Root Cause Analysis and Solution Proposal of Invoice Cycle Time

I. Executive Summary:

- **Initial Goal:**
  - The goal of this analysis is to identify the primary bottlenecks and root causes behind long invoice cycle times (SLA >10 days), using a combination of qualitative and quantitative assessments.
- **The Problem Spotted:**
  - The invoice process is in **crisis:** The average cycle time for a standard invoice is **12.90 days**, resulting in a catastrophic **2.22% overall SLA compliance** rate. This failure is compounded by a persistent **14.12% rework rate**, signaling **systemic administrative breakdown**
- **The Opportunity (The Paradox):**
  - Invoices flagged for rework (TRUE) are resolved **faster (10.97 days)** than standard invoices (**13.22 days**). This proves the process *can* be fast; the solution is **automating the proactive "chasing" logic into the standard flow**.
- **The Primary Fix:**
  - Focus on eliminating the **12.47 days of passive waiting** in both approval stages and standardizing and consolidating intake for all invoices.

II. Quantitative Assessment: Cycle Time & Bottleneck

A. Data Overview

Metric	Result	Insight
Average Cycle Time	**12.90 days**	Overall process is too slow.
Rework Rate	**14.12%**	**Third Bottleneck**—Significant volume bypasses the "Happy Path." 🚩
Overall SLA Compliance	**2.22%**	Catastrophic failure to meet the 10-day total target.

B. Cycle Time Breakdown

The data clearly shows that 12.47 days of the 12.90-day average cycle time is spent in the approval phase (Stages 1 and 2).

Stage	Average Days	SLA Compliance	Insight
Stage 1 (Validate → Approver 1)	4.93 days	12.12%	**Second Bottleneck**—Passive waiting for approver availability. 🚩

Stage	Average Days	SLA Compliance	Insight
Stage 2 (Approver 1 → Approver 2)	7.53 days	18.48%	**Primary Bottleneck**—The 8-day passive wait is the single largest delay point. 🚩
Stage 3 (Approver 2 → AP Posting)	0.44 day	100.00%	AP team is highly efficient once approved.
Total	12.90 days	2.22%	Entire process is structurally flawed.

Key Insight:

- The 14.12% rework flag acts as a **high-priority queue**, triggering the manual follow-up (chasing via WhatsApp/Email) that the standard process lacks. The fix is to **automate this proactive chasing** into the standard workflow.
- The core problem is **Non-Value-Added Time**, resulting almost entirely from passive waiting (no reminders, no escalation).

III. The Process Paradox

The comparison of standard vs. rework cycle times proves that the issue is process design, not capability.

Invoice Status	Average Cycle Time	Interpretation
FALSE (Standard)	13.22 days	Stuck in passive waiting (Stage 1 & 2).
TRUE (Rework)	10.97 days	**2.25 days faster** due to priority attention.

Conclusion:

- While the 10.97-day cycle time is faster, the labor hours spent on manual "detective work" (chasing approvers via WhatsApp, contacting vendors for missing documents) makes those 14.12% of invoices the **most expensive** to process. This justifies the investment in the new system by framing it as a **labor saving**, not just a time saving.

