



Digital Transformation and Data-Driven Retail Execution in FMCG: An Empirical Study of HCCB's RED/GREEN Performance Measurement Framework

An Empirical Study of HCCB's RED/GREEN Performance Measurement Framework

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Abstract

Retail execution in fast-moving consumer goods (FMCG) depends on the ability to convert dispersed outlet-level observations into timely managerial action. This study examines how structured field data capture and performance measurement can support retail execution in the context of Hindustan Coca-Cola Beverages (HCCB). The study combines an empirical retailer-survey dataset with an exploratory case-study perspective and draws on the Technology Acceptance Model (TAM), the Resource-Based View (RBV), and Dynamic Capabilities theory. The raw dataset contains 257 submitted responses. After excluding records without both shop name and market area and deduplicating repeated outlet-area combinations, 240 unique outlet-area observations were retained. Coca-Cola assets were reported in 81.7% of these observations. Observed availability was high for Thums Up (95.8%), Coca-Cola (93.3%), Sprite (90.8%), Fanta (85.4%) and Maaza (74.2%), while lower availability was recorded for Diet Coke (17.1%), Coca-Cola 0 Sugar (15.4%), Charged (17.9%), Minute Maid (30.4%) and Rim Zim Soda (36.2%). Pepsi was reported in 36.7% of observations, Campa in 19.2%, and 41.7% reported no competition. Chi-square tests identified significant associations between asset availability and P&G outlet classification, no-competition status, and Pepsi presence; these results indicate association rather than causation. The study proposes a research-oriented RED/GREEN measurement architecture linking structured capture, execution measurement, dashboards, managerial prioritisation and verification.

Machine-learning applications for outlet-risk prediction, route optimisation, demand forecasting and image-assisted compliance are proposed as future capabilities rather than documented HCCB systems. The study contributes an empirical FMCG retail-execution case while maintaining a clear boundary between observed field evidence, secondary contextual evidence and proposed analytics.

Keywords: FMCG; digital transformation; retail execution; sales force automation; RED/GREEN; data-driven decision making; HCCB; outlet analytics; dynamic capabilities

1. Introduction and Industry Background

FMCG retail execution is characterised by high outlet density, frequent replenishment, heterogeneous retailer formats and intense competition at the point of purchase. In such settings, execution depends on more than product availability. Brand visibility, asset availability, cooler execution, assortment, outlet classification, competitor presence and distribution responsiveness can all shape the conditions observed at the retail point. Because these variables are dispersed geographically and can change between visits, managers require structured information that can be captured consistently and converted into action.



Digital transformation research distinguishes basic digitisation from broader organisational transformation. Vial (2019) describes digital transformation as a process in which digital technologies trigger organisational responses and changes in value creation. Verhoef et al. (2021) similarly distinguish stages of digitisation and digitalisation and emphasise organisational capabilities and performance measurement. In sales environments, sales-force-automation research indicates that technology benefits depend on user learning, adaptive selling and implementation support rather than on technology adoption alone (Park et al., 2010; Hunter & Perreault, 2007).

The HCCB internship context provides a field setting in which structured outlet observations, product and SKU availability checks, retailer interaction, competitive observation, cooler and asset verification, and market analysis were performed. The internship documentation also records a practical problem around manual RED-score calculation and a proposed AI-based RED compliance concept. The present study uses these observations as contextual case evidence but does not claim access to HCCB's proprietary scoring formula, internal software code or confidential business information.

The research problem is therefore framed around the information-to-action process: how can outlet-level data be captured, cleaned, measured and converted into managerial priorities that support retail execution? The study does not attempt to estimate a causal effect of digital transformation on sales because the available dataset does not contain a longitudinal treatment-control design or a validated measure of individual digital adoption.

1.1 Research Objectives

RO1. Examine how structured field/digital data capture can support consistency and visibility in FMCG retail execution.

RO2. Analyse outlet-level execution gaps using observable dimensions including product availability, asset availability, competition, outlet classification and SKU breadth.

RO3. Map the pathway from frontline data capture to performance measurement, dashboard insight and managerial prioritisation.

RO4. Propose a future analytics roadmap for outlet-risk prediction, route optimisation and demand forecasting.

