrowed to four core issues

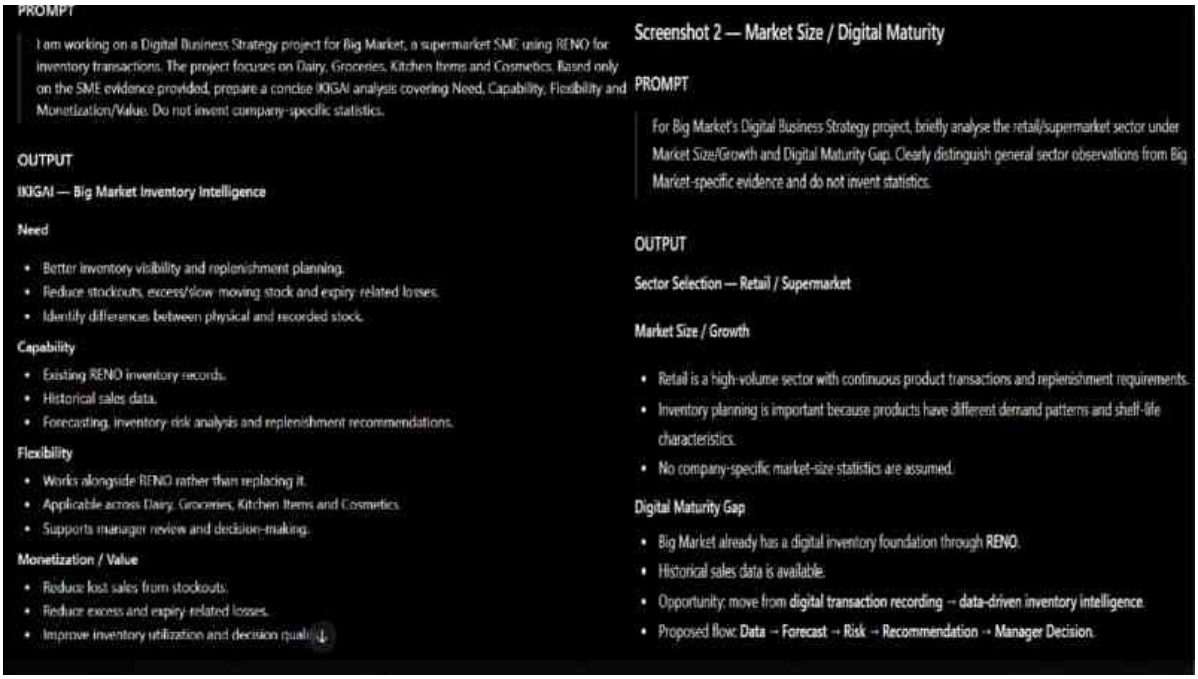


Figure 29. GenAI prompt and output evidence — Prompts 1 and 2 (IKIGAI and sector selection).

