

# THEORY OF QUALITY MANAGEMENT: ITS ORIGINS AND HISTORY

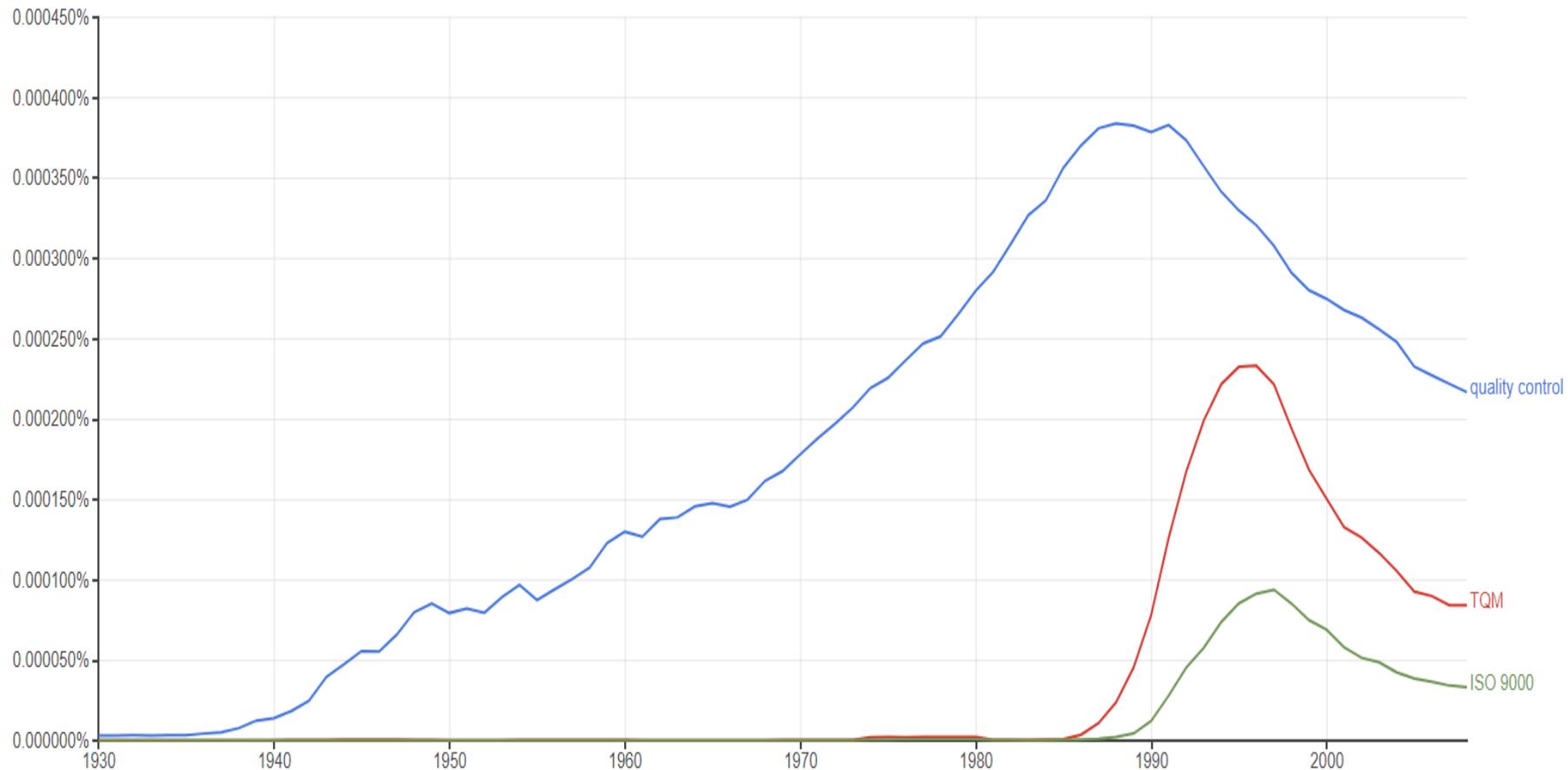
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## Decline of the quality discipline?

- On TQM: “...during the first 10 years of the new millennium, the term TQM seems to have lost its attractiveness in Western parts of the world” (Dahlgard-Park 2011)
- On ISO 9000: “We have followed like sheep, pursued goals without challenging whether they were the right goals but most of all we have forgotten why we were doing this. It was to improve quality, but clearly it has not.” (Hoyle 2007)

The frequency of the word strings “quality control”, “TQM” and “ISO 9000” in books published in English in 1930 – 2008, according to Ngram.



## What might be the cause?

- Scott and Cole (2000) claim that the quality effort is not readily linked to a well-identified, clearly specified set of ideas and practices but, rather, appears as a loosely coupled collection of orientations and practices.
- We politely disagree: The seminal authors on quality have presented influential theoretical and philosophical starting points for quality. Unfortunately, those starting points fall outside the usual paradigms of management scholars, and they have often failed to spot them.

