JOURNAL OF MARKETING & SOCIAL RESEARCH
ISSN (Online): 3008-0711
Volume 03 | Issue 08 | 2026
Journal homepage: https://jmsr-online.com/
Research Article https://doi.org/10.61336/jmsr.0308.07

Enhancing Indian Military Textile Supply Chain Traceability through Barcode, QR Code, RFID and Digital Product Passport Technologies, a Defence-Specific Indian Military Digital Product Passport (IM-DPP) Framework

Trivedi Rajneesh[1*] and Dr. Smitha Viswanathan Girija[2]
[1,2]Research Scholar and Professor & Dean, School of Management, GD Goenka University, Gurugram, India

Received	11/06/2026	Revision	22/06/2026	Accepted	13/07/2026	Published	20/08/2026

*Corresponding author
Trivedi Rajneesh
Email: trivedi.rajneesh@gmail.com

Abstract: Indian military textile supply chains operate across diverse operational environments and involve multiple institutions, suppliers, laboratories, quality-assurance establishments and logistics nodes. Military textiles-including combat uniforms, body armour, NBC/CBRN protective clothing, winter clothing and parachute textiles-are safety- and mission-critical products whose quality must remain traceable beyond procurement and acceptance. The existing ecosystem has a strong institutional foundation through the Defence Acquisition Procedure 2020 (DAP 2020), Directorate General of Quality Assurance (DGQA), Defence Research and Development Organisation (DRDO), Bureau of Indian Standards (BIS), Government e-Marketplace (GeM) and the Army Integrated Material Management Online System (IMMOLS). However, the article identifies a central gap: information generated during procurement, manufacturing, inspection, storage, issue, maintenance and disposal is not consistently connected through a persistent item-level identity. This limits rapid retrieval of product history, targeted recall, supplier accountability, lifecycle management and auditability. The article therefore proposes an Indian Military Digital Product Passport (IM-DPP) framework that combines globally recognised Automatic Identification and Data Capture (AIDC) technologies-barcodes, QR codes and RFID-with GS1 Digital Link and EPCIS event data, while integrating the resulting information with existing defence systems. A tiered information architecture is proposed to balance traceability with defence security requirements. The article further develops a pilot methodology, research hypotheses and a phased implementation roadmap. The framework is intended to strengthen quality assurance, operational readiness, indigenous-content verification, anti-counterfeit controls, lifecycle cost management and evidence-based defence procurement.

Keywords: Indian Military Textiles, Digital Product Passport, Supply-Chain Traceability, DGQA, DAP 2020, QR Code, RFID, GS1, IMMOLS, Defence Logistics, Quality Assurance

INTRODUCTION

India's military textile supply chain is large, geographically dispersed and operationally critical. The Armed Forces require clothing and protective textiles suited to high-altitude cold deserts, tropical and humid environments, hot deserts and maritime conditions. Products include combat uniforms, body armour, ballistic helmets, NBC/CBRN protective clothing, parachute and aerial-delivery textiles and specialised technical fabrics. Their performance affects personnel safety and operational readiness, making reliable traceability a quality-assurance requirement rather than simply an inventory-management convenience.

The procurement ecosystem is institutionally complex. DAP 2020 provides the principal procurement framework, while DGQA performs quality-assurance functions for Army stores and common stores. DRDO establishments such as DMSRDE and DEBEL develop material and protection specifications, laboratories undertake testing, public-sector entities and private manufacturers produce the goods and logistics systems manage receipt, storage, issue and disposal. The existing institutional framework is therefore substantial. The challenge is that the information produced by these institutions is not always connected through a common digital identity.

The source article identifies quality failures, counterfeit vulnerabilities and lifecycle-accountability gaps documented in defence oversight material. In particular, the reported absence of adequate batch-level traceability for some body-armour panels, limitations in material and certification documentation, and weak lifecycle tracking demonstrate why a persistent product identity is needed. A paper record can document an inspection, but it does not automatically connect that inspection to subsequent depot receipt, unit issue, repair, service-life assessment or disposal.

The same problem arises in winter clothing, NBC/CBRN equipment and parachute systems, where product history is operationally important.

AIDC technologies provide a practical starting point. Linear barcodes are inexpensive and familiar; QR codes offer greater information density and web-based resolution; and RFID can support rapid identification where non-line-of-sight reading is useful. Yet none of these technologies, by themselves, constitutes a lifecycle traceability system. Their value depends on the data architecture behind the identifier and the governance arrangements that determine who creates, verifies, updates and accesses the information.