1.2 Research Questions

RQ1. What retail-execution patterns are visible in the captured outlet-level dataset?

RQ2. How can structured outlet data be translated into a RED/GREEN-oriented performance-measurement architecture?

RQ3. What relationships exist between asset availability and selected outlet/competitive variables?

RQ4. How can predictive analytics extend a descriptive retail-execution system without replacing managerial validation?

2. Literature Review and Theoretical Underpinnings

2.1 Digital Transformation

Digital transformation is not limited to converting paper records into electronic records. Vial (2019) conceptualises it as organisational change associated with digital technologies, while Verhoef et al. (2021) emphasise changes in organisational resources, structures, strategies and metrics. For FMCG field operations, the implication is that mobile capture, digital ordering, outlet records and analytics create value when embedded in operating routines.

2.2 Technology Acceptance Model

Davis (1989) identifies perceived usefulness and perceived ease of use as central determinants of information-technology acceptance. TAM is relevant because frontline employees may resist a digital audit or sales tool if it adds effort without improving their work. In the present study TAM is a theoretical lens, not an empirically tested construct, because the uploaded retailer survey captures outlet conditions rather than salesperson perceptions.

2.3 Resource-Based View

Barney (1991) argues that valuable and difficult-to-imitate resources can underpin sustained competitive advantage. In a digital FMCG setting, the relevant resource may be a bundle comprising structured outlet data, process knowledge, analytical capability and organisational routines. The value therefore lies not in software alone but in the firm's ability to repeatedly turn information into effective action.



2.4 Dynamic Capabilities

Teece, Pisano and Shuen (1997) describe dynamic capabilities as organisational abilities to integrate, build and reconfigure resources in changing environments. Retail execution can be interpreted through a sensing–interpreting–acting loop: sensing outlet conditions, interpreting patterns through dashboards or performance measures, acting through targeted interventions, and updating the record after verification.

2.5 Sales Force Automation and Data-Driven Decision Making

Park et al. (2010) found that learning and adaptive selling behaviours mediate the relationship between sales-force automation and performance. Research on SFA implementation also highlights the role of training and support. Brynjolfsson, Hitt and Kim (2011) reported a positive relationship between data-driven decision making and productivity in a sample of large firms. These findings support the conceptual rationale for data-driven field management, but they do not establish that the same effect exists in this HCCB dataset.

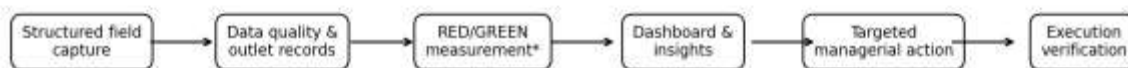
2.6 Research Gap

Existing research explains why digital technologies, organisational resources and data-driven decision making can matter, but there is value in showing how these concepts connect to granular FMCG outlet execution. This study addresses that operational gap by linking actual outlet observations to a research-oriented RED/GREEN measurement architecture and a managerial action loop.

3. Conceptual Framework

The study proposes the following conceptual pathway:

Digital/structured field capture → data quality and granular outlet records → RED/GREEN-oriented measurement → dashboard insights → targeted managerial decisions → execution verification and improvement.



*Research architecture; official HCCB proprietary weights/thresholds are not disclosed in this study.

Figure 1. Research-oriented data-to-decision framework. The RED/GREEN stage is a research architecture; official HCCB proprietary weights and thresholds are not reproduced.

The framework integrates the three theoretical perspectives. TAM explains adoption conditions for field technologies; RBV explains the potential value of accumulated data and analytics routines; and Dynamic Capabilities explains how information can be converted into adaptive action. The empirical dataset directly informs the outlet-observation layer. Predictive AI components are treated as future extensions.

4. Research Methodology

4.1 Research Design

An exploratory empirical case-study design was adopted. The primary empirical source is the retailer survey dataset captured during the HCCB internship. The contextual case source is the internship/OJT documentation, which records field activities and observations. The design is cross-sectional at the analytical outlet level and supports descriptive and associational inference, not causal inference.