# Where can the theoretical and philosophical ideas of quality management be found?

- Quality is about artifacts produced: **production (theory)**
- Knowledge is needed: **epistemology**
- For perceiving and acting for the sake of quality, a conception on what is out there in the world is needed: **ontology**
- **What we are searching for should be actionable!**

# Theory of production – value generation

Shewhart (1931): “Looked at broadly there are at a given time certain human wants to be fulfilled through the fabrication of raw materials into finished products of different kind. [...]The first step of the engineer in trying to satisfy these wants is therefore that of translating as nearly as possible these wants into the physical characteristics of the thing manufactured to satisfy these wants. In taking this step intuition and judgement play an important role as well as the broad knowledge of the human element involved in the wants of individuals.

The second step of the engineer is to set up ways and means of obtaining a product which will differ from the arbitrarily set standards for these quality characteristics by no more than may be left to chance.”

More: Koskela, L. (2000). *An exploration towards a production theory and its application to construction*. VTT Technical Research Centre of Finland.

# Epistemology

- The scientific method (Shewhart and Deming 1939) is to be used: “In this sense, specification, production, and inspection correspond respectively to making a hypothesis, carrying out an experiment, and testing the hypothesis. These three steps constitute a dynamic scientific process of acquiring knowledge”
- This is Aristotelian epistemology, rather than Platonic
- More: Koskela, L., Ferrantelli, A., Niiranen, J., Pikas, E., & Dave, B. (2018). Epistemological explanation of lean construction. *Journal of Construction Engineering and Management*, 145(2), 04018131.

Mainstream thinking on  
management and production  
is Platonic

Lean thinking is Aristotelian

Ideas  World

Ideas  World

Plan-do!

Plan-do-check-act!

# Ontology

- “Out of the crisis” (Deming 1982): “Every activity, every job is part of the process. A flow diagram of any process will divide the work into stages. The stages as a whole form the process. The stages are not individual entities...”
- Each stage works with the next stage and with the preceding stage toward optimum accommodation, all stages working together toward quality that the ultimate customer will boast about
- This is process ontology, rather than thing ontology
  - emphasis on relationships between different things and processes, and on continuous change
- More: Koskela, L. J., & Kagioglou, M. (2005). On the metaphysics of production. In *Proceedings of 13th International Group for Lean Construction Conference*. (pp. 37-45).

# How did these starting points influence?

## The case of Total Quality Management

- Dean and Bowen (1994) contended that in Total Quality Management, there are three basic principles: (1) customer focus, (2) continuous improvement, and (3) teamwork.
- These neatly correspond to the underlying theory of quality as discussed above:
  - Customer focus is compatible with the value generation model of production.
  - Continuous improvement is compatible both with Aristotelian epistemology and process metaphysics.
  - Teamwork is compatible with process metaphysics.

# Problematic tendencies

- Two problematic tendencies become visible:
  1. independently from the quality movement, quality practices and techniques were developed based on another theory of production, (improvement outside the starting points) and
  2. the original starting points are forgotten or misunderstood (deterioration).

## Quality at Toyota

- “Just-in-Time dictates that parts are delivered to the right part of the assembly line, at the right time and in the right amount. However, for this to work effectively, Ohno realized that another factor had to be controlled: quality. Parts must be flawless and defects must be eliminated before progressing along the line. This is when *jidoka*, the second pillar of what would later become the Toyota Production System, entered the picture.” (Toyota 2004)

## What did this mean?

- Quality was needed, not primarily for the sake of the customer, but for realizing the Just-in-Time system
  - Quality was needed for reducing temporal variability, rather than dimensional and functional variation only
- Quality was approached from inside production, and generic tools, such as source inspection and fool-proofing mechanisms, *poka yoke*, were promoted for ensuring zero defects in produced parts (Shingo 1988).
  - This contrasts to the mainstream quality thinking that looks at quality as an outcome of production, and assumes the rectification of a quality problem to be one of a kind, separate from general improvement of production.
- “ISO 9000/QS 9000 was unnecessary for Toyota, moreover, because it was incomplete: It did not deal with cost, one of the two pillars of management.” (Hino 2005)

# What happened to the epistemological starting point?

- ISO 9000 series of quality standards, first published in 1987 and revised in 1994, 2000 and 2015
- These standards contained a prescriptive approach to quality: they stipulated which kind of documents should be prepared for the quality system.
- This represents Platonic epistemology (Koskela et al. 2018): existing knowledge is pushed to the world.
- Outcome: not even one case where identified quality problems would have led to improvement action in the studied organizations that followed the mentioned standard could be found in a recent Irish research (Taggart 2016).
- It is only the newest version of the standard (2015) that takes a much less procedural approach and stresses the application of the PDCA cycle at all levels of an organization.

# What happened to the ontological starting points?

- In Harrington's (1991) influential book on business process design, only 2 % of the pages (5 and a half pages out of 274) are addressing continuous improvement
- Armistead and Rowland (1996) state: "...business processes can be broken down into a hierarchy of smaller processes which share the same characteristics".
- The seven ISO quality principles: Customer focus, Leadership, Engagement of people, Process approach, Improvement, Evidence-based decision-making, Relationship management
  - Internal collaboration and teamwork missing

## Conclusion

- The degeneration of the original philosophical foundation seems to be one of the longstanding problems in the area of quality
- Value generation theory of production is a partial theory of production; quality should also be approached through the flow theory. Lacking theoretical evolution seems another long-standing problem that arguably has hindered the progress of quality management.