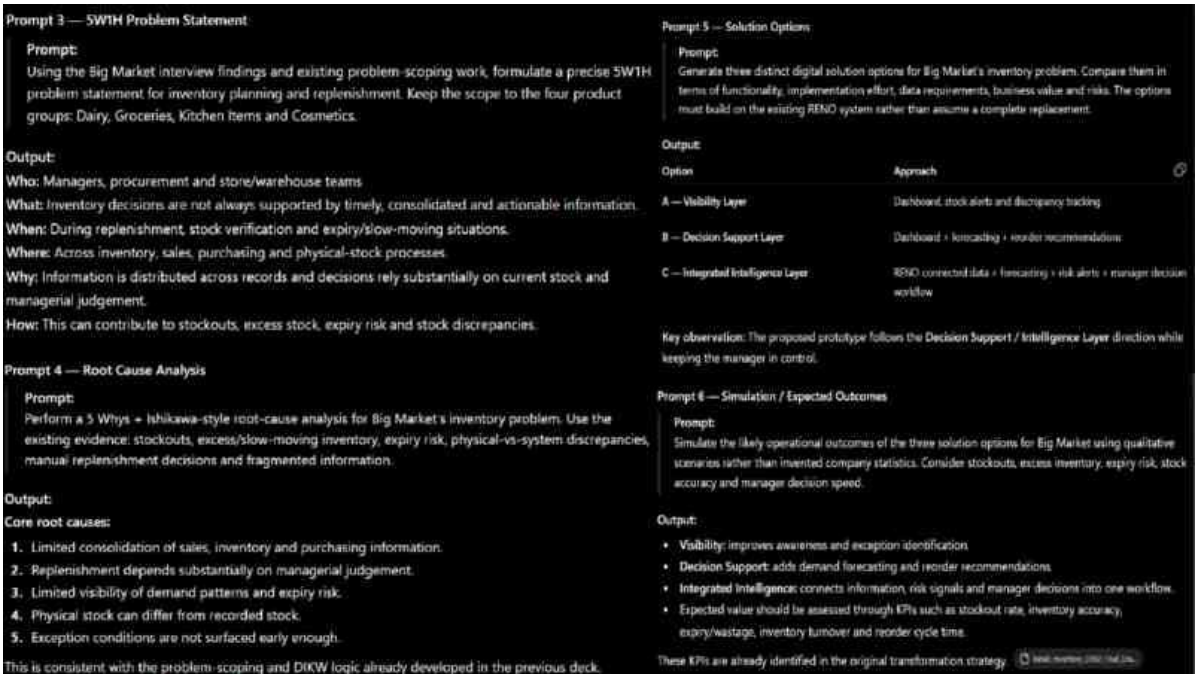


Figure 30. GenAI prompt and output evidence — Prompts 3 to 6 (5W1H, root-cause analysis, solution options, expected outcomes).

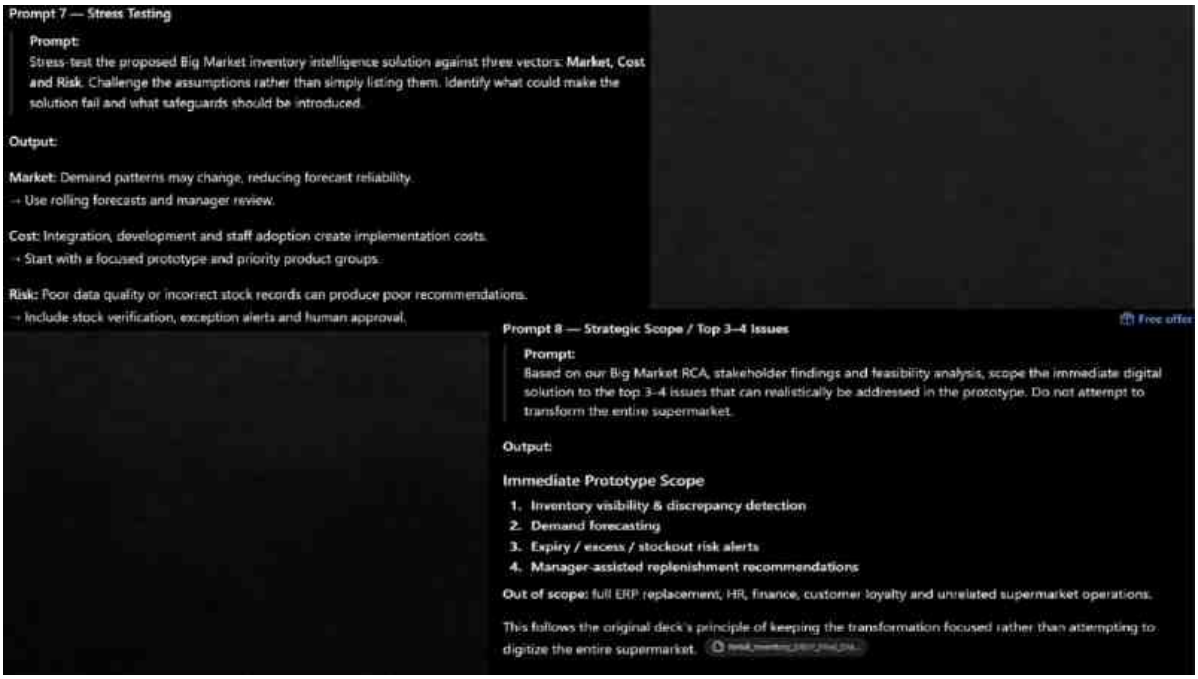


Figure 31. GenAI prompt and output evidence — Prompts 7 and 8 (stress testing and strategic scoping).