4.2 Data Collection

The uploaded survey file contains 257 submitted responses. The dataset includes outlet identification, area, MGR, outlet type, Coca-Cola asset availability, product/SKU availability, competition, water-brand availability, system status, P&G classification, packaged-size information and retailer-reported issues. The internship documentation separately describes structured market-survey activities, including product availability, competition, asset verification and retail-execution observations.

4.3 Data Cleaning

Records lacking either shop name or market area were excluded from the outlet-level analytical frame. This left 243 records. A combined outlet key of shop name and area was then used to identify repeated outlet-area combinations. Three repeated combinations were identified; the latest timestamp was retained, resulting in 240 unique outlet-area observations. This procedure avoids treating repeated captures of the same outlet-area combination as independent outlets.

Cleaning stage	Records
Raw submitted responses	257
Records with shop name + area	243
Unique outlet-area observations	240
Repeated outlet-area records excluded	3

4.4 Measures and Variables

The principal variables were directly derived from the survey fields. Asset availability is a binary indicator based on the Coca-Cola asset field. Product availability indicators were derived from the captured cooler-stock field. Competition indicators were created for Pepsi and Campa, while a separate indicator identified observations explicitly reporting no competition. P&G and system status were analysed using reported-response denominators because some observations contain blank responses.

4.5 Statistical Analysis

Descriptive statistics were calculated using counts and percentages. Product availability is reported as the percentage of the 240 analytical observations in which the product appears in the captured stock field. Pearson chi-square tests were used to examine associations between selected categorical variables. A 5% significance level was used. Statistical significance is interpreted as evidence of association within the sample, not evidence of causality.

4.6 Confidentiality and Research Boundaries

The analysis does not disclose proprietary RED weights, confidential algorithms, source code, unreleased financial information or internal system architecture. The AI/ML architecture in this paper is explicitly proposed for future research and managerial evaluation. The paper also keeps the 240-observation raw-survey analysis separate from the 154-outlet/67-market-area subset reported in the internship documentation.

5. Empirical Results

5.1 Sample Profile

Indicator	Result
Raw survey responses	257
Records with shop + area	243
Unique outlet-area observations	240
Coca-Cola asset available	196 / 240 (81.7%)
P&G outlet – reported YES	76 / 197 reported (38.6%)



System outlet – reported YES	196 / 199 reported (98.5%)
No competition reported	100 / 240 (41.7%)
Pepsi present	88 / 240 (36.7%)
Campa present	46 / 240 (19.2%)

The P&G and system percentages use reported-response denominators. This is important because treating blank responses as “No” would artificially lower the reported rates.

5.2 Product/SKU Availability

Product/SKU	Outlets	Availability
Thums Up	230	95.8%
Coca-Cola	224	93.3%
Sprite	218	90.8%
Fanta	205	85.4%
Maaza	178	74.2%
Kinley Soda	128	53.3%
Limca	124	51.7%
Rim Zim Soda	87	36.2%
Minute Maid	73	30.4%
Charged	43	17.9%
Diet Coke	41	17.1%
Coca-Cola 0 Sugar	37	15.4%

