ISSN: 2583-9888
DOI: doi.org/10.51219/JAIMLD/tulasi-siva-krishna-prasad-kadiyam/691

URF PUBLISHERS
connect with research world

Journal of Artificial Intelligence, Machine Learning and Data Science

https://urfpublishers.com/journal/artificial-intelligence

Vol: 6 & Iss: 2

Research Article

Intelligent Retail Supply Chain Master Data Automation Using SAP Fiori and SAP BTP

Tulasi Siva Krishna Prasad Kadiyam*

Global Technology and Innovation Leader, Corning Incorporated, USA

Citation: Kadiyam TSKP. Intelligent Retail Supply Chain Master Data Automation Using SAP Fiori and SAP BTP. *J Artif Intell Mach Learn & Data Sci 2023* 6(2), 3509-3516. DOI: doi.org/10.51219/JAIMLD/tulasi-siva-krishna-prasad-kadiyam/691

Received: 02 June, 2023; **Accepted:** 18 June, 2023; **Published:** 20 June, 2023

***Corresponding author:** Tulasi Siva Krishna Prasad Kadiyam, Global Technology and Innovation Leader, Corning Incorporated, USA

ABSTRACT

High-quality master data is essential to the efficiency, responsiveness and reliability of retail supply chains. However, many retail organizations continue to rely on fragmented, manual and error-prone master data processes that delay product onboarding, create duplicate records, reduce data consistency and increase operational risk. This study proposes an intelligent retail supply chain master data automation framework based on SAP S/4HANA, SAP Fiori and SAP Business Technology Platform. The framework integrates user-friendly Fiori applications, BTP-based workflow automation, governance controls and AI-assisted validation to improve the creation, verification, approval and maintenance of retail master data. It incorporates automated completeness checks, duplicate detection, anomaly identification, rule-based validation and role-based approvals within a governed data lifecycle. The proposed approach is evaluated conceptually using data quality, processing time, manual effort, governance effectiveness and onboarding efficiency as key performance indicators. The study demonstrates how combining enterprise architecture, intelligent automation and data governance can strengthen master data quality while supporting faster and more scalable retail supply chain operations. The framework provides practical guidance for organizations pursuing SAP-enabled digital transformation and intelligent data management.

Keywords: SAP S/4HANA, SAP Fiori, SAP BTP, master data management, retail supply chain, workflow automation, AI-assisted validation, data governance, digital transformation

1. Introduction

Retail supply chains are highly interconnected networks of suppliers, manufacturers, distribution centers, logistics providers, stores, digital commerce platforms and customers. The impact of these networks is strongly dependent on the quality, consistency and accessibility of master data throughout operational and analytical processes. Master data consists of relatively stable business entities, like products, materials, suppliers, customers, locations, pricing data attributes, units of measure and organizational structures. With missing, duplicated, inconsistent and outdated data, errors can begin to cascade throughout the procurement, inventory planning

order fulfillment, transportation, merchandising and financial processes. Therefore, data quality should be considered not only on a technical level, but also in terms of its completeness, consistency, relevance, accessibility and fitness for business use[1]. In a supply chain environment, the reliability of the analytical data can be weakened, planning decisions distorted and value of enterprise information systems (EIS) diminished by poor quality data[2].

In retail, it can be especially challenging as businesses often deal with thousands to millions of product records, channel-specific locations, suppliers, seasonal product lines and geographies. When introducing a new product, a lot of information can have to be described, classified, made available for suppliers, taxed, priced, logistically defined and replenished. These tasks still rely on spreadsheets, e-mail, disconnected applications and manual, sequential approvals in many organizations. This disjointed operation can lead to duplicate records, missing fields, misclassification, long delays in approvals and unclear responsibility. Organisational, procedural and technological barriers are reported by Haug and Arlbjørn[3] as significant factors in the master data quality issues and by Otto, et al.[4,5] as essential requirements for achieving sustainable master data quality, which include clear responsibilities, processes, standards and governance mechanisms. Therefore, the decision rights and accountability for creating, validating, approving, maintaining and consuming critical enterprise data[6] will be needed for effective data governance.