The proposed IM-DPP therefore treats the digital product passport as an integration layer rather than another standalone information system. A persistent identifier can connect material provenance, specifications, certificates, inspection events, logistics movements, maintenance records and end-of-life decisions. The concept is aligned with GS1 Digital Link and EPCIS principles and can be connected to IMMOLS through an APN-to-GTIN mapping and application interfaces. This approach builds on existing infrastructure rather than requiring complete replacement of legacy systems [1-4].

The study addresses four questions: (1) what traceability gaps affect Indian military textiles; (2) how can AIDC technologies address these gaps; (3) how can an IM-DPP architecture be integrated with existing defence procurement, quality and logistics systems; and (4) what implementation, security and research arrangements are required for adoption? [5-8].

Indian Defence Regulatory and Institutional Context

DAP 2020 provides the policy foundation for defence procurement and places strong emphasis on domestic industry, quality requirements and documentation. For textile procurement, technical specifications, quality-assurance requirements and vendor documentation form part of the procurement process. The expansion of domestic procurement under Atmanirbhar Bharat also increases the number and diversity of suppliers, making standardised digital traceability more important [5].

DGQA is central to the quality-assurance architecture. Textile inspection may involve raw-material inspection, in-process inspection and finished-goods inspection. These stages generate reports, certificates, sampling records and acceptance decisions. Digitally linking each event to a product or batch identifier would convert separate records into an auditable chain of custody. The framework can incorporate QAP references, test reports, inspection dates, QAR identification and accept/reject outcomes.

BIS and DRDO provide the technical baseline. The source article identifies standards and specifications relevant to bullet-resistant jackets, NBC protective clothing, fire-retardant clothing, parachute textiles, camouflage fabrics and textile testing. DMSRDE and DEBEL specifications provide additional material and performance requirements. These standards should not be replaced by the DPP; rather, the passport should reference the applicable specification and the verified conformity evidence.

The Army's IMMOLS is particularly important because it already supports demand, receipt, storage, issue and disposal functions. The major interoperability challenge identified in the article is the use of Army Part Numbers (APNs) rather than GS1 GTINs. An APN-to-GTIN mapping registry would allow GS1-compatible identifiers to coexist with established Army item codes. Scanning at receipt, inspection and issue points could then feed existing transactions while the DPP retains richer lifecycle information.

GeM offers another integration point. Linking procurement records, delivery confirmation and DPP compliance can reduce duplicate data entry and make digital traceability a contractual requirement. The objective should be progressive integration rather than parallel duplication of existing procurement systems [3,4,6,9-12].

Literature and Research Gap

Need for Traceability: Evidence from Previous CAG Audits: Digital traceability research increasingly recognises that visibility across complex supply chains depends on persistent identifiers, interoperable data and event-based records. GS1 Digital Link allows an identifier to resolve to digital information, while EPCIS records events describing what happened, where, when and in what business context. QR codes and RFID provide practical physical carriers for these identifiers. The literature and the source article nevertheless reveal an important distinction between identification and traceability: scanning a product is useful only when the scan creates or retrieves verified lifecycle information.

The principal research gap is therefore architectural. Existing defence logistics systems may support inventory transactions, and existing quality systems may support inspection, but the complete product history is fragmented. A military textile item may have a material certificate at the supplier, an inspection record at DGQA, an inventory record at a depot and a service record at a unit, without these records being persistently connected.

A second gap is sectoral. Much DPP development has been associated with commercial products, sustainability and circular-economy objectives. Defence textiles require additional functionality: Operational readiness, controlled access, anti-counterfeit authentication, service-life monitoring, safety-critical inspection and secure handling of sensitive technical information. These requirements justify a defence-specific adaptation.

A third gap concerns Indian interoperability. The country already possesses procurement, quality and logistics platforms, but a common identifier and event architecture linking them is not fully established. IM-DPP is consequently conceived as an interoperability layer connecting existing systems rather than replacing them.

The resulting research proposition is that traceability capability should improve when technological readiness, organisational readiness and regulatory support are combined with a persistent product identity. Better traceability should in turn improve information transparency, quality-assurance effectiveness, lifecycle management and operational readiness [1,2,13].