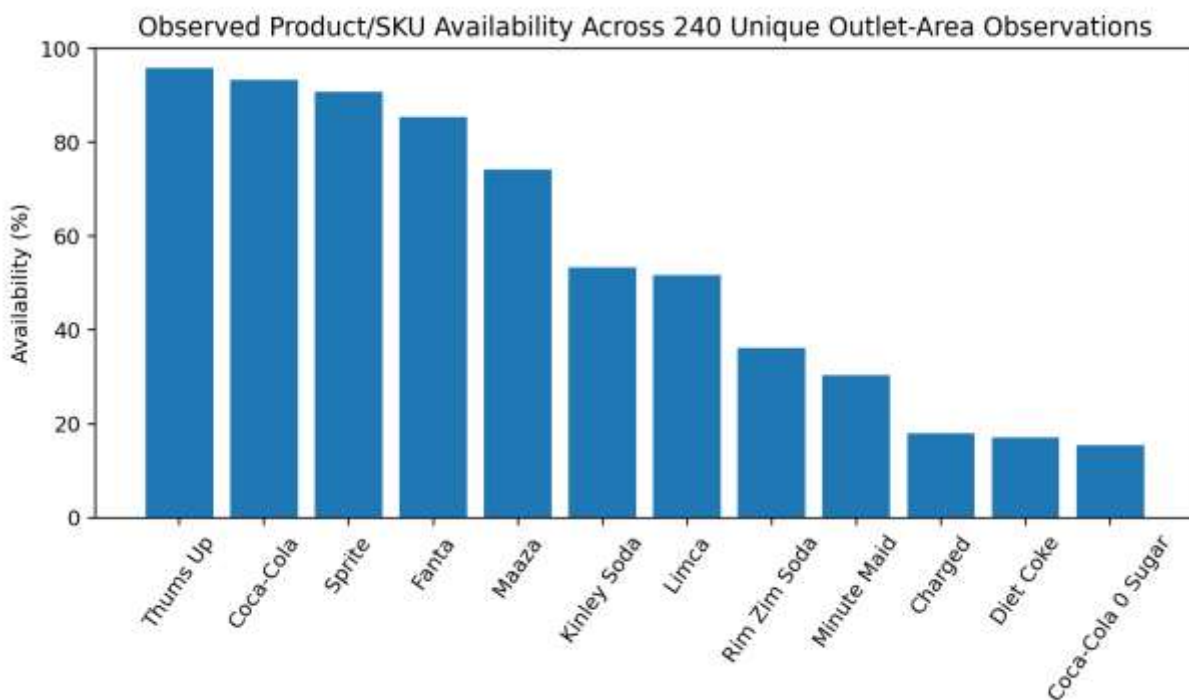


Figure 2. Observed product/SKU availability across 240 unique outlet-area observations.



The highest observed availability rates were for Thums Up, Coca-Cola, Sprite and Fanta, followed by Maaza. Lower observed availability occurred for Diet Coke, Coca-Cola 0 Sugar, Charged, Minute Maid and Rim Zim Soda. These differences identify assortment patterns for managerial investigation; they do not by themselves establish stock-out causes or sales impact.

5.3 Asset, Outlet and Competitive Conditions

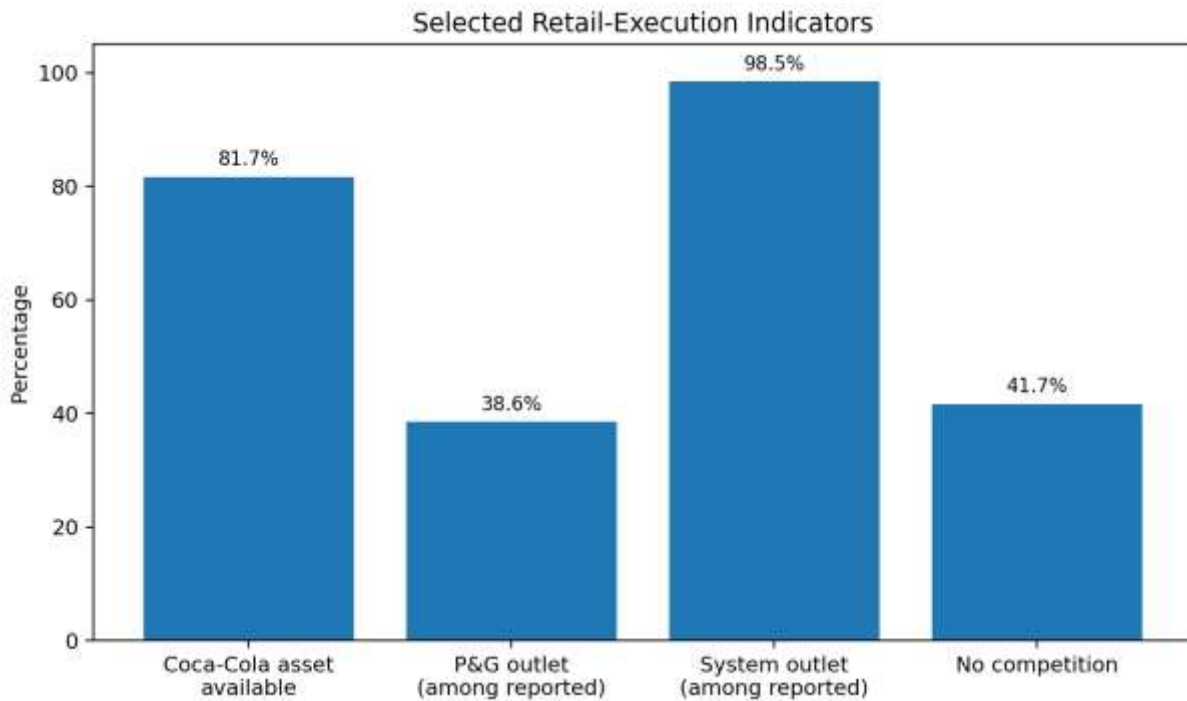


Figure 3. Selected retail-execution indicators. P&G and system percentages use reported-response denominators.