With digital transformation, the chance to re-imagine these processes by embracing enterprise platforms and intelligent automation. In SAP-based retail environments, SAP S/4HANA can be used as the foundation of transaction and master data and SAP Fiori can be used for role-oriented user experiences for data entry, review, approval and exception handling. SAP Business Technology Platform can help to further extend this environment and enable the development of applications, process integration, workflow orchestration, automation, analytics and intelligent services. These technologies can enable organizations to create master data management workflows that are at the same time governed and automated, with the ability to route requests to the next step, validate mandatory elements, identify potential duplicates, catch anomalies, enforce business rules and escalate exceptions to responsible master data stewards. This is in line with the wider research demonstrating that the use of digital technologies can enhance the visibility, integration and responsiveness of information along supply chains[7,8]. It also shows how the use of artificial intelligence is growing in the area of organization decision support and performance improvement[9,10].

AI-assisted validation is particularly relevant where retail master data volumes make purely manual control difficult to sustain. Intelligent mechanisms can support pattern recognition, anomaly detection, duplicate identification, classification assistance and confidence-based validation while preserving human oversight for sensitive or uncertain decisions. However, automation alone does not guarantee trusted data. Governance remains essential because responsibilities, quality standards, approval authorities and exception procedures must be explicitly defined. Weber, et al.[11] argue that data governance arrangements should be adapted to organizational context rather than applied uniformly, while Vilminko-Heikkinen and Pekkola[12] show that successful master data management depends strongly on organizational implementation and coordination. Consequently, an effective retail solution must combine technology, workflow design, governance and intelligent validation within a unified operating model.

This study therefore aims to develop an intelligent retail supply chain master data automation framework integrating SAP S/4HANA, SAP Fiori, SAP BTP, workflow automation, governance controls and AI-assisted data validation. Its objectives are to define an integrated master data lifecycle, identify mechanisms for reducing manual processing and data errors, establish governance and approval responsibilities and propose performance measures for evaluating data quality, onboarding speed, processing effort and operational effectiveness. The study contributes by linking established master data governance principles with contemporary SAP enterprise architecture and intelligent automation. In doing so, it provides a practical and conceptually grounded framework for retailers seeking to improve master data reliability, accelerate business onboarding and strengthen digitally enabled supply chain performance.

2. Literature Review and Conceptual Foundations

2.1. Retail master data management and data quality

MDM is a key enabler for retail supply chain coordination because the daily activities of the supply chain rely on uniform product, supplier, customer, store, pricing, inventory and logistics attributes. These data objects are common to procurement, merchandising, warehousing, transportation, sales, e-commerce and finance in large retail stores. These mistakes can then ripple through multiple downstream operations, leading to such issues as inventory inaccuracies, late orders, incorrect buying decisions, mismatching prices and fulfillment errors. Wang and Strong[1] believe that data quality is not just about accuracy - it's about completeness, consistency, relevance, accessibility and fitness for use. In eCommerce, master data plays a crucial role in making real-time operational decisions, particularly in multi-channel environments.

In addition to technical issues, poor governance, overlapping ownership, inconsistent processes and unclear responsibilities are significant contributors to master data quality issues. In Haug and Arlbjørn[3] they point to organizational and process barriers as major drivers of poor master data quality. Likewise, Otto, et al.[4,5] argue that effective master data quality management needs to be structured, involve responsibility, is measurable and should be monitored continuously. On governance, Khatri and Brown[6] suggest that organizations need to set up decision authority and responsibility for important data assets. Weber, et al.[11] also propose that governance structures should be adapted to the specific context of the organization rather than depending on a generic governance structure.

These principles can be directly applied in the retail supply chain. Multiple departments and approval authorities are often involved with onboarding products, creating suppliers, changing prices and changing stores. If the governance model is not in place, duplications of records, varying naming conventions, missing attributes, inconsistent classifications may result. These issues impact the accuracy of analytics and the decision-making process in the supply chain. Hazen, et al.[2] show how poor data quality can impact predictive analytics and supply chain performance and Kache and Seuring[8] emphasize the increasing

relevance of quality information in a more data-intensive supply chain.

2.2. SAP S/4HANA, SAP Fiori and SAP BTP architectural foundations

SAP S/4 HANA is the enterprise transactional bedrock that enables companies to connect business processes like procurement, inventory, sales, logistics and finance. In an intelligent retail master data architecture, S/4HANA can serve as an authoritative operational core that hosts approved master data and that is used by downstream processes. But a good architecture can't be just a centralized data store. It also needs to be easy for users to interact with, to coordinate workflows, to have validation in place and to be integrated with other applications.