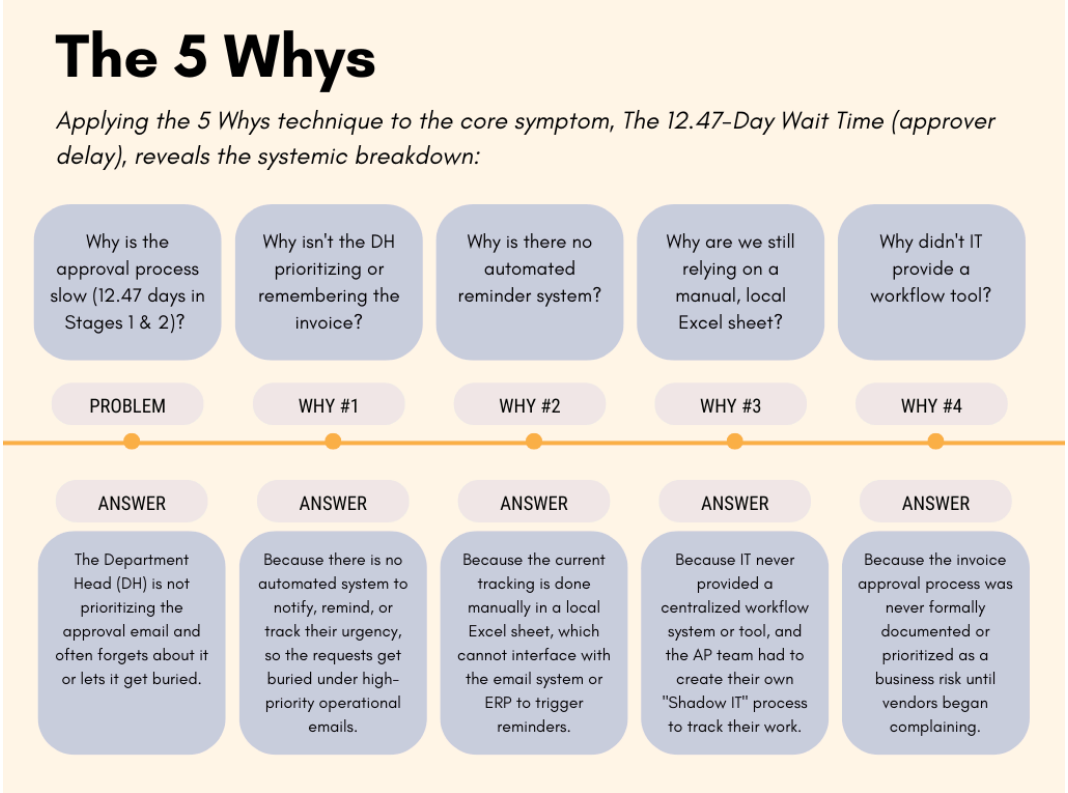
IV. Qualitative Analysis: Root Causes of Delay & Rework

A. Root Cause of Passive Waiting

The 12.47-day spent in Stages 1 and 2 is non-value-added time, confirmed by the low SLA compliance (12.12% and 18.48%). T**he core issue is a lack of automation in the approval layer.**

1. The 5 Whys: Uncovering the Workflow Failure

Applying the 5 Whys technique to the core symptom, **The Wait Time** (approver delay), reveals the systemic breakdown:



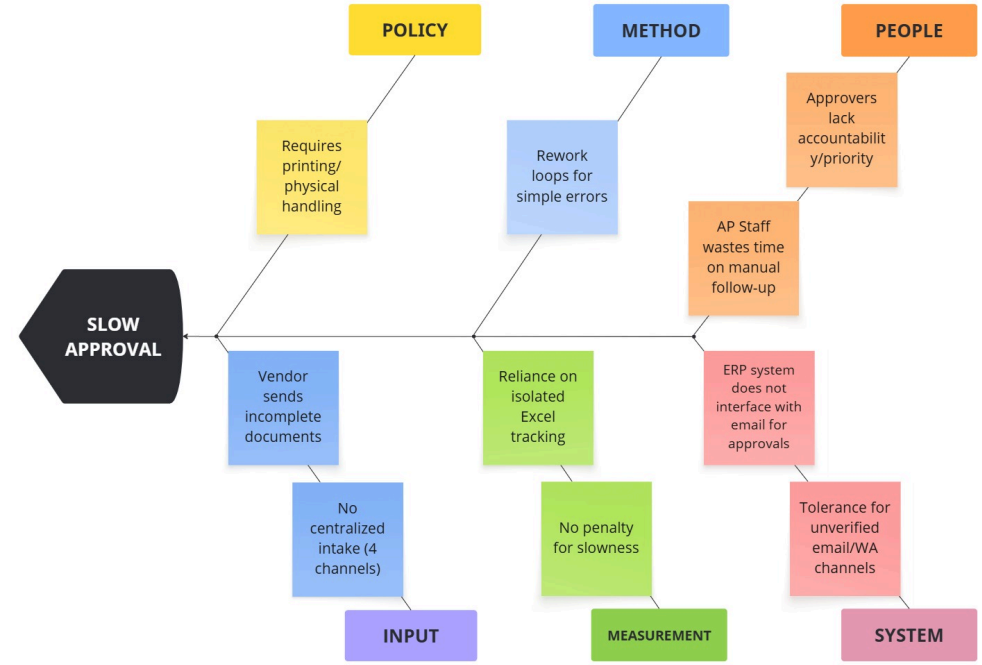
The 5 Whys: Uncovering the Workflow Failure