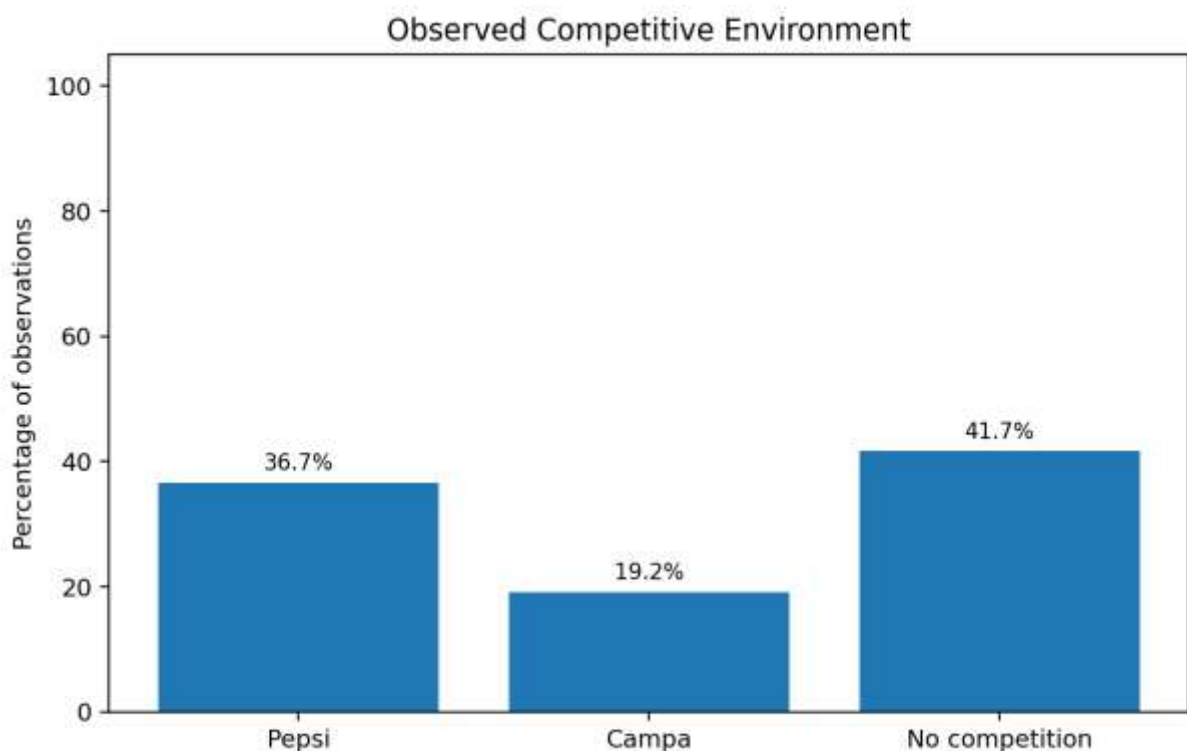


Figure 4. Observed competitive environment.

Coca-Cola assets were available in 81.7% of the analytical observations. Pepsi was observed in 36.7% and Campa in 19.2%, while 41.7% explicitly reported no competition. These variables provide complementary views of outlet



execution: asset presence captures physical availability of company equipment, whereas competitive presence captures the observed market context.