Counterfeit, Substandard and Unauthorised Material Risk

The historical audit trail extends beyond textiles. CAG's review of the Kargil procurement period reported that equipment and supplies worth Rs. 260.55 crore did not meet quality parameters, illustrating the operational and financial consequences that can arise when urgent procurement, supplier controls and quality assurance are insufficiently connected. These historical findings should not be interpreted as evidence that all defence textile supplies are defective or counterfeit. Rather, they establish a recurring control problem: when provenance, approval, testing, batch identity and subsequent issue are not digitally linked, it becomes difficult to establish quickly whether a defective, substituted, unauthorised or potentially counterfeit material entered the supply chain.

The CAG record also documents instances directly relevant to the traceability problem. Report No. 30 of 2013 highlighted procurement-control weaknesses in a special clothing item, including an incorrect assertion regarding sample approval and the absence of adequate evidence that the supplier's sample had been approved by the competent technical authority. Report No. 34 of 2014 recorded the provisioning of substandard, unsuitable, untested and uncertified flying clothing; in one case, technical analysis found supplied flame-retardant overalls to be substandard and the issue was considered significant for aircrew safety. These findings demonstrate the consequences of gaps between supplier claims, technical approval, testing, certification and the item actually entering service.

The case for end-to-end traceability is reinforced by the Comptroller and Auditor General of India (CAG) audit record. Earlier audits of Army supply-chain management for general stores and clothing identified systemic deficiencies, including user dissatisfaction with quality, procurement weaknesses and failures in the supply chain [14]. The subsequent Performance Audit of the Ordnance Equipment Group of Factories again reported that the supply chain for general stores and clothing continued to face deficiencies and that the factories supplied only about 56 per cent of the Services' total requirement during 2008–12. The audit specifically examined records of ordnance factories, Central Ordnance Depot Kanpur, CQA (Textile & Clothing) and DGOS, demonstrating that quality and supply-chain performance are interconnected rather than isolated functions [14,15].

Proposed IM-DPP Architecture

The IM-DPP is a structured, machine-readable digital record associated with a military textile item or defined batch. The physical item carries a data carrier-QR code, barcode, RFID or a combination-while the underlying record is maintained in a secure digital registry.

The first layer is product identification. Mandatory fields include Army Part Number, GTIN where applicable, NATO Stock Number where relevant, batch number and serial number for items requiring individual identification. The second layer captures material and manufacturing information, including fibre composition, supplier identity, production batch, relevant specification and material certificates. The third layer records performance and quality information such as applicable BIS/DRDO standards, laboratory certification, inspection date, sampling reference and acceptance decision.

The fourth layer is supply-chain and lifecycle information. It records manufacture, dispatch, depot receipt, transfer, issue, inspection, repair, condition assessment, laundry cycles where relevant, and service-life status. The fifth layer supports authentication and security, including digital signatures, anti-counterfeit markers, access controls and audit trails. The final layer covers condemnation, disposal, destruction or recycling as applicable.

A tiered access model is essential. Operational users should receive only the information needed to identify, issue and maintain an item. Procurement, quality and audit users can access supplier, certification and inspection information under role-based controls. Sensitive technical information should remain restricted to appropriately cleared personnel and secure defence networks. This design follows the principle of data minimisation: the QR code should not itself expose sensitive technical information; it should resolve to information according to the user's authorisation.

The architecture should use GS1 Digital Link for web-enabled identifiers and EPCIS for event capture. IMMOLS would remain the system of record for relevant logistics transactions, while the DPP registry would maintain the richer product and lifecycle context. An API layer and APN-to-GTIN mapping would connect the two environments.

Blockchain should be treated as an optional certification-anchoring layer rather than a prerequisite. Where justified, permissioned distributed-ledger mechanisms can provide tamper-evident records for high-value acceptance or certification events. The fundamental requirement, however, is authoritative data governance, secure identity management and interoperability [1,2] (Figure 1).

This is particularly relevant under increasing domestic procurement and the expansion of private and MSME participation. A larger supplier ecosystem increases the importance of standardised digital evidence of origin and conformity. Traceability therefore becomes both a quality-assurance mechanism and a supplier-governance mechanism, strengthening the ability of the Services to conduct targeted recalls, supplier performance analysis and forensic investigations.

