

LEAN AND OPERATIONAL EXCELLENCE

Constraints, Six Sigma and Process

Goldratt · Six Sigma · Hammer · Spear

PAPER 03 / 03

A Furtherance reference compendium on the intellectual traditions behind organisational design, leadership, execution, and culture.

IN THIS PAPER

The series closes with the system-level and process disciplines that sit alongside lean – managing the constraint, reducing variation with data, redesigning the process itself, and turning daily work into experiments. The question it answers: once you understand waste and quality, how do you improve the system as a whole?

Goldratt focuses improvement on the one constraint that governs throughput; Six Sigma reduces variation through disciplined, data-driven method; Hammer redesigns the process rather than automating a broken one; Spear reveals the experimental habit beneath high-velocity operations.

Eliyahu Goldratt The Goal, 1984

Theory of Constraints · throughput

CORE THESIS

Every system has a single **constraint** – a bottleneck – that governs its total **throughput**. Improving anything other than the constraint barely helps; the way to improve the whole is to manage that constraint, and to resist the pull of local efficiencies that do not lift the system.

FRAMEWORK

Five focusing steps	Action
Identify	Find the system's constraint
Exploit	Get the most from it without new investment
Subordinate	Align everything else to the constraint
Elevate	Increase the constraint's capacity
Repeat	Find the next constraint; avoid inertia

Goldratt reframed measurement around **throughput, inventory and operating expense** rather than local cost efficiency.

METHODOLOGY

A physicist's systems logic, taught through a business novel.

SIGNIFICANCE AND CRITIQUE

A powerful, counter-intuitive discipline of focusing on the bottleneck. The critique: the single-constraint assumption can oversimplify, and the approach is thinner on quality and people than lean.

Six Sigma Motorola, 1986 · scaled by GE

Statistical improvement · variation reduction

CORE THESIS

Reduce process **variation** until defects are vanishingly rare – the namesake target of 3.4 defects per million opportunities. Improvement follows a disciplined, data-driven cycle, executed by a trained hierarchy of practitioners.

FRAMEWORK

DMAIC step	Purpose
Define	Frame the problem and the customer requirement
Measure	Quantify current performance
Analyse	Find the root causes of variation
Improve	Design and test the fix
Control	Hold the gains with monitoring

A belt hierarchy (green, black, master black belt) supplies the capability; later fused with lean as **Lean Six Sigma**.

METHODOLOGY

Statistical process improvement, originated at Motorola and scaled famously at GE.

SIGNIFICANCE AND CRITIQUE

A disciplined, measurable and widely adopted improvement method. The critique, per the caveat: it can become bureaucratic, and an over-emphasis on variation reduction can crowd out innovation.

Michael Hammer *Reengineering the Corporation, 1993*

Business process reengineering

CORE THESIS

Do not pave the cow-paths. Rather than automate an inefficient process, **obliterate and radically redesign** it around end-to-end outcomes. Organise around **processes**, not functions.

FRAMEWORK

Idea	Meaning
Radical redesign	Rethink the process from scratch, not incrementally
Process orientation	Organise around end-to-end value, not silos
“Don't automate, obliterate”	Fix the process before adding technology
Process maturity	Later work on managing and maturing processes

METHODOLOGY

A practitioner doctrine that swept management in the 1990s.

SIGNIFICANCE AND CRITIQUE

Put process at the centre of the organisation and reshaped a decade of management practice. The critique, per the caveat: reengineering became a byword for downsizing, carried a high failure rate, and was later tempered toward disciplined process management.

Steven Spear Decoding the DNA of the TPS, 1999

High-velocity organisations · work as experiment

CORE THESIS

What truly distinguishes Toyota – and other **high-velocity organisations** – is that they turn work into **experiments**: every activity is a hypothesis, tested and improved through the scientific method embedded in daily work. The engine is rapid problem-solving and knowledge-building, not the visible tools.

FRAMEWORK

Capability	What it means
See problems	Design work so abnormalities are immediately visible
Swarm and solve	Attack problems at once, where and when they occur
Share knowledge	Spread solutions across the organisation
Develop the capability	Leaders teach others to do the same

METHODOLOGY

Field research decoding the tacit “rules-in-use” beneath the Toyota Production System.

SIGNIFICANCE AND CRITIQUE

Revealed the deep operating logic beneath lean – continuous experimentation – and showed it generalises well beyond manufacturing, including to health care. The critique: the capability is demanding to build and sustain.

A NOTE ON EVIDENCE

A caution on the improvement industry: business process reengineering, in particular, became associated with indiscriminate downsizing and a high failure rate, and Six Sigma programmes can ossify into bureaucracy that dampens innovation. Treat these as disciplined methods to apply with judgement – not as programmes to roll out wholesale – and keep the aim (customer value, throughput, learning) above the machinery.

Synthesis

Contribution	Lens	Key idea	Critique
Goldratt	The constraint	Five focusing steps; throughput	Single-constraint; thin on people
Six Sigma	Variation	DMAIC; belts	Can ossify; anti-innovation risk
Hammer	Process	Radical redesign	Downsizing; high failure rate
Spear	Experimentation	Work as hypothesis	Demanding to build

FOR THE OPERATOR

This paper supplies the system-level disciplines – manage the constraint that governs throughput (Goldratt), reduce variation with data (Six Sigma), redesign the process rather than automate it (Hammer), and turn daily work into disciplined experiments (Spear). For the operator: focus on the bottleneck, build quality and improvement into the work as experiments, and redesign the process before layering on tools. That closes the Lean and Operational Excellence series – and, with strategy, delivery and systems thinking, the Structure and Execution group entire.