5.4 Chi-Square Association Analysis

Association	N	Test result	df	Interpretation
Asset availability × P&G outlet classification	240	23.208, $p < 0.001$	1	Significant association
Asset availability × no-competition status	240	8.934, $p = 0.0028$	1	Significant association
Asset availability × Pepsi presence	240	8.389, $p = 0.0038$	1	Significant association
P&G outlet classification × Pepsi presence	197	0.299, $p = 0.5843$	1	Not significant
Asset availability × system status	199	1.609, $p = 0.2046$	1	Not significant

Asset availability was significantly associated with P&G outlet classification, no-competition status and Pepsi presence in the analytical data. The P&G–Pepsi association was not statistically significant, and asset availability was also not significantly associated with system status. These results should be interpreted as sample-level associations. They may reflect outlet potential, location, format, historical sales, distributor practices or other variables not controlled for in the present cross-sectional analysis.

6. RED/GREEN Performance Measurement Framework

The field internship identified manual RED-score calculation and compliance monitoring as a practical operational challenge and developed a proposed AI-based RED compliance concept. The present study does not claim to reproduce HCCB's official RED scoring formula. Instead, it develops a research-oriented architecture based on the dimensions actually observable in the dataset and internship context.

Dimension	Observed/research indicator	Use in decision support
Product availability	SKU/product present in captured stock field	Identify assortment gaps
Asset availability	Coca-Cola asset present	Identify asset deployment/verification priorities
Competitive environment	Pepsi/Campa/other competition fields	Identify competitive conditions
Outlet classification	P&G, system and outlet-type fields	Review targeting and categorisation
Cooler execution	Cooler/purity/planogram observations where captured	Identify compliance actions
Service reliability	Retailer-reported delivery/stock issues	Escalate distribution/service gaps
Pack breadth	Packaged-size field	Assess assortment breadth



For research purposes, an execution index may be expressed as $REI_i = \sum(w_j X^*_{ij})$, where X^* is a normalised indicator and w represents an authorised or empirically estimated weight. No proprietary HCCB weights are assumed in this paper. If an authorised internal scoring rule becomes available for academic use, it can replace the generic construct.

6.1 Data-to-Decision Operating Loop

- Capture: record outlet, product, asset, competition and issue observations.
- Validate: check outlet identity, missing fields and duplicate records.
- Measure: classify execution conditions using the authorised RED/GREEN standard or a research index.
- Visualise: aggregate by outlet, area, MGR, outlet type and execution dimension.
- Prioritise: identify outlets with multiple or high-impact gaps.
- Act: assign corrective actions to the appropriate field/distribution owner.
- Verify: revisit or confirm the outcome and update the outlet record.

7. Discussion

The empirical results demonstrate the value of outlet-level granularity. Territory averages can conceal meaningful differences in assortment and competitive context, whereas structured outlet observations preserve those differences for analysis. The dataset therefore supports the proposition that the first value of digital/structured field capture is improved visibility into execution conditions.

The findings also support a capability-based interpretation. From an RBV perspective, structured outlet data become more valuable when combined with process knowledge and analytical routines. From a Dynamic Capabilities perspective, the data-to-decision loop can be viewed as sensing market conditions, interpreting them through performance measurement and acting through targeted interventions. TAM adds the frontline perspective: a field tool must be useful and sufficiently easy to use to sustain adoption.

The significant associations involving asset availability illustrate why multiple dimensions should be analysed together. Asset status, outlet classification and competition may be related in the observed data, but the direction and mechanism of those relationships cannot be inferred from the cross-sectional dataset. This reinforces the need for managerial interpretation and, in future studies, richer longitudinal data.

8. Managerial Implications

Based on the empirical execution dimensions examined in this study, a managerial decision matrix can be developed by combining execution status with observed competitive conditions. The matrix is intended as a research-derived decision-support framework rather than a representation of HCCB's proprietary RED/GREEN scoring rules. It illustrates how the same execution status may require different managerial responses depending on competitive intensity. Actual intervention decisions should additionally consider outlet potential, historical sales, distributor capability, issue history and managerial validation.