How to Cite: Rajneesh *et al*. "Enhancing Indian Military Textile Supply Chain Traceability through Barcode, QR Code, RFID and Digital Product Passport Technologies, a Defence-Specific Indian Military Digital Product Passport (IM-DPP) Framework". *Journal of Marketing & Social Research*, vol. 3, no. 08, August 2026, pp. 48–54. https://doi.org/10.61336/jmsr.0308.07

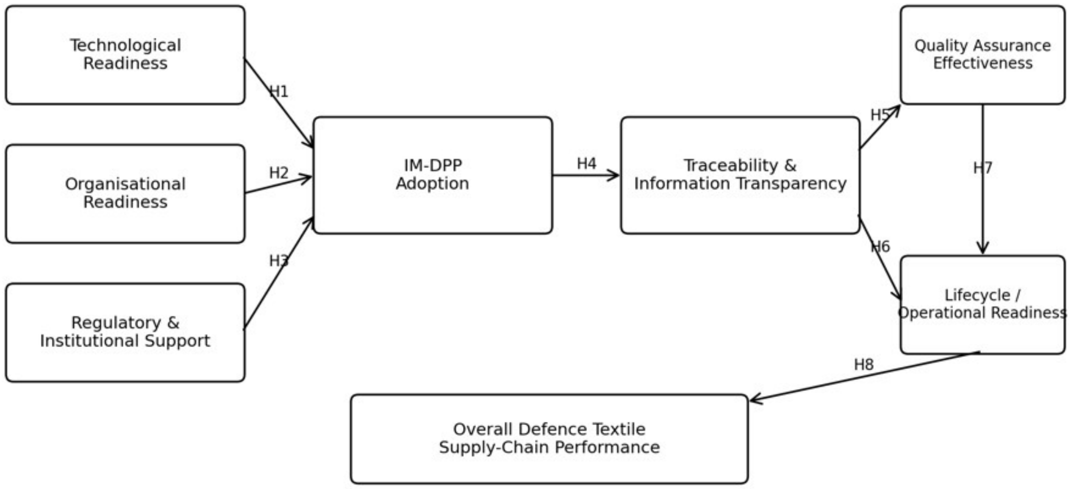

Figure 1: Proposed IM-DPP Research Model and Hypotheses

IM-DPP can reduce this vulnerability through a combination of physical and digital controls. A unique product or batch identity can be linked to the approved manufacturer, raw-material lot, production batch, test certificate, DGQA inspection event and acceptance decision. Digital signatures can authenticate certificates, while QR/RFID scans at receipt and issue points can verify that the physical item corresponds to the expected digital record. For high-risk items, a second authentication factor-such as a covert fibre marker, secure RFID credential or cryptographic token-can be used. A mismatch can trigger quarantine and investigation rather than allowing the material to proceed through normal inventory flows.

Counterfeit material in defence should be understood broadly to include unauthorised substitution, falsified certification, misrepresentation of material composition, use of unapproved production sources, or insertion of products that do not conform to the contracted specification. The CAG reports cited above provide evidence of substandard, unsuitable, untested or uncertified stores and procurement-control failures; they do not establish a universal incidence rate of counterfeit military textiles. The policy implication is nevertheless important: the absence of item-level provenance and immutable verification increases the difficulty of detecting and isolating such risks.

Technology Selection for Military Textiles

No single data carrier is optimal for every military textile. Linear barcodes remain appropriate where low cost and straightforward scanning are the primary requirements. QR codes are attractive for high-volume textiles because they can store identifiers and resolve to digital records using ordinary optical scanners or approved mobile devices. RFID is advantageous where automated bulk reading or non-line-of-sight identification provides operational value.

The source article proposes selective use: optical QR codes for high-volume, lower-value products and RFID for higher-value or more operationally critical items such as body armour and NBC suits. Washable RFID technologies and durable textile labels require validation under actual Indian environmental conditions. The physical carrier must survive laundering, abrasion, moisture, UV exposure, temperature variation and other stresses.

India's operating environments make durability a specific research requirement. High-altitude areas present cold, frost, UV and abrasion; tropical environments involve high humidity, fungal growth and water exposure; deserts present heat, sand and UV degradation; and maritime operations involve salt spray and immersion. Accordingly, carrier materials and printing processes should be tested through defined defence-specific protocols before large-scale adoption.

The source article also identifies anti-counterfeit opportunities using covert physical markers and digital authentication. A cryptographically signed DPP can establish digital provenance, while a physical fibre marker can provide an independent authentication factor. Such combinations are particularly relevant for body armour, NBC materials and other high-risk products [8,10,16].

