

Decision choices

Item	No. of variables	Selections
Portfolio selection	5	Permutation of 10 candidates, choose 5
Timing of R&D launch	5	Range from 0 (now) to 15 (7.5 years later)
Late stage manufacturing strategy: CMO vs. In-house	5	0 - All in-house; 1 - PhaseIII CMO; 2 - PhaseIII + Market 1st year CMO; 3 - PhaseIII + Market first 2 years CMO; 4 - PhaseIII + Market first 3 years CMO; 5 - PhaseIII + Market first 4 years CMO; 6 - All CMO
Pilot plant build decisions and timings	3	-1: Not to build; 0: Build at time 0 (now); 1 to 8: Build at time point 1 to 8 (ranging from 0.5 to 4 years)
Large scale production facility build decisions and timings	5	-1: Not to build; 0: Build at time 0 (now); 1 to 8: Build at time point 1 to 8 (ranging from 1 to 8 years)

CMO vs. In-house at full capacity

Rank	CMO : In-house 2:1	CMO : In-house 1:1	CMO : In-house 1:2
All population	15.08	17.36	17.6
Rank < 11	14.56	16.31	17.176
Rank < 6	13.4	16.2	18
Rank < 3	12.42	17	18
Rank < 1 (optimal)	7	19	21.5

Method of calculation:

From the selected solutions, calculate the sum of late manufacturing decision variables, then divided by the number of solutions picked.