Lean Enablers for Terminal Operations
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Project Overview

**Problem:** Despite dedicated resources for process optimization and training, APM Terminals management has trouble consistently and efficiently meeting the needs of our customers.

**Goal:** Define areas for improvement and design changes to make improvements permanent.

**Methodology:**

- Survey employees to determine the most significant challenges that they face in creating value for their respective customers.
- Map challenges to applicable Lean Enablers.
- Develop strategies to address the most significant challenges with applicable Lean Enablers.
Supply Chain Overview

Marine cargo terminals are a critical junction of international trade. Global coordination is essential for the supply chain to function.

- Standardized data interchange between many complex systems
- Centralized planning for stowage
- Standardized equipment and machinery

Operating strategies are dependent on local conditions.
Marine Terminal System

Marine Terminals exist as a contained (but not disconnected) system within the larger Supply Chain System.

- Container entry is handled via Vessel, Rail, or Gate Operations
- Productive handling of containers is dependent on utilization of powered industrial equipment that is maintained by Maintenance and Repair Department.
- Most containers are intermediately handled by Yard Operations while they “dwell” within the terminal and wait to exit.
- Container exit is handled via Vessel, Rail, or Gate Operations
Terminal Operations: Unique Challenges

Safety

- Industrial heavy lift/transport equipment
- Man vs. machine interfaces

Blue Collar Labor Culture

- Longshore history
- Militancy and skepticism

Productivity

- Process direction and instruction
- Human error
- Dispatch
- Job category restrictions
Global APM Terminals Network, LA-LB Harbor, LA Pier 400 Terminal Map

APM Terminals' global port activities 2012:
- Existing terminals
- Expansion of existing terminals
- New terminal projects
Six Principles of Lean Thinking

Five Principles (Womack)

1. Value (Defined by Customer)
2. Optimize the Value Stream
3. Create Flow
4. Pull from Downstream Customers
5. Pursue Perfection

Sixth Principle

6. Treat People as your Most Valuable Asset
Lean Systems and Programs

Systems Engineering is a discipline that looks at the problem as a whole and designs solutions that take all facets and variables into account through the entire life cycle of the product.

Lean Systems Engineering promotes mission success by frontloading with planning and preparation to ensure that all tasks are executed right the first time, while minimizing waste.

Lean Enablers for Systems Engineering are 147 specific best-practices that have been validated through benchmarking against NASA and the Government Accountability Office’s lists of Best Practices.

Lean Enablers for Managing Engineering Programs expands LEfSE to a total of 326 Enablers and Sub-Enablers and maps them to the Top 10 Challenges in Program Management.
Program Management

Complexity of Engineering Programs is comparable to operational complexity Terminal Management.

Engineering Program Lifecycle vs. Terminal Operations Lifecycle

- A throughput unit (each container) has a defined start and end point for each customer
- Safe and efficient operations are the core of Terminal Management
- Maintenance and Repair are critical for Operations support
- Lean Enablers are mainly applicable in Production/Utilization categories of Engineering Systems
Challenges in Managing Engineering Programs

1. Firefighting (Reactive Program Execution)
2. Unstable, Unclear, and Incomplete Requirements
3. Insufficient Alignment and Coordination
4. Locally Optimized Processes
5. Unclear Roles, Responsibility, and Accountability
6. Mismanaged Culture, Competency, and Knowledge
7. Insufficient Program Planning
8. Improper Metrics, Metric Systems, and KPIs
9. Lack of Proactive Risk Management
10. Poor Acquisition and Contracting
Adaptation of Challenges and Lean Enablers

Initial efforts to distribute and collect surveys were largely unsuccessful.

Respondents were confused by technically-oriented verbiage and explanations taken from LEfSE and LEfMEP

Respondents were overwhelmed by the length of the original survey packet that included all Lean Enablers for all Challenges.

To ensure that feedback was relevant to define and address areas for improvement, it was necessary to revise the survey elements:

- Adapt and abbreviate ranking of Challenges
- Adapt and consolidate Lean Enablers
Survey Respondents

23 respondents in total, representative of all facets of Terminal Operations.

- Yard Operations, Vessel Operations, Rail Operations, and Support Departments

- Labor, Assistant Managers, Managers, Directors, and Vice President
Adapted Challenges for Terminal Operations

1. Firefighting—Reactive Program Execution:
   - Resources are disproportionately dedicated to fixing problems instead of preventing them.

2. Unstable, Unclear, and Incomplete Requirements:
   - The needs of internal and external stakeholders and customers are changing, unknown, or unclear, which affects the efficiency and effectiveness of execution.

3. Insufficient Alignment and Coordination of the Extended Enterprise:
   - Corporate strategy is not aligned with functional/departmental strategy, priorities, or realities.

4. Locally Optimized Processes that are not Integrated Across Departments and Stakeholders:
   - Stakeholders act to improve metrics in their functional area without understanding the effects on subsequent stakeholders.

5. Unclear Roles, Responsibilities, and Accountability:
   - Jobs and expectations are not clearly defined and there is no personal accountability for outcomes.
Adapted Challenges for Terminal Operations

6. Mismanagement of Program Culture, Team Competency, and Knowledge:
   - The expertise and knowledge of individuals, teams, and the organization are insufficient, not properly transferred, or not appropriately applied.