Application Cases

Body armour provides a strong initial use case because each panel can be safety-critical and its material, production batch, ballistic certification and service history are important. Under IM-DPP, each panel can receive a unique identifier linked to its material lots, manufacturer, DGQA acceptance, laboratory test certificate, manufacture date and service-life information. EPCIS events can then record depot receipt, issue, annual inspection and replacement. This would allow a quality failure to be traced rapidly to affected production batches. Winter clothing provides a second use case. When a defect is detected in thermal insulation or waterproofing, the ability to identify the affected supplier, raw-material lot and production batch can enable targeted investigation and recall instead of broad condemnation. QR-based provenance can connect fibre receipt, spinning, weaving, finishing, garment assembly, DGQA inspection and issue.

NBC/CBRN protective clothing is especially suited to lifecycle tracking because activation and service-life information can be safety-critical. The DPP can record activation date, authorised use, inspection status and remaining service life, subject to appropriate security controls. This creates a stronger basis for ensuring that expired or degraded protective equipment is not issued.

Parachute and aerial-delivery textiles provide another high-value application. Deployment cycles, inspections, repairs, storage and service-life calculations can be digitally linked to the canopy or assembly identifier. Scanning at packing and inspection points can reduce manual recordkeeping and create an auditable history.

Strategic and Operational Benefits

IM-DPP can strengthen Atmanirbhar Bharat by providing verifiable evidence of domestic content and supplier provenance. Rather than relying solely on declarations, the digital record can connect domestic fibre origin, mill registration, supplier identity and manufacturing events to the delivered item or batch.

Quality accountability is another major benefit. A digitally signed inspection event linked to an identified batch provides stronger attribution than a detached paper certificate. Rejected batches can automatically update supplier-performance information, supporting more evidence-based vendor evaluation.

Auditability can improve because authorised auditors can retrieve a product's procurement, inspection, movement and disposal history without reconstructing it manually from multiple offices. This does not eliminate audit judgement, but it improves the completeness and retrievability of evidence.

Lifecycle management can also become more data-driven. Instead of relying only on generic service-life assumptions, actual issue dates, inspections, condition grades and usage events can support better replacement decisions. This may reduce premature condemnation while limiting continued use of unsafe items. The source article presents potential economic benefits, but these should be treated as hypotheses requiring validation rather than established savings.

At the strategic level, accumulated DPP data can support supplier-risk analysis, defect trend identification, demand forecasting and predictive maintenance. The longer-term opportunity is therefore not simply traceability but a data-driven defence textile quality and logistics ecosystem [5,17].

Implementation Risks and Mitigation

Cybersecurity and information classification are the principal implementation constraints. A phased approach should therefore begin with unclassified and restricted information while classified technical content is handled only after appropriate security accreditation. The DPP should implement role-based access, encryption, secure authentication, audit logging and controlled data sharing.

MSME capability is another constraint. Many small suppliers may not possess ERP systems or advanced digital traceability infrastructure. Immediate mandatory compliance could create barriers to participation. A graduated adoption schedule, standard low-cost tools, training and targeted financial support can reduce this risk.

Legacy integration with IMMOLS requires an APN-to-GTIN mapping registry and APIs. This is an engineering challenge, but it is preferable to replacing a mature logistics system. The same principle applies to GeM and DGQA databases: integration should reuse existing authoritative records wherever possible.

Multi-service coordination is necessary for eventual scale. The Army, Navy and Air Force may use different workflows and systems, but common identifiers, data definitions and security principles can create interoperability while preserving service-specific processes. HQ IDS can provide the coordination mechanism for common standards.

Governance is equally important. A central policy should define data ownership, authoritative sources, correction procedures, retention periods, access rights, vendor obligations and responsibilities for maintaining the DPP after delivery [18].

Research Methodology and Pilot Validation

Because the proposed framework is conceptual, empirical validation should precede full-scale implementation. A mixed-method pilot is appropriate. Quantitative data can measure changes in traceability completeness, time required to retrieve product history, inventory accuracy, inspection-record availability, recall response time and lifecycle-record completeness. Qualitative interviews with DGQA personnel, logistics staff, procurement officers, manufacturers and users can identify usability issues and organisational barriers.

High-priority pilot categories should include body armour and NBC/CBRN protective clothing, followed by winter clothing and parachute assemblies. The pilot should establish a baseline using current processes, introduce the DPP-enabled workflow, and compare post-implementation measures.