The user interaction layer for these processes is offered via SAP Fiori – role-based applications and standardized user experiences. In the case of a retail master data use case, Fiori interfaces can be used for initiating requests, guiding data entry, reviewing records, approving and rejecting records, handling exceptions and tracking status. This significantly cuts dependence on spreadsheets, email and other disconnected communication methods. The general relevance of the integrated digital interfaces is in line with literature on the digital transformation, which focuses on the redesign of processes and on creating more interaction between processes in the organization and not just on replacing the existing technologies[13,14].

SAP Business Technology Platform builds on this on by providing application development, integration, workflow orchestration, automation, business rules, APIs, analytics and intelligent services. The conceptual model proposed should be seen as an integration and automation layer between the Fiori applications, SAP S/4HANA, external data sources and validation services. This enables a modular extension without any more modifications of the transactional core. The digital supply chain research indicates that the integration capability and interoperability of digital technologies are key to the realization of visibility, responsiveness and operational coordination[7,15].

2.3. Workflow automation, AI-assisted validation and research gap

Workflow automation can significantly improve master data operations by replacing unstructured manual handoffs with predefined digital processes. Automated workflows can route requests according to data type, business unit, risk level or approval authority. They can also enforce mandatory fields, trigger business rules, generate notifications, maintain audit trails and escalate unresolved exceptions. Syed, et al.[16] demonstrate that process automation can reduce repetitive work while improving process consistency, although governance and exception management remain important challenges.

AI-assisted validation extends conventional rule-based controls by identifying patterns that may not be easily captured through predefined business rules. Potential applications include duplicate detection, anomaly identification, completeness checking, classification support and identification of unusual combinations of master data attributes. AI can therefore assist data stewards by prioritizing suspicious records and reducing repetitive verification activities. Research indicates that AI capabilities can improve organizational performance when they are integrated with appropriate organizational resources and decision processes[10,17]. Within supply chain management, AI has also been associated with improvements in forecasting, decision support, process optimization and operational responsiveness[9,18].

Despite these developments, an important research gap remains. Existing studies largely examine data quality, master data governance, digital transformation, process automation and AI-enabled supply chains as separate research domains. Limited scholarly attention has been given to an integrated framework that connects SAP Fiori-based user interaction, SAP BTP-enabled orchestration, SAP S/4HANA master data, governance responsibilities and AI-assisted validation within a retail supply chain context. This study addresses that gap by proposing a unified architecture in which human governance, workflow automation, enterprise integration and intelligent validation operate as complementary components of master data management.

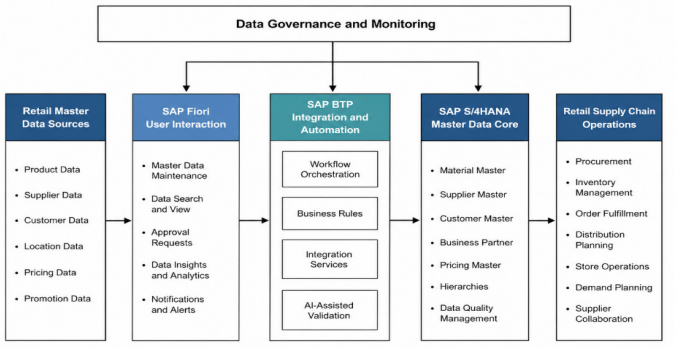

Figure 1: Conceptual Architecture for Intelligent Retail Supply Chain Master Data Automation Using SAP.

Table 1: Conceptual Foundations of Intelligent Retail Master Data Automation.

Conceptual Area	Core Focus	Relevant Literature	Application to Proposed Framework
Master Data Quality	Accuracy, completeness, consistency, relevance, usability	Wang & Strong[1]; Haug & Arlbjørn[3]	Establishes validation and quality-control requirements
Data Governance	Decision rights, ownership, accountability, stewardship	Weber, et al.[11]; Khatri & Brown[6]; Otto[19]	Defines approval roles, responsibilities and escalation mechanisms
Master Data Management	Standardized creation, maintenance and control of enterprise data	Otto, et al.[4,5]	Supports controlled retail master data lifecycle
Digital Supply Chain	Integration, visibility, responsiveness, digital coordination	Kache & Seuring[8]; Büyüközkan & Göçer[7]	Connects trusted master data with retail supply chain processes
Workflow Automation	Process standardization, routing and reduction of repetitive work	Syed, et al.[16]	Automates creation, review, approval and exception handling
AI-Assisted Validation	Pattern recognition, anomaly detection, decision support	Mikalef & Gupta[10]; Toorajipour, et al.[9]; Pournader, et al.[18]	Enables duplicate detection, anomaly checking and intelligent validation
Digital Transformation	Enterprise-wide redesign through digital capabilities	Vial[13]; Verhoef, et al.[14]	Positions SAP-enabled master data automation within broader transformation strategy