Root Cause:

- The process suffers from the **Absence of a workflow system** with automated reminders, escalation, and delegation rules.
- The manual process lacks visibility for the AP team and Approver ("No visibility dashboard for SLA monitoring" pain point).

2. Fishbone Diagram Insight: Categorizing Causes of Slow Approval

The Fishbone Diagram confirms that the delay is not a single issue, but a combination of systemic failures across all categories .

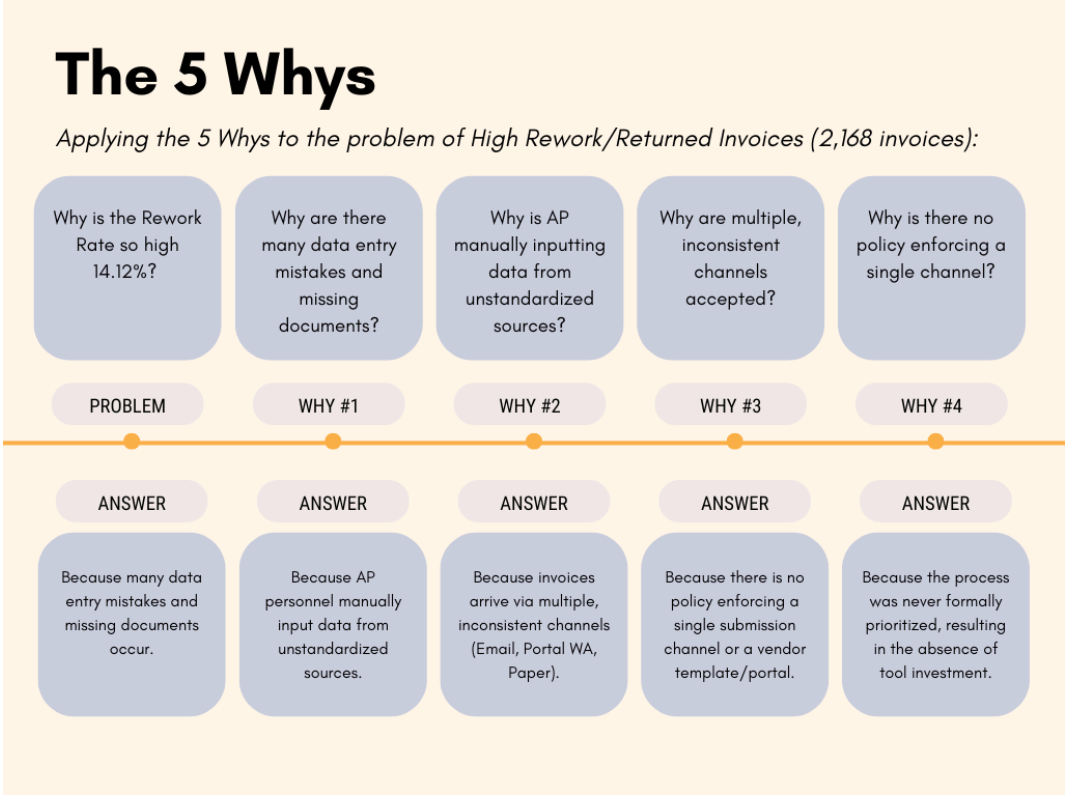


Fishbone Diagram: Categorizing Causes of Slow Approval

B. Root Cause of High Rework

The 14.12% exception rate is costly and disruptive. The problem is heavily concentrated in the unstructured **Email** channel for Goods and Services 45.57% of rework).