Execution status	High competitive threat	Low competitive threat
RED / Execution gap	ACTION A — Defensive intervention • Focused ASM/MGR audit • Verify cooler/asset and visibility compliance • Review SKU availability and replenishment/service gaps • Confirm corrective action and follow-up	ACTION B — Availability recovery • Investigate stock, delivery and service gaps • Review PJP/route frequency and order lead-time issues • Correct outlet categorisation where evidence indicates a mismatch • Restore execution before incremental investment



GREEN / Execution maintained	ACTION C — Competitive expansion - Strengthen visibility and assortment where outlet potential supports it - Evaluate incremental SKU and merchandising opportunities - Monitor competitor presence and changing execution conditions - Use periodic review to prevent deterioration into RED	ACTION D — Productivity and growth - Maintain existing execution standards - Evaluate assortment expansion and higher-value order opportunities - Improve merchandising efficiency and outlet productivity - Use data to identify scalable growth opportunities
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9. Future Analytics and AI Roadmap

The following capabilities are proposed future extensions and are not represented as existing HCCB proprietary systems.

Capability	Potential inputs	Potential output	Purpose
Outlet-risk prediction	Historical SKU gaps, assets, competition, issue history	Risk/priority score	Prioritise field attention
Dynamic route optimisation	Outlet priority, geography, PJP, service windows	Visit sequence	Improve productive coverage
Demand forecasting	Historical sales/orders, seasonality, SKU and outlet characteristics	SKU-level forecast	Reduce stock-out risk
Image-assisted compliance	Outlet/cooler photographs and validated labels	Compliance exceptions	Support audit review
Recommendation engine	Outlet gaps and historical corrective actions	Suggested action	Standardise responses
Management dashboard	Validated outlet-level records	Exception/RED-GREEN views	Accelerate decisions

A practical implementation sequence would be: data governance → automated descriptive dashboards → validated research scoring → historical data accumulation → predictive modelling → image-assisted compliance. Predictive models should be evaluated using out-of-sample validation and monitored for data drift. Computer vision should include human review and a clearly defined escalation mechanism.

10. Theoretical Contributions

- The study connects digital-transformation theory with granular FMCG retail execution.
- It frames data, analytics capability and field routines as a potential information-based organisational resource under RBV.
- It operationalises Dynamic Capabilities as a sensing–interpreting–acting–verifying loop at outlet level.
- It identifies a boundary between theoretical technology-adoption constructs and the empirical variables actually available in the retailer dataset.



11. Limitations

- The analytical dataset represents a specific field-survey context and should not be generalised to the entire HCCB network without broader sampling.
- The cross-sectional design does not establish causal effects of digital transformation, assets, competition or SKU availability on sales.
- The dataset does not contain a validated salesperson-level TAM instrument; therefore TAM is discussed theoretically rather than statistically tested.
- Sales revenue, order value, outlet profitability and longitudinal sales outcomes were not available for this analysis.
- Several fields contain missing or free-text responses, requiring field-specific denominators and cleaning rules.
- Official HCCB RED/GREEN weights and thresholds were not supplied and therefore are not reproduced.
- Chi-square tests do not control for potential confounders such as outlet size, geography, historical sales, retailer preference or distributor characteristics.

12. Conclusion

This study demonstrates how actual outlet-level field data can support a data-driven approach to FMCG retail execution. Across 240 unique outlet-area observations, the dataset reveals substantial asset coverage alongside variation in product availability and competitive conditions. The association analysis indicates that asset availability is statistically related to selected outlet and competition variables, while the absence of causal design prevents stronger claims.

The principal contribution is a practical information-to-action framework: capture reliable outlet data, validate it, convert observations into a consistent performance measure, visualise exceptions, prioritise action and verify the result. RED/GREEN can serve as a useful performance language within such a loop, provided official scoring rules are applied according to authorised standards. Predictive analytics can extend the system through outlet-risk scoring, route optimisation and demand forecasting once sufficient historical data and governance mechanisms exist.

For HCCB and comparable FMCG organisations, the strategic opportunity is therefore not simply to collect more data but to build a repeatable organisational capability for converting granular data into timely field decisions. This conclusion is consistent with the combined logic of TAM, RBV and Dynamic Capabilities: technology must be usable, data and analytics must become organisational resources, and information must lead to adaptive action.

Data and confidentiality note. The empirical analysis uses outlet-level field/survey observations collected during the study period. Company-sensitive operational details, proprietary scoring weights, internal algorithms and confidential financial information are not disclosed. The proposed AI and analytics architecture is presented as a research framework and should not be interpreted as an existing HCCB proprietary system.

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