3. Research Methodology and Proposed Automation Framework

3.1. Research design and framework-development approach

The conceptual design-oriented research approach is used in this research for developing an intelligent automation framework for retail supply chain master data management. The methodology is based on the synthesis of literature from various sources, including master data quality, data governance, enterprise information systems, workflow automation, AI and digital supply chain transformation. The study does not focus on a single organizational implementation, but builds a framework for an SAP Fiori, SAP Business Technology Platform, SAP S/4HANA, workflow automation, governance controls and AI-assisted validation master data operating model. This is suitable, as master data problems are socio-technical in nature and they encompass technology, process organizational responsibilities, data standards and decision rights. Past research has demonstrated that master data management has to be a collective effort of organizations, a master of the governance, quality control mechanisms and a technical solution and not any of these components alone[3-5].

There are four analytical stages in the development of the framework. First, the critical retail master data entities and activities in their lifecycle are identified. Second, the areas and locations where errors are being made, duplication, missing information and approval delays are marked. Third, digital competencies are allocated to these activities, such as engaging with Fiori orchestrating workflows using BTP, implementing business rules, providing APIs, automating services and validating them with AI. Lastly, governance tasks and performance monitoring are included to guarantee that automated choices are accountable and trackable. The framework also incorporates technological automation along with organizational governance because, according to Khatri & Brown[6] and Weber, et al.[11], decision rights, responsibilities and accountability for enterprise data assets must be clearly defined to be a part of data governance.

3.2. Retail master data lifecycle and fiori-based user interaction

The proposed retail master data lifecycle is initiated by customer request, captured, validated (preliminary and intelligent), reviewed, approved, activated, distributed, monitored and then maintained. The lifecycle covers important retail elements like products, suppliers, customers, stores, logistics attributes, purchasing information and pricing master data. A master data request can be triggered when a retailer launches a new product, a retailer adds a new supplier, a retailer opens a new store, a retailer updates the logistics parameters or changes the existing commercial information.

These activities are the major point of user interaction that's provided through SAP Fiori. Authorized users can submit master data requests via consistent interfaces based on roles rather than relying on spreadsheets, email or disparate forms. When guided data entry is used it may be necessary to fill in certain mandatory fields, format the data in a specific way, select from a limited list of values and contextually display information that must be known before a request can proceed. For instance, in a product creation request, the product description, category, supplier, unit of measure, tax classification, purchasing attributes, logistics characteristics and sales information are required. When essential information is missing, the system can prevent it from being submitted, thus reducing the completeness issue at the time of creation.

Fiori based interaction also enables transparency throughout the master data lifecycle. Requesters can track the status of submissions, while data stewards and approval authorities can view submission status by tasks and review, correct, approve or reject. This kind of organized interaction decreases the amount of unofficial "handoffs," and helps to manage the process in a more consistent matter. This is significant because many master data quality issues are not only technical, but also due to lack of clarity in ownership and inconsistent organizational processes[12]. However standardized digital interfaces help to achieve process discipline and better user accountability.

3.3. SAP BTP workflow, integration and ai-assisted validation

SAP BTP functions as the central orchestration and integration layer of the proposed framework. Once a master data request is submitted through SAP Fiori, workflow services coordinate the sequence of validation, review, approval and posting activities. Routing decisions can be based on master data type, business unit, geographical location, financial significance, risk level or exception severity. Standard requests may proceed through automated validation and routine approval, while high-risk or unusual records can be escalated to specialist data stewards or governance authorities.

Integration services and APIs support information exchange between SAP Fiori, SAP S/4HANA, external supplier systems, product information platforms and other relevant applications. This integration reduces repeated manual entry and supports consistent use of validated information across enterprise processes. Research on digital supply chains emphasizes that information integration and connectivity are important for improving visibility, coordination and responsiveness[7,15].

AI-assisted validation complements deterministic business rules by examining patterns within master data. Duplicate detection can compare new records against existing entities using combinations of product descriptions, supplier identifiers, addresses, classification codes or other attributes. Anomaly detection can identify values that differ significantly from expected patterns, such as an unusual unit of measure, exceptional product dimensions, abnormal pricing attributes or inconsistent category assignments. Completeness checking determines whether required data has been supplied, while classification assistance can recommend likely categories based on previously validated records.