1. The 5 Whys: Uncovering the Intake Failure



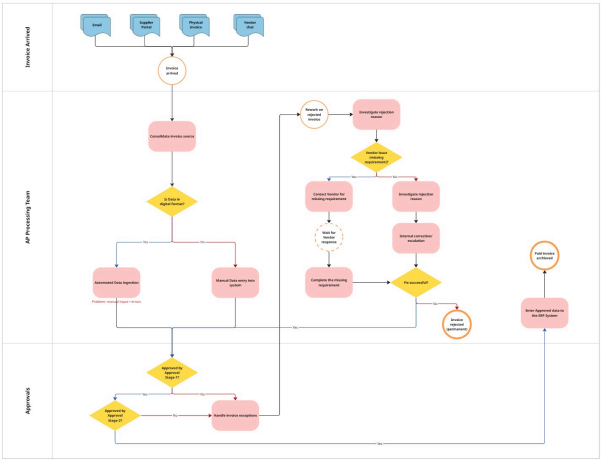
The 5 Whys: Uncovering the Intake Failure

Root Cause:

- **Manual entry and multiple unstructured channels** create an error-prone process. The responsibility for quality control is shifted from the vendor to the AP team.

2. Swimlane Analysis Insight: The Overall

A Swimlane analysis confirms the inefficiency with the manual effort:



The As-Is Diagram

Pain Points of As-Is Diagram

- Miro link: https://miro.com/app/board/uXjVJgfJldQ=/?

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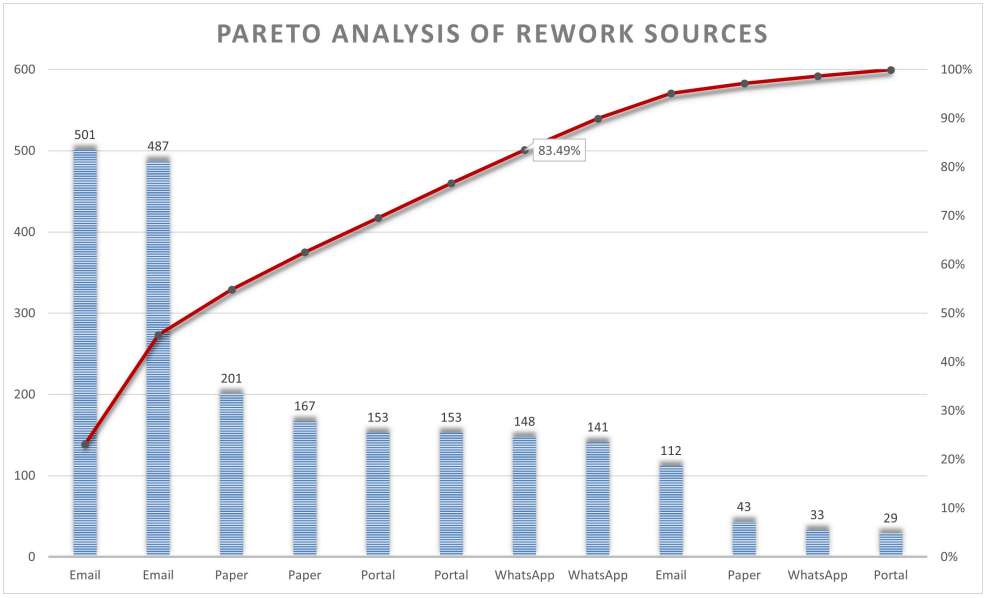
V. Pareto Analysis: Rework Source Quantification

The Pareto analysis quantifies the source of the 14.12% rework, proving that the problem is concentrated in a "vital few" Category/Channel combinations.

Rank	Source Combination	Count	Percentage	Cumulative %
1	**Services - Email**	501	23.11%	**23.11%**
2	**Goods - Email**	487	22.46%	**45.57%**
3-7	*5 other sources (Paper, Portal, WA)*	822	37.92%	**83.49%**
8-13	*Remaining*	358	16.51%	100.00%



Pareto Analysis Chart

Key Insight:

- The **Services-Email** and **Goods-Email** combinations alone generate **45.57%** of all exceptions. The solution must prioritize eliminating Email intake for these categories.