The research model can be grounded in Technology–Organization-Environment (TOE), Resource-Based View (RBV) and dynamic-capabilities perspectives. The proposed hypotheses are: H1, technological readiness positively influences traceability capability; H2, organisational readiness positively influences IM-DPP adoption; H3, regulatory and institutional support positively influences adoption; H4, adoption positively influences information transparency; H5, information transparency positively influences quality-assurance effectiveness; H6, traceability positively influences lifecycle asset management; H7, quality-assurance effectiveness positively influences operational readiness; and H8, IM-DPP adoption positively influences defence textile supply-chain performance.

How to Cite: Rajneesh *et al.* “Enhancing Indian Military Textile Supply Chain Traceability through Barcode, QR Code, RFID and Digital Product Passport Technologies, a Defence-Specific Indian Military Digital Product Passport (IM-DPP) Framework“. *Journal of Marketing & Social Research*, vol. 3, no. 08, August 2026, pp. 48–54. https://doi.org/10.61336/jmsr.0308.07

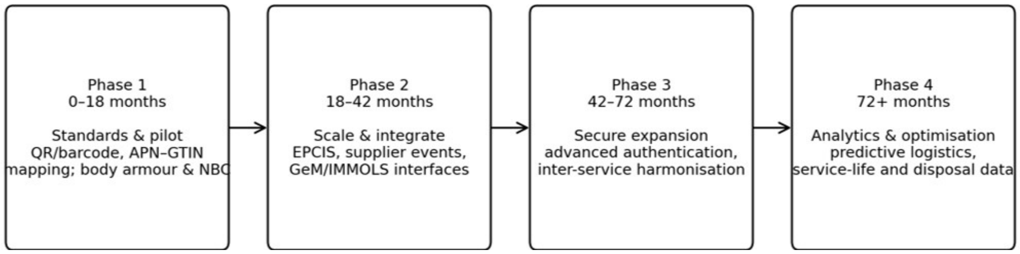

Figure 2: Phased Implementation Roadmap for IM-DPP

Pilot data can initially be analysed using descriptive statistics and paired comparisons. If an adequate sample becomes available, regression, structural equation modelling or PLS-SEM can test the proposed relationships. Reliability and validity of survey instruments should be established before hypothesis testing. The pilot should also assess carrier durability, scan reliability, user acceptance, integration effort and total cost of ownership.

Implementation Roadmap

A four-phase roadmap is recommended. Phase 1 (0–18 months) should establish identifier standards, mandate QR/barcode requirements for selected contracts, develop the APN-to-GTIN mapping, equip relevant DGQA locations with scanning capability, and pilot Tier 1 and Tier 2 DPP data for body armour and NBC suits.

Phase 2 (18–42 months) should expand upstream event capture through EPCIS, integrate supplier production and despatch events, connect DPP compliance to relevant GeM workflows, and extend coverage to winter clothing and parachute assemblies across services.

Phase 3 (42–72 months) should introduce advanced anti-counterfeit capabilities and classified-data integration after required security certification. Inter-service harmonisation should be completed through common data standards and service-specific interfaces.

Phase 4 (72 months and beyond) should use accumulated event data for predictive logistics, service-life modelling, quality-risk alerts and continuous assurance. Disposal records should complete the lifecycle chain and provide evidence for future procurement and audit planning [16,19] (Figure 2).

DISCUSSION

The central finding is that India does not need to start from zero. The country already has DAP 2020, DGQA procedures, DRDO technical capability, BIS standards, GeM, IMMOLS and a growing digital manufacturing base. The main gap is connecting these capabilities through a common product identity and interoperable event architecture.

The IM-DPP proposal is therefore best understood as an integration and governance framework. It does not replace DGQA inspection, IMMOLS logistics, GeM procurement or DRDO testing. Instead, it links their authoritative outputs to a persistent identity so that the lifecycle history of a military textile can be reconstructed quickly and reliably.

Future research should validate QR and RFID durability in Indian operational environments; develop and test APN-to-GTIN mapping; quantify implementation costs and benefits; evaluate user acceptance; assess cybersecurity and classification models; and investigate AI-enabled analytics using accumulated EPCIS events. Research on secure interoperability with international defence partners is another important direction.