AI recommendations should not automatically replace human judgment in high-risk cases. Instead, confidence scores and validation results can be used to determine whether a request is approved automatically, routed for manual review or rejected for correction. This human-supervised model reflects broader research showing that AI creates greater organizational value when it is integrated with appropriate organizational capabilities and decision processes[10,17].

3.4. Governance Roles, approval mechanisms and control structure

Governance provides the control structure that ensures automation does not weaken accountability. The proposed framework distinguishes among requesters, data owners, data stewards, approval authorities, system administrators and process owners. Requesters initiate or modify records, while data stewards verify quality and resolve exceptions. Data owners remain accountable for standards and business definitions, whereas approval authorities authorize records with significant operational, financial or compliance implications.

Approval mechanisms should follow risk-based rules rather than applying identical controls to every request. Low-risk and high-confidence changes may proceed through simplified approval, while sensitive records can require multiple validation stages. Every significant action should generate an audit trail containing the requester, validation results, approvals, exceptions, modifications and final activation status. Otto[19] emphasizes that effective data governance depends on clearly defined organizational responsibilities, while Weber, et al.[11] demonstrate that governance structures should be adapted to organizational requirements.

After approval, validated master data is transferred to SAP S/4HANA and made available to procurement, inventory, sales, logistics and finance processes. Continuous monitoring then measures data quality, processing time, exception rates, duplicate rates, approval delays and manual intervention. The resulting feedback supports continuous refinement of business rules, workflows and AI validation models, creating a closed-loop master data governance system **(Figure 2)** and **(Table 2)**.

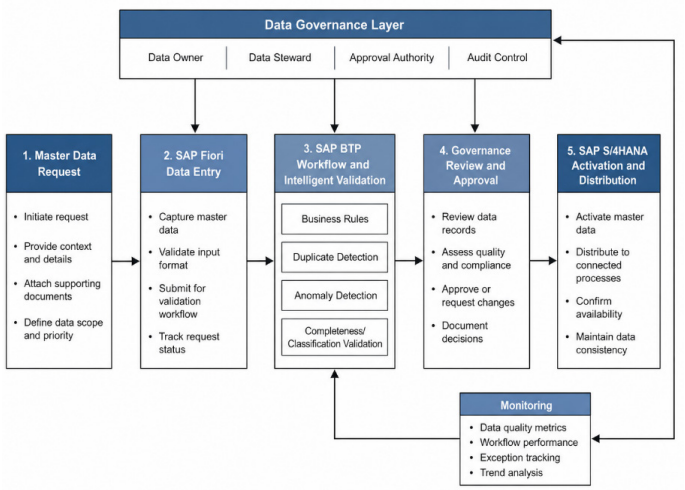

Figure 2: Proposed Intelligent Retail Master Data Automation Framework.

Table 2: Components of the Proposed Retail Master Data Automation Framework.

Framework Component	Main Function	Key Activities	Expected Control/Outcome
Retail Master Data Request	Initiates creation or modification	Product, supplier, customer, store, pricing and logistics requests	Standardized request initiation
SAP Fiori Interaction	Provides structured user interface	Guided entry, mandatory fields, review, status tracking	Improved completeness and usability
SAP BTP Workflow	Orchestrates process execution	Routing, notifications, approvals, escalation	Reduced processing delay and manual handoffs
Integration Layer	Connects enterprise applications	APIs, system integration, data exchange	Greater consistency across systems
Business Rules	Applies deterministic controls	Format, range, policy and mandatory-field validation	Prevention of known data errors
AI-Assisted Validation	Detects complex quality problems	Duplicate detection, anomalies, classification, completeness checking	Improved quality and reduced manual verification
Governance and Approval	Establishes accountability	Ownership, stewardship, approval, exception handling	Controlled and auditable decision-making
SAP S/4HANA Core	Activates approved master data	Master record creation and operational distribution	Trusted data for supply chain execution
Monitoring and Feedback	Measures performance	Quality KPIs, exception rates, processing time, audit trails	Continuous improvement of master data governance

The proposed framework can be evaluated according to its ability to improve master data quality while reducing the operational effort associated with retail master data creation, validation, approval and activation. Data quality represents the first evaluation dimension because inaccurate, incomplete, inconsistent or duplicated records can affect procurement, inventory planning, replenishment, logistics, pricing and sales execution. Wang and Strong[1] establish that data quality should be assessed through multiple dimensions, including accuracy, completeness, consistency and relevance. Accordingly, the proposed framework combines structured SAP Fiori data entry, business-rule validation, duplicate detection, anomaly identification and governance review to prevent defective information from entering SAP S/4HANA.