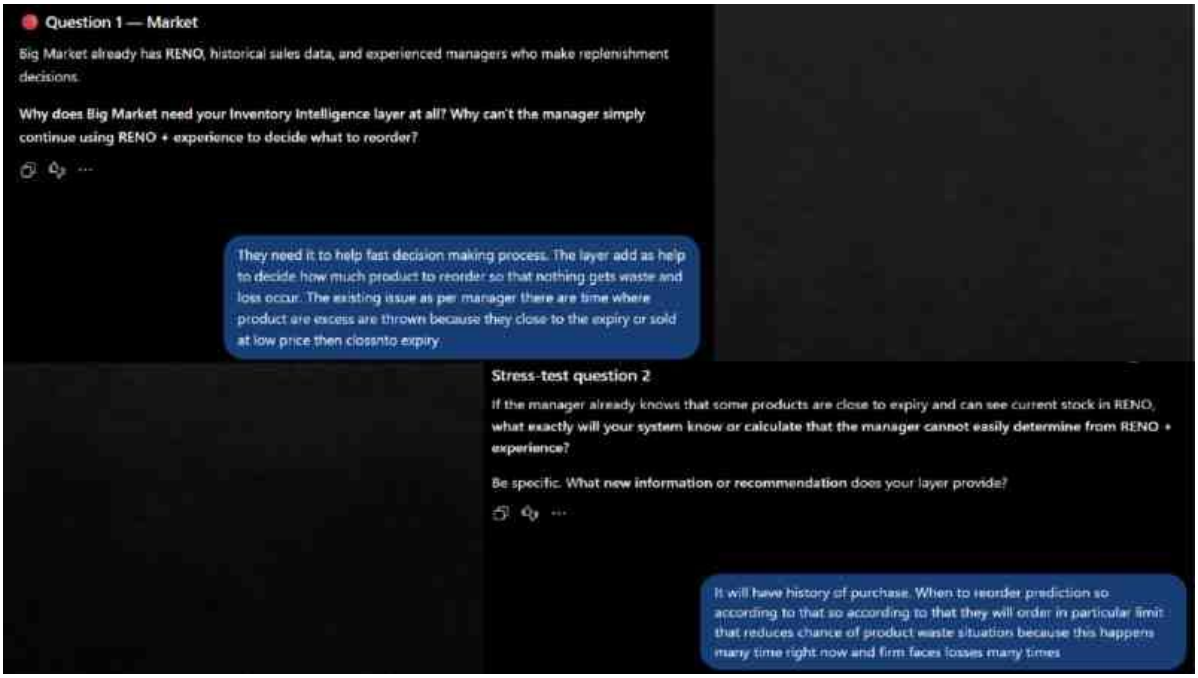


Figure 32. Stress-test counter-questions 1 and 2 with the team's responses.