7. Insufficient Program Planning:
   - Planning is inaccurate and/or unable to account for uncertainty.

8. Improper Metrics, Metric Systems, and KPIs:
   - The metrics or performance indicators are lagging instead of predictive, do not reflect the intended performance attributes, or incentivize the wrong behavior.

9. Lack of Proactive Program (Operational) Risk Management:
   - Operations team does not understand or account for uncertainty that could affect execution, does not build risk mitigation into operational plan, or does not have mitigating operational alternatives prepared in advance or reserved as best practices.
Survey Results:
Most Relevant Challenges

Total Terminal Top 3 Challenges

1. Firefighting
2. Process Optimization
3. Unstable, Unclear, or Incomplete Requirements
Challenge Analysis

Total Terminal Ranking of Challenges gives a good general overview of why we have trouble delivering value consistently and efficiently; however...

Each Functional Area and Job Grade has a unique perspective that is important to take into consideration when making changes that may affect them.
Most Relevant Functional Challenges

**Vessel Operations**
- Firefighting

**Rail Operations**
- Culture, Competency, and Knowledge

**Yard Operations**
- Unstable, Unclear, Incomplete Requirements

**Support Departments**
- Firefighting
Vessel Operations Top Challenges

Why Firefighting (1)?

- Changing operational plans based on foreseeable and unforeseeable circumstances, including crane/yard "bumps", traffic/congestion, yard allocations, labor-related failures, and equipment breakdown.

Why Risk Management (9)?

- Reactive management of Firefighting requires Vessel Operations to have "outs" in the probable event that plans will need to be changed.
Yard Operations Top Challenges

Why Unstable, Unclear, and Incomplete Requirements (2)?

- Limited resources are provided to accomplish several routine tasks, but the priority and importance of completing each task changes regularly and often without notice.

Why Process Optimization (4)?

- Yard Operations are required to clean up the mistakes of Vessel and Rail Operations, but has no means to hold them accountable or make permanent improvements to their separate operations.
Rail Operations Top Challenges

Why Culture, Competency, and Knowledge (6)?

- Efficient Rail Operations requires high container sort and data integrity, but they are regularly faced with poor sort and data integrity, making it more difficult and less efficient to execute due to weak performance culture, mismanagement, or incompetence.

Why Process Optimization (4)?

- Rail Operations is required to clean up the mistakes of Vessel and Yard Operations, but has no means to hold them accountable or make permanent improvements to their separate operations.
Support Departments Top Challenges

Why Firefighting (1)?

- Support Departments are necessarily required to react to unforeseen changes in operational plan and to support as needed, but often times a change in plan is not communicated when the decision is made, forcing support departments to react instead of change plans concurrently.

Why Process Optimization (4)?

- Vessel, Yard, and Rail Operations have competing demands for support functions’ limited assets and expertise. Each operation is focused on achieving their local metrics, but not optimized or prioritized to deliver the greatest benefit to the whole system.
Most Relevant Job Grade Challenges

Blue Collar Labor

- Program Planning and Unstable, Unclear, and Incomplete Requirements
  ➢ Receives maligned or competing directions from management that change often

Assistant Manager

- Process Optimization
  ➢ Feels the silo effect of competing priorities between functional areas

Manager

- Firefighting
  ➢ Handles problems that are unforeseen and not resolved when and where they are created

Senior Leadership

- Process Optimization
  ➢ Creates or perpetuates the silo effect. Feels pressure from peer-run silo departments.
Implementation Step 1: Address Program Culture

- Operational plans are not executed per script for various reasons, many of which are foreseeable, which causes downstream process owners to react/ﬁreﬁght.

- Silo mentality prevents coordination between stakeholders and is a major cause of many of the challenges that managers face in efﬁciently and consistently delivering value.

- Because of the need to manage reactively and the lack of integration, managers have difﬁculty projecting what resources are required to meet the needs of their customers and stakeholders. Certain customers are prioritized for service, but the priorities change based on severity of service failure.

- Senior Leadership embeds silo mentality in terminal culture and makes change difﬁcult and unattractive.
Culture Change Agents

Senior Leadership
- *Resolve/Prioritize competing goals*

Operations Managers
- Clarify expectations and priorities
- Empower decision-making
- *Input party, Output customers*

Support Function Managers
- Communicate availability of resources
- Anticipate needs of Operations

Operations Assistant Managers
- Implement and monitor standard processes
- Communicate clear directions and expectations to labor

Operations and Support Steady Labor
- Help develop standard processes and execute perfectly
- Stop and fix problems on the spot, and ensure that they do not repeat
LEs and SEs with Most Room for Improvement

Adapted Lean Enablers and Sub-Enablers were ranked by total count and weighted score.
LEs and SEs with Most Room for Improvement

1. 6.1 Use standardized processes that can be adapted to the operating environment to achieve the greatest benefit instead of the easiest or most convenient
   - Embraced by Senior management, but not well-executed
   - Mitigates Firefighting by reducing variability in defined processes
   - Improves Process Integration when benefits are viewed holistically