4. Framework Evaluation and Retail Supply Chain Impact

4.1. Data Quality, process efficiency and governance effectiveness

The proposed framework can be evaluated according to its ability to improve master data quality while reducing the operational effort associated with retail master data creation, validation, approval and activation. Data quality represents the first evaluation dimension because inaccurate, incomplete, inconsistent or duplicated records can affect procurement, inventory planning, replenishment, logistics, pricing and sales execution. Wang and Strong[1] establish that data quality should be assessed through multiple dimensions, including accuracy, completeness, consistency and relevance. Accordingly, the

proposed framework combines structured SAP Fiori data entry, business-rule validation, duplicate detection, anomaly identification and governance review to prevent defective information from entering SAP S/4HANA.

Automated completeness checks can identify missing mandatory attributes before records progress through the workflow, while duplicate detection can compare new requests with existing product, supplier, customer or location records. AI-assisted anomaly detection provides an additional control by identifying unusual combinations or values that may satisfy conventional validation rules but remain inconsistent with established data patterns. These controls support continuous data quality management, which is important for maintaining trustworthy information in complex digital environments[20].

A second evaluation dimension concerns processing efficiency. Traditional retail master data processes often involve spreadsheet-based requests, email communication, repeated manual verification and sequential approval activities. Such practices increase processing time and create administrative bottlenecks. SAP BTP workflow orchestration can automate task assignment, notifications, validation sequences, approvals and exception escalation. This reduces repetitive manual intervention and shortens the time between initial master data request and final activation. Process automation research indicates that automation can improve consistency and efficiency by reducing repetitive human activities and standardizing process execution[16].

Governance effectiveness is equally important. The framework does not treat automation as a replacement for organizational accountability. Data owners, data stewards, approval authorities and process owners retain clearly defined responsibilities. Automated audit trails provide evidence of submissions, validation results, changes, approvals, rejections and exceptions. Such transparency supports accountability and compliance with internal master data policies. This reflects the governance principles of Khatri and Brown[6], who emphasize clear decision rights and responsibilities for enterprise data.

4.2. Supply chain impact, KPIs and comparison with traditional processes

The operational value of the framework should ultimately be assessed through its impact on retail supply chain performance. Reliable master data can improve product onboarding, purchasing accuracy, inventory visibility, replenishment decisions, warehouse execution order fulfillment and coordination between suppliers and retail channels. Hazen, et al.[2] demonstrate that data quality directly influences the usefulness of supply chain analytics, while Büyüközkan and Göçer[7] identify information integration and digital connectivity as important foundations of digital supply chain performance.

Evaluation should therefore employ a balanced set of key performance indicators. Recommended metrics include master data accuracy rate, completeness rate, duplicate-record rate, first-time-right rate, average request processing time, product onboarding cycle time, manual intervention rate, approval turnaround time, exception rate, governance compliance rate and downstream error rate. These indicators allow organizations to measure both technical data quality and operational performance.

Compared with traditional master data management, the proposed framework is expected to provide stronger performance across several dimensions. Traditional processes are characterized by high manual effort, slower validation, fragmented approval mechanisms, limited real-time monitoring and primarily reactive error correction. The proposed SAP-enabled model introduces standardized Fiori interactions, automated BTP workflows, intelligent validation, traceable governance and continuous monitoring. AI should remain supportive rather than fully autonomous, particularly where uncertain or high-impact master data decisions require human review. This combination of automation and governance provides a stronger basis for scalable retail operations and supports the wider organizational value associated with intelligent digital transformation[10,14].

