

# Appendix 4: Checklist of Project Lifecycle Cost Categories

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This document is part of the online supplement for the book *Learning Engineering Practice* by James Trevelyan.

This checklist has been adapted from Australian Standard AS4536. It lists all the major components of the life cycle cost of an engineered solution.

## Concept and definition

- Market research.
- Project planning
- System concept and design analysis.
- Preparation of a requirement specification of the product

## Design and development

- Project management – cost of planning and monitoring all project activity.
- System and design engineering including reliability, maintainability and environmental protection activities – cost of employing engineers with appropriate expertise.
- Design documentation – cost of preparing comprehensive documentation to enable construction, manufacture, installation, operations and maintenance.
- Prototype fabrication – to check that the proposed design will work, for example a pilot plant.
- Software development – it is rare for software cost estimates to be accurate.
- Testing and evaluation – some systems and components will need to be tested to ensure they will work as expected.
- Productivity engineering and planning – to ensure that the system will provide the expected benefits.
- Vendor selection – choosing appropriate suppliers (vendors) and ensuring that they can meet the required level of technical capacity and competence takes engineering time and effort.
- Demonstration and validation – providing reasonable assurance that the project as a whole will comply with requirements.
- Quality management – ensuring that all the work meets the required standards for accuracy and elimination of mistakes and errors.

## Manufacturing and installation:

- Once only costs for each project —
  - Planning and optimizing construction and manufacture,
  - construction of support facilities,
  - procurement, manufacture of production tooling and test equipment,
  - spares and repair parts for manufacturing equipment,
  - initial training of personnel,
  - process and equipment documentation, setting up operation, accounting, logistics and maintenance management systems and software,
  - qualification testing – proving that the equipment works to the required standards.
- Recurring costs —
  - production management,
  - facility maintenance,
  - fabrication (labour, materials and the like),

- quality control and inspection,  
assembly, installation and checkout,  
packaging, storage, shipping and transportation,  
ongoing training, and  
insurance.

#### Operation and maintenance

##### Operation —

- labour costs (see chapter above)
- training, re-training, maintenance of skill levels,
- materials and consumables,
- energy (for example, electrical power, fuel, including supply and support costs),
- hire of temporary equipment and facilities, rent, accommodation, and
- engineering modifications, upgrades and improvement.

##### Maintenance (items not included above) —

- facilities, support, consumables, tools
- contractor services, and
- IT support.

##### Logistics (items not included above) —

- spare parts and repair or replacement material,
- warehousing facilities, and
- packaging, shipping and transportation.

##### Support services —

- corporate management,
- administration, accounting, and
- insurance.

#### Disposal, Decommissioning

- system shutdown (labour, materials, specialist contractors)
- disassembly and removal,
- recycling or safe disposal, and
- sale of residual equipment.