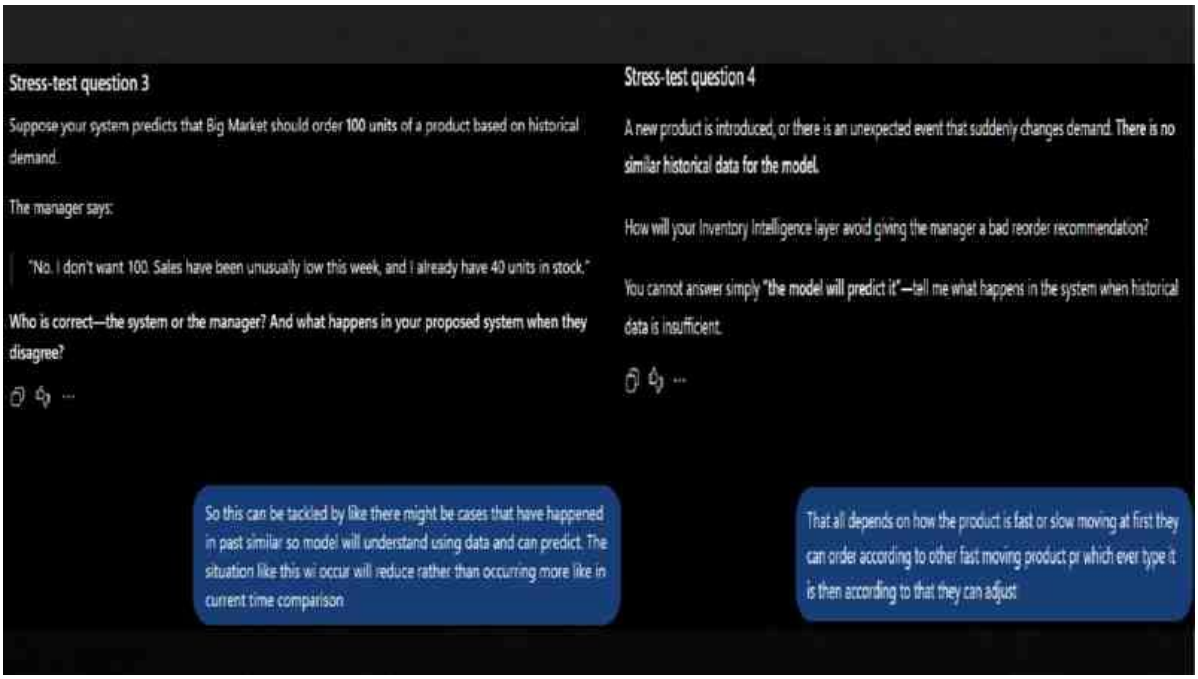


Figure 33. Stress-test counter-questions 3 and 4 with the team's responses.

