

Analysing the impact of alternative network structures on resource-constrained schedules: Artificial and empirical experiments, Computers and Industrial Engineering, Tom Servranckx, Mario Vanhoucke and Giel Vanhouwaert*

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Appendix: Project card N°1

Project details

Project description:
A construction project that consists of 22 houses and 3 apartment buildings with 8 living units per building. Also, a big common park is being laid out besides the housing units. The project consists of activity, resource and cost data that were obtained directly from the actual project owner.

Industry: Construction
Country: Belgium
Date: November 2016 - December 2018

Project and flexibility properties

Number of activities: 44 (4 subprojects)
Number of resources: 10*
Resource types: 5*
SP-indicator: 12%

Number of choices: 16
Avg. number of alternatives/choice: 3
Number of combinations: 65,536
Number of optional activities: 24

Activity information - types of alternatives

Category	Duration	Cost	Resource	(Non)-implementation	Activity sequence
Structural work	✓	✓	✗	✓	✓
Facade masonry	✓	✓	✗	✓	✓
Roofing	✗	✗	✗	✗	✓
Pipes	✓	✗	✗	✓	✓
Screeds	✗	✗	✓	✗	✗
Floors	✓	✓	✓	✗	✗

Subproject information

Subproject	Duration (days)
13 houses	260
2 apartment buildings	345
9 houses	258
1 apartment building	281

Appendix: Project card N°2

Project details

Project and flexibility properties

<p>Project description: A construction project that consists of 24 service flats. The project consists of activity, resource and cost data that were obtained directly from the actual project owner.</p> <p>Industry: Construction Country: Belgium Date: November 2016 - December 2018</p>	<p>Number of activities: 60 (3 subprojects) Number of resources: 10* Resource types: 5* SP-indicator: 34%</p> <hr/> <p>Number of choices: 13 Avg. number of alternatives/choice: 2 Number of combinations: 8,192 Number of optional activities: 35</p>
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Activity information - types of alternatives

Category	Duration	Cost	Resource	(Non)- implementation	Activity sequence
Ventilation	✓	x	x	✓	✓
Electricity	✓	x	x	✓	✓
Facade masonry	x	x	x	✓	x
Instal. elevators	✓	✓	x	x	x
Entrance	x	✓	✓	x	x
Outdoor construct.	x	✓	✓	x	x

Appendix: Project card N°3

Project details

Project and flexibility properties

<p>Project description: A construction project of a drawbridge over one of the largest sluices in the world. The project consists of separate pavements and an axis to turn the bridge 90 degrees. The project consists of activity, resource and cost data that were obtained directly from the project contractor.</p> <p>Industry: Construction Country: Belgium Date: Februari 2017 - Maart 2019</p>	<p>Number of activities: 97 (4 subprojects) Number of resources: 10* Resource types: 5* SP-indicator: 18%</p> <hr/> <p>Number of choices: 22 Avg. number of alternatives/choice: 2.45 Number of combinations: 379,632,808 Number of optional activities: 52</p>
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Activity information - types of alternatives

Category	Duration	Cost	Resource	(Non)- implementation	Activity sequence
Init. components	✓	X	X	✓	X
Road surface	✓	X	X	X	X
Preparatory work 1	X	X	X	✓	X
Preparatory work 2	X	X	X	✓	X
Delivery	X	X	X	✓	X
On-site connection	X	X	X	✓	X

* The number of resources and resource types are rescaled to protect private corporate information, yet resemble realistic resource availabilities/requirements