

A PORTFOLIO/PROCESS/OPERATIONS (PPO) ANALYSIS OF A META-PROJECT PRODUCTION SYSTEM IN RENOVATION PROJECTS

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1 WHAT IS THE "PORTFOLIO/PROCESS/OPERATIONS (PPO)" MODEL?

The Portfolio/Process/Operations (PPO) model (Figure 1) is a new approach to conceptualizing the intertwined factors that impact the work flow in construction production systems (Sacks, 2016).

- "Operations": individual value-adding tasks performed by trade crews
- "Process": the flow of individual products (locations within a building project) through the tasks across different trades.
- "Portfolio" a meta-project point of view, examining the flow of products and crews across multiple projects.

The portfolio and the operations levels are linked to close a loop (Figure 2), in that the trade crews (subcontractors and suppliers) balance the demands of the multiple projects in which they are involved across the local construction market.

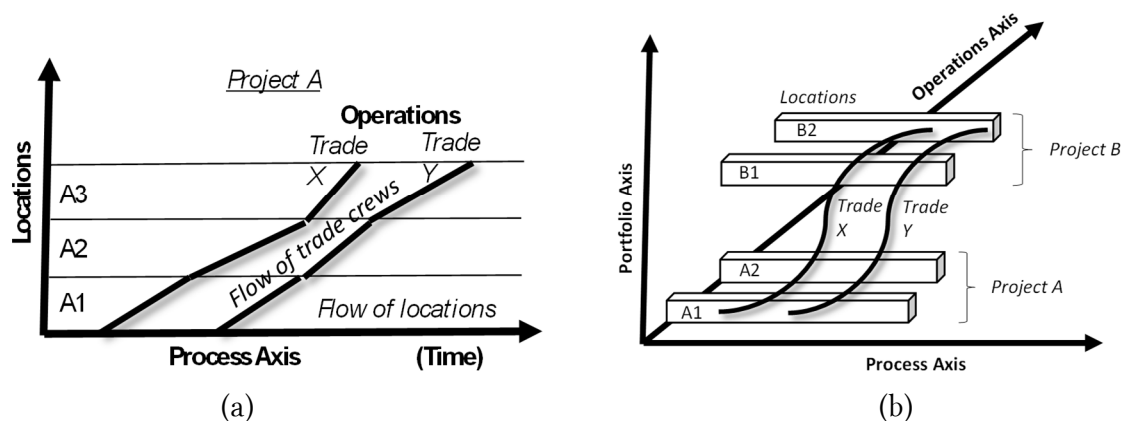


Figure 1: (a) Traditional "Line of Balance" (LOB) chart for managing a single project, showing Process (location) flows and Operations (trade crew) flows. (b) Three-dimensional Portfolio, Process and Operations (PPO) model of construction flows.

2 PPO AT FIRA PALVELUT

Fira Palvelut is a Finnish contractor specializing in the refurbishment of bathrooms in the aging Finnish mass housing market. By addressing each of the elements of the PPO model, Fira has managed to build a robust and successful production system that dramatically outpaces the

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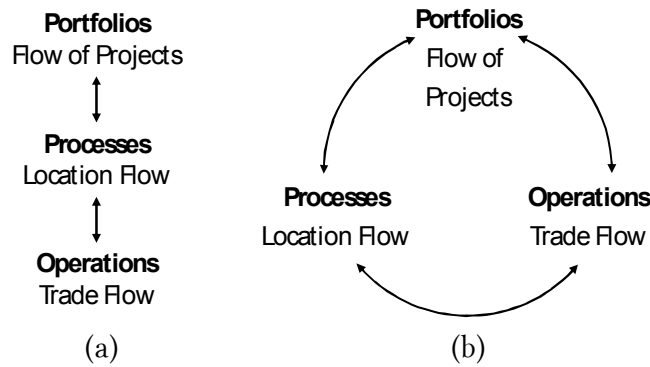


Figure 2: Hierarchical (a) vs. cyclical (b) relationships in the PPO model. The cyclical view reflects the flow of trades across projects as well as their flow across locations within a project.

industry standard for project lead time. In the renovation sphere, this means customers must be out of their houses for significantly less time while the work is performed.

- **Portfolio:** Fira works to create a stable backlog of projects and start them in steps, so that trade crews can flow directly from one project to another. Crews have a steady supply of jobs; subcontractor crew composition is maintained from project to project. This allows them to build on the learning curve of each individual project, accumulating learning from project to project instead of starting from scratch with each new project team (Figure 3).
- **Process:** Fira builds a stable flow of work both within and between projects by identifying, quantifying, defining, and balancing the work packages so that each stage has an equal duration of work. Wastes are systematically addressed, and stability enables compression of project timelines. Fira documents innovations and standardizes them across projects.
- **Operation:** Project-to-project team continuity means that there is a degree of repetition not present in the typical one-off project organization, enabling continuous improvement of processes and trade crews learning to work "the Fira Way". There is not only room for improvement but also desire, since the benefits accrue directly to the trades as long as they keep moving from project to project.

Fira's practice illustrates implementation of a production system that considers all three aspects of the PPO model. The designers of Fira's production system are implicitly aware of all elements, and by addressing each in an integrative fashion, they have improved performance.

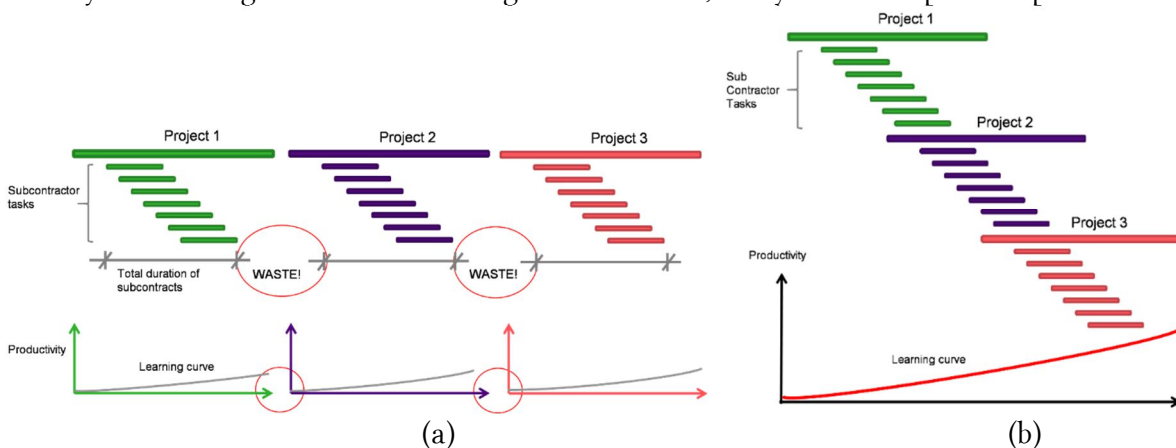


Figure 3: (a) The "waste" of shared learning when projects are disconnected and teams are ad-hoc. (b) Linking projects and maintaining team continuity leads to long-term learning and improvement