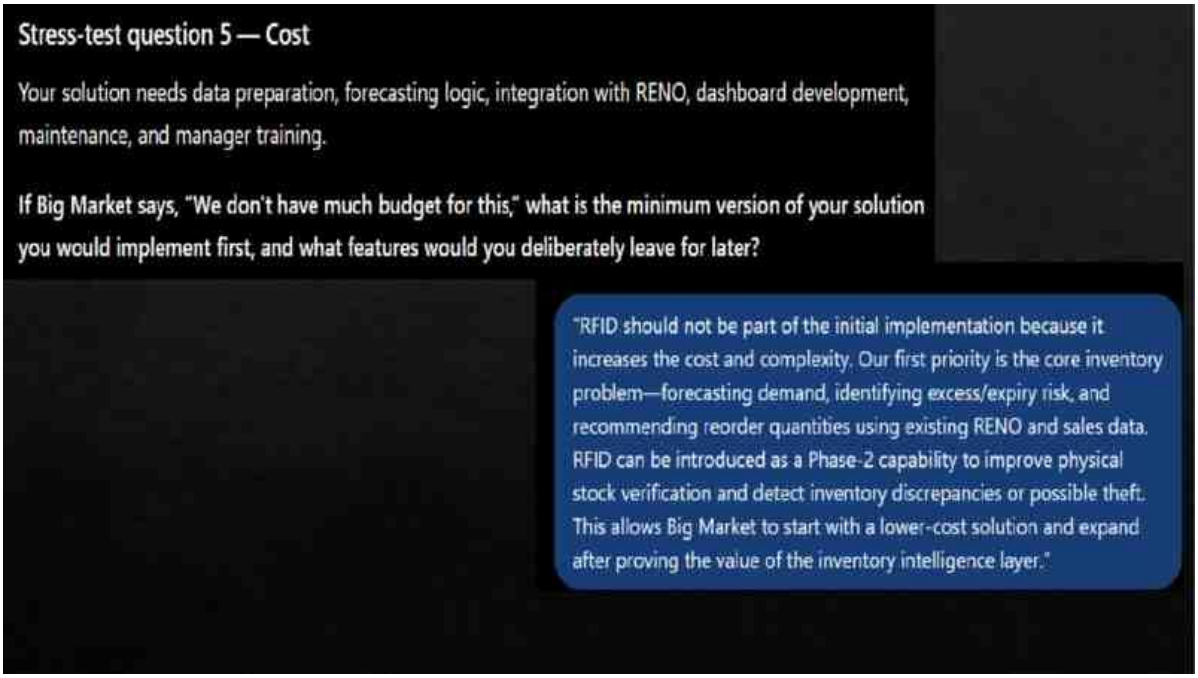


Figure 34. Stress-test question 5 (cost) with the team's response.

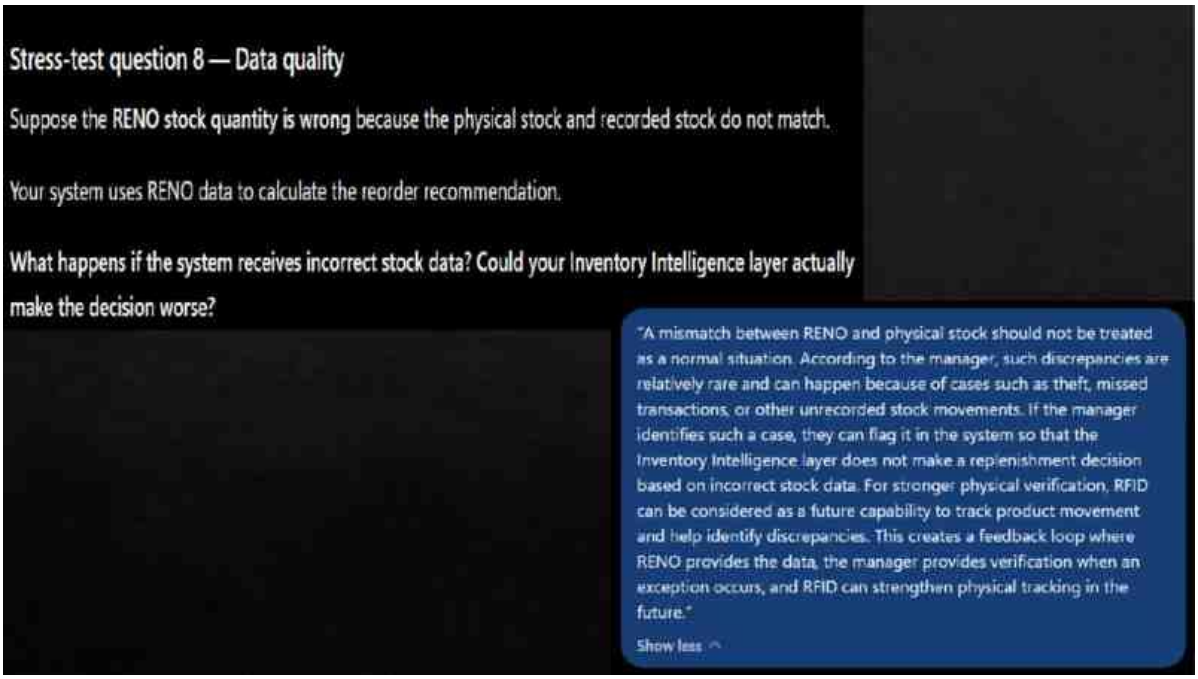


Figure 35. Stress-test question 8 (data quality) with the team's response.