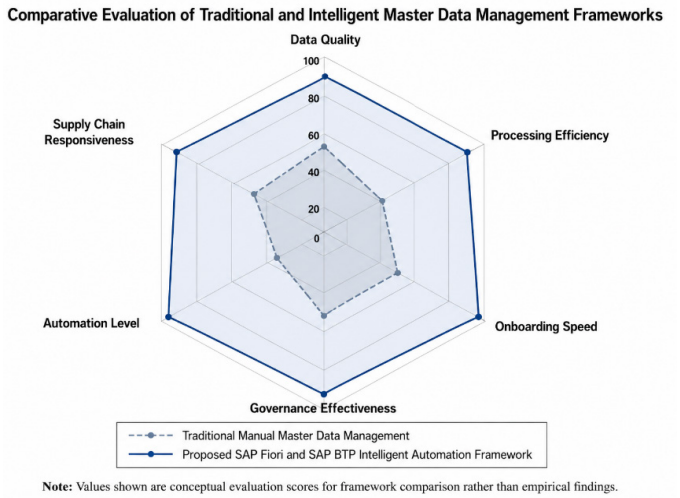

Figure 3: Comparative Performance of Traditional and Intelligent Retail Master Data Management.

5. Discussion

The proposed intelligent retail master data automation framework demonstrates how SAP Fiori, SAP Business Technology Platform, SAP S/4HANA, workflow automation, governance controls and AI-assisted validation can be combined to address persistent master data challenges in retail supply chains. The framework responds to a central problem identified in the literature: data quality failures are rarely caused by technology alone. They often result from fragmented responsibilities, inconsistent procedures, weak governance and limited process visibility[3-5]. By integrating structured user interaction with automated validation and clearly defined approval responsibilities, the proposed framework establishes a more controlled and traceable master data lifecycle.

A major contribution of the framework is the positioning of SAP BTP as the orchestration layer between user-facing Fiori applications and the SAP S/4HANA transactional core. This arrangement supports workflow automation, rule enforcement, integration services, exception handling and intelligent validation without relying excessively on manual intervention. Such capabilities are particularly valuable in retail environments where large volumes of product, supplier, customer, store and logistics data must be processed rapidly. The framework also supports the broader argument that digital technologies create greater operational value when they improve information integration, process coordination and organizational responsiveness[7,14].

AI-assisted validation further extends conventional master data controls by supporting duplicate detection, anomaly identification, classification and completeness assessment.

However, the framework deliberately retains human governance for uncertain, sensitive or high-impact decisions. This reflects the importance of balancing automation with accountability. Clear data ownership, stewardship, approval authority and auditability remain necessary even where intelligent systems support decision-making[6,11].

From an operational perspective, improved master data quality can support faster product onboarding, more reliable inventory planning, accurate procurement, better replenishment and fewer downstream errors. Nevertheless, successful implementation depends on data standards, integration maturity, employee adoption, governance discipline and appropriate AI model monitoring. Future empirical studies should therefore validate the framework using real organizational data and longitudinal performance measures.

6. Conclusion

This study proposed an intelligent retail supply chain master data automation framework integrating SAP Fiori, SAP BTP, SAP S/4HANA, workflow automation, governance mechanisms and AI-assisted validation. The framework addresses limitations associated with fragmented and manually intensive master data processes by establishing a structured lifecycle from data request and validation to governance approval, activation, distribution and continuous monitoring.

Its principal value lies in combining technological automation with organizational accountability. SAP Fiori provides standardized user interaction, while SAP BTP supports workflow orchestration, integration, business rules and intelligent validation. SAP S/4HANA serves as the operational master data core, while data owners, stewards and approval authorities maintain governance oversight. This combination can improve data completeness, reduce duplication, shorten onboarding cycles, lower manual effort and strengthen supply chain reliability.

The framework also provides measurable indicators for evaluating data quality, processing efficiency, governance effectiveness and downstream operational impact. Although conceptual, it offers a practical foundation for organizations pursuing SAP-enabled retail transformation. Future research should test the framework through case studies and empirical implementation data to determine its effectiveness across different retail environments and organizational scales.