2. 4.5.10 Proactively manage trade-offs and conflicts instead of glossing them over or handing them off
   - Mitigates Firefighting by ensuring that all stakeholders understand how they will be affected and create a plan to mitigate negative impact
   - Gives downstream process owners a chance to contribute feedback
LEs and SEs with Most Room for Improvement

3. 6.3 Strive for excellence and continuous improvement in planning, execution, and satisfaction of stakeholder requirements by looking at the system as a whole instead of solitary functions and departments.
   - Culture must be driven by Senior Management
   - Mitigates Firefighting by iteratively reducing variability in improvement areas
   - Improves Process Integration by viewing the system as a whole

4. 1.3 Encourage people to take action on the spot, make decisions and solve problems at the lowest possible level, accept responsibility for their actions, and learn from their mistakes.
   - Mitigates Firefighting by addressing problems when they are smallest and easiest to fix
   - Helps employees develop Competency and Skills to prevent mistakes from reoccurring.
Lean Principles Ranked as Areas for Improvement

1. Optimize the Value Stream (LP2)
2. Pursue Program Perfection (LP5)
3. Create Flow (LP3)
4. Treat People as the Most Important Asset (LP6)
Implementation Step 2: Focus on Waste

Lean Principle 2, Optimize the Value Stream is an area with great room for improvement and many relevant LEs can be applied.

Changing strategy does not address the driver of inefficiency—waste.

Must have commitment to eliminating waste instead of blaming outside causes for operational inefficiencies.

Make decisions based on facts and implement best practices from comparable terminals in global network.
Lean Terminal Operations: Teams and Roles

Operations Departments

• Each Operations Department works with the others as a team to achieve terminal-wide KPIs.

Support Departments

• Each Support Department works to assist the Operations Departments in achieving efficient and consistent value delivery.

Global Transformation Team

• Evaluates areas for operational improvement and implements best practices from global network.

Performance Excellence Team

• Evaluates areas for operational improvement and implements change within local constraints.

Training Team

• Provides general training for new-hires and transfers
• Provides employee-specific training to meet individual development needs.
• Delivers “Stevedoring 101” refresher course developed with focus on responsibility.
• Provides training to laborers or training tools to Assistant Managers who must retrain the labor force daily.
Implementation: Value Stream Optimization

- Ideal State is hypothetical based on maximum Overall Equipment Effectiveness calculations.
  - Assumes zero waste.
- Proposed Future State is conservative estimate of effective waste elimination and implementation of GT High Priority Initiatives.
  - Acknowledges RNVA waste.

Source: GT "20130227 Diagnostics Report Out for Pier 400 – Final Fullest" p.37
GT Focus Areas Prioritizes Waste Reduction: Impact vs. Ease of Implementation

Proposed initiatives are generally high priority initiatives with significant financial impact

Financial Impact $M

- Low priority
- Medium priority
- High priority

Yard strategy allocation & sequence

Gantry automation

QC operator skills (3 sub-initiatives)

Shift change (7 sub-initiatives)

Spare parts inventory

Pilling of UTR's (exclusion and discharge free flow only)

Appointment on show line

IT infrastructure improvement

Wasting time of equipment

Empty container gates

Optimizing lanes under cranes

CUT driving compliance

Optimize due date

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Ease of Implementation

Vessel

Yard

Rail

Cost

Note: *Based on base scenario of 8x 55' UTR boxes. All cost impacts at 2013$ at 1.3%.

Source: GT “20130227 Diagnostics Report Out for Pier 400 – Final Fullset” p.272
GT Initiatives Aggressively Attack Waste and Make Progress Visible

- Waiting is the most abundant and costly form of waste at Pier 400.
  - Bottlenecks also restrict flow.
- Global Best Practices are implemented as standard processes to reduce variability (LE 6.1).
- Prioritized initiatives address areas where waiting has largest impact on productivity.
- Progress on Initiatives is displayed in easily understood format that is visible to all.
Implementation: Expand Scope

Iteration of GT Initiatives with the help of Lean Enablers to continue to reduce waste and variability.

Expansion of Lean Principles and Lean Enablers to Global Transformation.

- Adoption and application of Survey in future terminal projects. Lean Training and PEX initiation for all Managers, Supervisors, and Steady Labor.
Ethical Contribution

Health and Safety

- Above all else, our "License to Operate" is grounded in our commitment to the health and safety of our employees and partners.
- Standardization helps reduce and manage risk working in potentially dangerous environments

Productivity and Efficiency has wider economic impacts.

- Efficiency of global supply chain.
- Decreased consumption of resources.
- Local, Regional, and Wide Economic Impact

Positive Working Culture

- Trust and empower employees.
- Link results, performance, and rewards.
- Lead by example.

Stakeholder Engagement

- Stakeholders at all levels, internal and external, have a right to be heard because they have a valuable interest in the Company success.
- We must account to our stakeholders and be able to explain rationale behind decision-making.
Literature


Project Management Book of Knowledge (4e), Project Management Institute, 2008.

Questions?

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