CONCLUSION

In conclusion, the traceability challenge in Indian military textiles is fundamentally a lifecycle information problem. Barcodes, QR codes and RFID can provide the physical identification layer, but the Digital Product Passport provides the information architecture needed to make those identifiers meaningful. An IM-DPP aligned with DAP 2020, DGQA, BIS, DRDO and IMMOLS can provide a practical pathway from fragmented records to continuous, auditable and data-driven lifecycle traceability. Its strongest initial value lies in safety-critical categories such as body armour, NBC/CBRN protection and parachute systems, followed by broader clothing and textile categories. The framework should now move from conceptual development to controlled pilot validation, with evidence from the pilot determining the final standards, business case and national rollout strategy.

Comptroller and Auditor General of India. Report No. 34 of 2014: Union Government (Defence Services)-Air Force and Navy. Government of India.

Comptroller and Auditor General of India. Report No. 30 of 2013: Union Government (Defence Services)-Army and Ordnance Factories. Government of India.

Comptroller and Auditor General of India. Report No. 24 of 2013: Performance audit on Ordnance Equipment Group of Factories of Union Government, Department of Defence. Government of India.

Comptroller and Auditor General of India. Report No. PA 4 of 2008: Supply chain management of general stores and clothing in the Army. Government of India.

Comptroller and Auditor General of India. Report of the Comptroller and Auditor General of India on the Kargil Operations. Government of India.

The CAG evidence cited in this article is used to establish the historical need for stronger traceability and quality-assurance controls; it is not used to infer that counterfeit material is universally present in defence textile supply chains.

How to Cite: Rajneesh *et al*. "Enhancing Indian Military Textile Supply Chain Traceability through Barcode, QR Code, RFID and Digital Product Passport Technologies, a Defence-Specific Indian Military Digital Product Passport (IM-DPP) Framework". *Journal of Marketing & Social Research*, vol. 3, no. 08, August 2026, pp. 48–54. https://doi.org/10.61336/jmsr.0308.07

Citation notes: In-text citations have been standardised to APA 7 author–date form. CAG citations are used specifically to substantiate the historical need for stronger quality, procurement and traceability controls; they should not be interpreted as evidence that counterfeit material is universally present in defence textile supply chains.

REFERENCES

[1] GS1. GS1 Digital Link standard-How to use GS1 identifiers as Web URIs. Release 1.2, 2022.
[2] GS1. Electronic Product Code Information Services (EPCIS). Version 2.0, 2023b.
[3] Army Headquarters. IMMOLS-Integrated Material Management Online System: User manual, volume III-Clothing and general stores. MGO Directorate, 2019.
[4] Army Headquarters. IMMOLS modernisation programme-Requirements document: Enhanced AIT integration module. MGO Directorate, 2022.
[5] Ministry of Defence. Defence Acquisition Procedure 2020 (DAP 2020). Government of India, 2020.
[6] Directorate General of Quality Assurance. Quality assurance procedures for defence clothing and general stores-CQA(C&GS) Handbook. 2021.
[7] GS1. GS1 general specifications. Version 23, 2023a.
[8] International Organization for Standardization. ISO/IEC 18004:2015-Information technology-QR Code bar code symbology specification. 2015.
[9] Bureau of Indian Standards. IS 15742:2018-Bullet Resistant Jacket-Specification. 4th Rev., 2018.
[10] Defence Materials and Stores Research and Development Establishment. Specification for combat uniform fabric-DMSRDE/SPEC/CUF-2020. 2020.
[11] Defence Bioengineering and Electromedical Laboratory. Specifications for individual protection equipment-NBC protective suit: IS 16444 Implementation Guidelines. 2021.
[12] Government e-Marketplace. Product quality assurance framework for defence buyers on GeM: Implementation guide. 2023.
[13] United Nations Economic Commission for Europe. Enhancing traceability and transparency of sustainable value chains. 2022.
[14] Comptroller and Auditor General of India. Report no. 3 of 2018-Union government (Defence Services): Air Force. 2018.
[15] Comptroller and Auditor General of India. Report no. 15 of 2020-Union government (Defence Services): Army (Capital Procurement). 2020.
[16] Ministry of Defence. Defence ICT policy 2021: Framework for digital transformation in the defence establishment. 2021.
[17] Ministry of Defence. Positive indigenisation lists I, II, III and IV-Textiles and clothing items. 2023.
[18] Ministry of MSME. Digital MSME scheme: Guidelines for technology adoption support. 2022.
[19] GS1 India. EPCIS implementation guide for Indian manufacturers: Track and trace best practices. 2023.