7. References

1. Wang RY, Strong DM. Beyond accuracy: What data quality means to data consumers. Journal of Management Information Systems, 1996;12: 5-33.
2. Hazen BT, Boone CA, Ezell JD, et al. Data quality for data science, predictive analytics and big data in supply chain management: An introduction to the problem and suggestions for research and applications. International Journal of Production Economics, 2014;154: 72-80.
3. Haug A, Arlbjørn JS. Barriers to master data quality. Journal of Enterprise Information Management, 2011;24: 288-303.
4. Otto B. How to design the master data architecture: Findings from a case study at Bosch. International Journal of Information Management, 2012;32: 337-346.
5. Otto B, Hüner KM, Österle H. Toward a functional reference model for master data quality management. Information Systems and e-Business Management, 2012;10: 395-425.
6. Khatri V, Brown CV. Designing data governance. Communications of the ACM, 2010;53: 148-152.
7. Büyüközkan G, Göçer F. Digital supply chain: Literature review and a proposed framework for future research. Computers in Industry, 2018;97: 157-177.
8. Kache F, Seuring S. Challenges and opportunities of digital information at the intersection of Big Data Analytics and supply chain management. International Journal of Operations & Production Management, 2017;37: 10-36.
9. Toorajipour R, Sohrabpour V, Nazarpour A, et al. Artificial intelligence in supply chain management: A systematic literature review. Journal of Business Research, 2021;122: 502-517.
10. Mikalef P, Gupta M. Artificial intelligence capability: Conceptualization, measurement calibration and empirical study on its impact on organizational creativity and firm performance. Information & Management, 2021;58: 103434.
11. Weber K, Otto B, Österle H. One size does not fit all: A contingency approach to data governance. ACM Journal of Data and Information Quality, 2009;1.
12. Vilminko-Heikkinen R, Pekkola S. Master data management and its organizational implementation: An ethnographical study within the public sector. Journal of Enterprise Information Management, 2017;30: 454-475.
13. Vial G. Understanding digital transformation: A review and a research agenda. The Journal of Strategic Information Systems, 2019;28: 118-144.
14. Verhoef PC, Broekhuizen T, Bart Y, et al. Digital transformation: A multidisciplinary reflection and research agenda. Journal of Business Research, 2021;122: 889-901.
15. Daneshvar Kakhki M, Gargeya VB. Information systems for supply chain management: A systematic literature analysis. International Journal of Production Research, 2019;57: 5318-5339.
16. Syed R, Suriadi S, Adams M, et al. Robotic process automation: Contemporary themes and challenges. Computers in Industry, 2020;115: 103162.
17. Wamba-Taguimdje SL, Fosso Wamba S, Kala Kamdjoug JR, et al. Influence of artificial intelligence (AI) on firm performance: The business value of AI-based transformation projects. Business Process Management Journal, 2020;26: 1893-1924.
18. Pournader M, Ghaderi H, Hassanzadegan A, et al. Artificial intelligence applications in supply chain management. International Journal of Production Economics, 2021;241: 108250.
19. Otto B. Organizing data governance: Findings from the telecommunications industry and consequences for large service providers. Communications of the Association for Information Systems, 2011;29.
20. Taleb I, Serhani MA, Bouhaddioui C, et al. Big data quality framework: A holistic approach to continuous quality management. Journal of Big Data, 2021;8.
21. Gunasekaran A, Papadopoulos T, Dubey R, et al. Big data and predictive analytics for supply chain and organizational performance. Journal of Business Research, 2017;70: 308-317.
22. Wamba SF, Gunasekaran A, Akter S, et al. Big data analytics and firm performance: Effects of dynamic capabilities. Journal of Business Research, 2017;70: 356-365.
23. Haneem F, Kama N, Taskin N, et al. Determinants of master data management adoption by local government organizations: An empirical study. International Journal of Information Management, 2019;45: 25-43.

24. Reinartz W, Wiegand N, Imschloss M. The impact of digital transformation on the retailing value chain. International Journal of Research in Marketing, 2019;36: 350-366.

25. Hofmann E, Rüsch M. Industry 4.0 and the current status as well as future prospects on logistics. Computers in Industry, 2017;89: 23-34.

26. Ben-Daya M, Hassini E, Bahroun Z. Internet of things and supply chain management: A literature review. International Journal of Production Research, 2019;57: 4719-4742.

27. Frank AG, Dalenogare LS, Ayala NF. Industry 4.0 technologies: Implementation patterns in manufacturing companies. International Journal of Production Economics, 2019;210: 15-26.

28. Dalenogare LS, Benitez GB, Ayala NF, et al. The expected contribution of Industry 4.0 technologies for industrial performance. International Journal of Production Economics, 2018;204: 383-394.

29. Frank AG, Mendes GHS, Ayala NF, et al. Servitization and Industry 4.0 convergence in the digital transformation of product firms: A business model innovation perspective. Technological Forecasting and Social Change, 2019;141: 341-351.

30. Bag S, Pretorius JHC, Gupta S, et al. Role of institutional pressures and resources in the adoption of big data analytics powered artificial intelligence, sustainable manufacturing practices and circular economy capabilities. Technological Forecasting and Social Change, 2021;163: 120420.