VI. To-Be Design: Solution Strategy

The solution strategy is designed in two phases to directly reverse the two primary root causes identified: **Passive Waiting 12.47-day** and **Unstructured Intake 14.12%.**

A. Phase 1: Fix the Wait (Automate the Standard Workflow)

- **Goal:** Formalize the proactive "chasing" logic—which the data proved is necessary for speed (the Process Paradox)—into the standard (FALSE) flow. This aims to eliminate the 12.47 days of passive waiting in Stages 1 and 2.

Design Solution	Rationale / Link to Evidence
Implement Time-Based Escalation Rules	**Reverses the Process Paradox:** Transforms passive waiting into automated action, ensuring invoices are never "lost" in an Approver's inbox.
Rule 1 (Reminder): System automatically sends a **Priority Reminder (via Email/SMS)** to Approver 1 or 2 if no action is taken within **24 hours**.	**Addresses Symptoms:** Eliminates the need for the AP Team's costly manual follow-up (Process Narrative, Step 7).
Rule 2 (Escalation): If no action is taken after **72 hours**, the invoice is automatically **routed to the Approver's Manager or Delegate**.	**Eliminates Primary Bottleneck:** Forcibly ends the **7.53-day** wait in Stage 2, achieving significant cycle time reduction.
Smart Routing (Auto-Approval)	**Accelerates 16% of Low-Value Invoices:** Eliminates the 13-day wait for low-risk transactions.
Logic: If the invoice amount is < $1,000$ **AND** the 3-Way Match is successful, the system **automatically approves and posts** to ERP, bypassing manual approval entirely.	**Evidence:** Data shows 16% of delayed invoices were < $1,000 proving they are not complex (04_5_whys_analysis_invoice_approval_delay.pdf).
Increased Visibility for Approvers	**Addresses Root Cause:** Provides intelligent data to counter the complaint that requests lack priority indicators and get "buried."
Action: Provide a **Weekly Aging Dashboard** showing which pending invoices are nearing the 72-hour escalation deadline.	**Evidence:** Addresses the Fishbone Root Cause: "Reliance on isolated Excel tracking."

B. Fix the Input (Enforce Single, Structured Intake)

- **Goal:** Prevent the top 83.49% of rework sources by eliminating error-prone intake channels and enforcing quality control at the source.

Design Solution	Rationale / Link to Evidence
Mandatory Channel Consolidation	**Directly Targets Pareto Analysis:** Explicitly eliminates the sources driving 45.57% of all rework (Services/Email and Goods/Email).
Email	**COMPLETELY BLOCKED**
WhatsApp/Paper	**COMPLETELY BLOCKED**
Vendor Portal	**MANDATORY** for all Invoices
Introduction of Structured Digital Intake Form	**Addresses Rework Root Cause:** Shifts quality control responsibility from the AP Team back to the Vendor.

Design Solution	Rationale / Link to Evidence
Action: The Portal must implement **mandatory field validation** and **tollgates** to instantly reject non-compliant invoices at the point of entry.	**Evidence:** Addresses the "Multiple unstructured channels create an error-prone process" Root Cause (05_5_whys_analysis_high_rework.pdf).

VII. Conclusion & Expected Impact

Target Area	Current State (Baseline)	Target State	Expected Impact (Validates the Investment)
Average Cycle Time	12.90 days (Standard)	Goal: Reduce to 6 days	**54% Lead-Time Reduction.** Eliminating 12.47 days of passive waiting allows the process to fall under the 10-day SLA.
SLA Compliance	2.22% (Overall)	Goal: Increase to 80%	The 72-hour escalation rule ensures that the majority of invoices comply with the target cycle time.
Rework Rate	14.12%	Goal: Reduce to 5%	Targeting 83.49% of rework sources via mandatory channel consolidation provides high confidence in meeting the 5% target.