References

Group 7 - Retail Inventory DBSP Final Draft v3 (with IKIGAI) (presentation provided)

Code snippets from the Big Market Inventory Intelligence application:

src/pages/InventoryDiscrepancy.jsx

src/store/DataContext.jsx

src/utils/riskEngine.js

SQL function from Supabase/PostgreSQL to submit a physical inventory count:

Screenshots of the database with examples of inventory rows, audit data and status constraints:

Application Screenshots demonstrating how discrepancies can be resolved by managers and how users cannot approve themselves:

Vercel screenshots demonstrating deployment status and source commit:

Big Market Inventory Intelligence - Group 7 (Prototype Review) (6th October 2026) (Presentation)

Big Market DBS - Group 7 (Steps 1-6) (Updated with Background) (Presentation)

Big Market Inventory Intelligence - Group 7 (Digital Business Strategy & Process) (Final Steps 1-8) (Presentation)

List of textbooks, lecture notes and outside sources used in this project. Ensure that you cite your sources using the required format for the institution. For online sources, ensure you have noted the time accessed.

Appendix A. Screenshot Evidence Index

All screenshots were captured from the deployed application at big-mraket.vercel.app on the simulation clock date of 13 December 2026 (some pages show earlier audit dates). The table lists where each one is used in the report.

Figure	Screen	Role	Used in
Figure 8	Landing page	Public	Section 17.8
Figure 9	Executive dashboard	Store Manager	Section 17.8
Figure 10	Dashboard restock table	Store Manager	Section 17.8
Figure 11	Staff dashboard	Staff Associate	Section 17.8
Figure 12	Inventory catalogue	Store Manager	Section 17.8
Figure 13	Inventory catalogue	Staff Associate	Section 17.8
Figure 14	Demand forecasting	Store Manager	Section 17.8, 18.6
Figure 15	Replenishment orders	Store Manager	Section 17.9
Figure 16	Restock requests	Staff Associate	Section 17.9
Figure 17	Reports and audit trail	Store Manager	Section 17.9
Figure 18	Stockout risk (Module A)	Store Manager	Section 18.1
Figure 19	Stockout risk (Module A)	Staff Associate	Section 18.1
Figure 20	Excess inventory (Module B)	Store Manager	Section 18.2
Figure 21	Expiry risk (Module C)	Store Manager	Section 18.3
Figure 22	Expiry risk (Module C)	Staff Associate	Section 18.3
Figure 25	Stock reconciliation (Module D)	Staff Associate	Section 19.1
Figure 26	Stock reconciliation (Module D)	Store Manager	Section 19.3

Evidence not included in this version: a screenshot of the database status constraint, the audit-record table rows and the Vercel deployment page were not supplied. They can be added to Chapter 19, Chapter 20 and Section 17.5 if the examiners expect them.

Appendix B. Formula Sheet

Measure	Formula / definition	Caution
Unit discrepancy	Physical count − recorded stock	Does not identify root cause.
Absolute discrepancy	Absolute value of physical count − recorded stock	Measures magnitude only.
Reorder point	Expected demand during lead time + safety stock	Use only with documented units and validated inputs.
Discrepancy rate	Mismatch events ÷ total eligible count events × 100%	Define eligible events and period.
Inventory turnover	Cost of goods sold ÷ average inventory value	Requires reliable financial/inventory data.
Forecast error	Named metric comparing forecast with actual demand	Do not report without matched forecasts and actuals.

Appendix C. Test Evidence Log

Date / ID	Environment and commit	Test and identity	Expected / actual result	Database evidence / outcome
[Fill]	[Local/test/prod; commit]	[Scenario and user roles]	[Expected vs actual]	[Audit row, stock values, status]

Appendix D. Pre-submission Checklist

- Enter the following information:
- • Institution, Programme, Guide Name, Student ID, Date, Name
- Ensure that all statements in your contribution section are true.
- Insert a screenshot of your deployed application (See Appendix A). You can also include the screenshots of your constraint, audit trail and Vercel deployment.
- Update Table of Contents and Page Numbers in Microsoft Word.
- Ensure all of your statuses, RPCs and roles are correct by checking them against the deployed database.
- For each graph, make sure it is labelled with its source, time frame and what it was calculated. Remove any graphs that do not have a valid reason for being there.
- If you have conducted interviews, only include verified findings.
- Check that the report meets the formatting and referencing standards of the faculty.