LEAN APPLICATIONS IN THE DEPARTMENT OF DEFENSE

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INTRODUCTION

- DoD traditionally viewed as bureaucratic and slow-moving
- Study investigates lean/six-sigma implementation within DoD
- Scientometric review of 465 documents (1992-2025)
- Case study examination of notable works from the dataset and out of dataset example

LITERATURE SEARCH

- In ProQuest create a search as:

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AB("Department of Defense" OR "DoD" OR "DOD" OR "U.S. Army"
OR
"Department of the Army" OR "U.S. Navy" OR "Department of the
Navy" OR
"U.S. Air Force" OR "Department of the Air Force" OR "U.S. Ma-
rine Corps" OR
"U.S. Space Force" OR "National Security Agency" OR "NSA" OR
"Defense Intelligence Agency" OR "DIA" OR "National
Geospatial-Intelligence
Agency" OR "NGA" OR "National Reconnaissance Office" OR
"NRO")
AND FT("six sigma" OR "6σ" OR "lean six sigma" OR
"continuous process improvement" OR "LSS") AND LA(EN)
```

- 465 documents after cleaning are exported to a spreadsheet.

SCIENTOMETRIC ANALYSIS

- 2 Step Python program to analyze publication trends and then classify themes
    1. Analyze abstracts and publication data for trends then use Latent Dirichlet Analysis on abstract to extract themes
    2. When themes extracted create a list of lean keywords related to that theme (Ex. Process Improvement: process, improvement, quality...), and classify abstracts similarity to theme
- Publication trends: Increase from 1992-2017, decline after 2017
- Document types: Primarily Theses and Trade journals
- Three themes identified: Management (54%), Process Improvement (36%), Continuous Learning (9%)

MANAGEMENT AND LEADERSHIP - OVERVIEW

- Toyota’s Hourensou vs. DoD’s command-and-control
- Challenge: Implementing lean in hierarchical systems
- Case studies show adaptation to DoD structures
- Focus on communication, knowledge flow, and supplier relationships

CASE STUDY: LEADERSHIP DEVELOPMENT STRATEGIES

- McCants (2024): Leadership transitions in Army
- High turnover environment creates disruption risks
- Five themes for successful transitions identified
- Organizational knowledge mirrors *genchi genbutsu*
- Communication emphasis parallels *hourensou*

CASE STUDY: PROJECT ENGINEER TURNOVER

- Turner (2024): Work-related stressors and turnover
- Strong correlation between stress and turnover intention
- Key stressors: workloads, deadlines, complexity, resources
- Directly relates to *muri* (overburden)
- Sustainable performance requires *heijunka*

CASE STUDY: CONTRACTING ENVIRONMENT IN AFSB

- Carlstedt (2020): Army supplier relationship management
- Structured contractor processes with regular reviews
- Standardized documentation supports lean processes
- Balance of accountability and partnership
- Reflects Toyota's *keiretsu* philosophy

PROCESS IMPROVEMENT - OVERVIEW

- Building culture of *kaizen* (continuous improvement)
- Identifying and removing non-value adding steps
- DoD applications show significant results
- Case studies demonstrate adaptability to defense contexts

CASE STUDY: ARMY'S COST-BENEFIT ANALYSIS

- Malin (2020): Analysis of Change of Command ceremonies
- Army lacks process to evaluate production loss costs
- Costs range from $18K to $404K per hour
- Recommended training-based solution and cost tools
- Addresses proper valuation of non-value-added activities

CASE STUDY: IMPROVING DEPOT REPAIR LEAD TIME

- Richmond (2023): Lean Six Sigma in depot repair
- 80% of repair lead time was non-value-added
- Implementation: DMAIC and process flow analysis
- Results: 84% decrease in lead time (114 to 18 days)
- Fill rate increase from 54% to 70%

CASE STUDY: DOD CONTRACT COST OVERRUNS

- Funches-Allen (2025): ML analysis of 524 contracts
- Random forest model achieved 80% prediction accuracy
- Top factors: cost estimation (42%), risk assessment (22%)
- Cost overruns represent financial *muda*
- Enables targeted improvement initiatives

CONTINUOUS LEARNING - OVERVIEW

- Building culture through *hansei* and *kaizen*
- Digital knowledge management amplifies learning
- Information must be accessible at right time by right people
- DoD initiatives focus on data-driven learning

CASE STUDY: PTSD DIAGNOSIS TOOL

- Le (2023): Classification Automation Tool (CAT)
- ML ensemble methods improve diagnosis accuracy
- Diagnostic errors framed as waste
- Identified key PTSD predictors in veterans
- Reduces false positives and negatives

CASE STUDY: ARMY KNOWLEDGE MANAGEMENT

- VanLaar (2023): KM implementation study
- "People" component ranked lowest in maturity
- Tacit knowledge not properly shared
- Four knowledge transfer barriers identified
- Knowledge flow barriers create waste

CASE STUDY: ARMY'S DATA FABRIC

- Patel (2021): Data fabric technology implementation
- Addresses data stovepipes and inefficient sharing
- Project Rainmaker enables data synchronization
- Eliminates digital *muda*
- Creates pull-based data system

CASE STUDY: DEFENSE INNOVATION UNIT

- Established 2015 as DoD’s gateway to tech companies
- Only DoD entity focused on commercial technology
- Streamlined acquisition: 60-90 days vs. years
- Demonstrates lean cycle time reduction

CASE STUDY: GIGEAGLE PROJECT

- DIU talent platform launched 2022
- Matches DoD with Reserve/Guard personnel
- AI/ML matching for short-term projects
- Addresses waste: underutilized talent
- Lean approach to human capital management

CONCLUSION

- Lean/Six Sigma has gained traction in DoD despite hierarchical challenges
- Management: Adapting Toyota practices to command structures
- Process Improvement: Significant results (84% lead time reduction)
- Continuous Learning: Addressing digital information flow
- Publication decline since 2017 suggests maturation or shift
- Lean principles successful even in bureaucratic environments