



Designing Enterprise Decisions



Decisions ... decisions



What can I control?
How?
By how much?

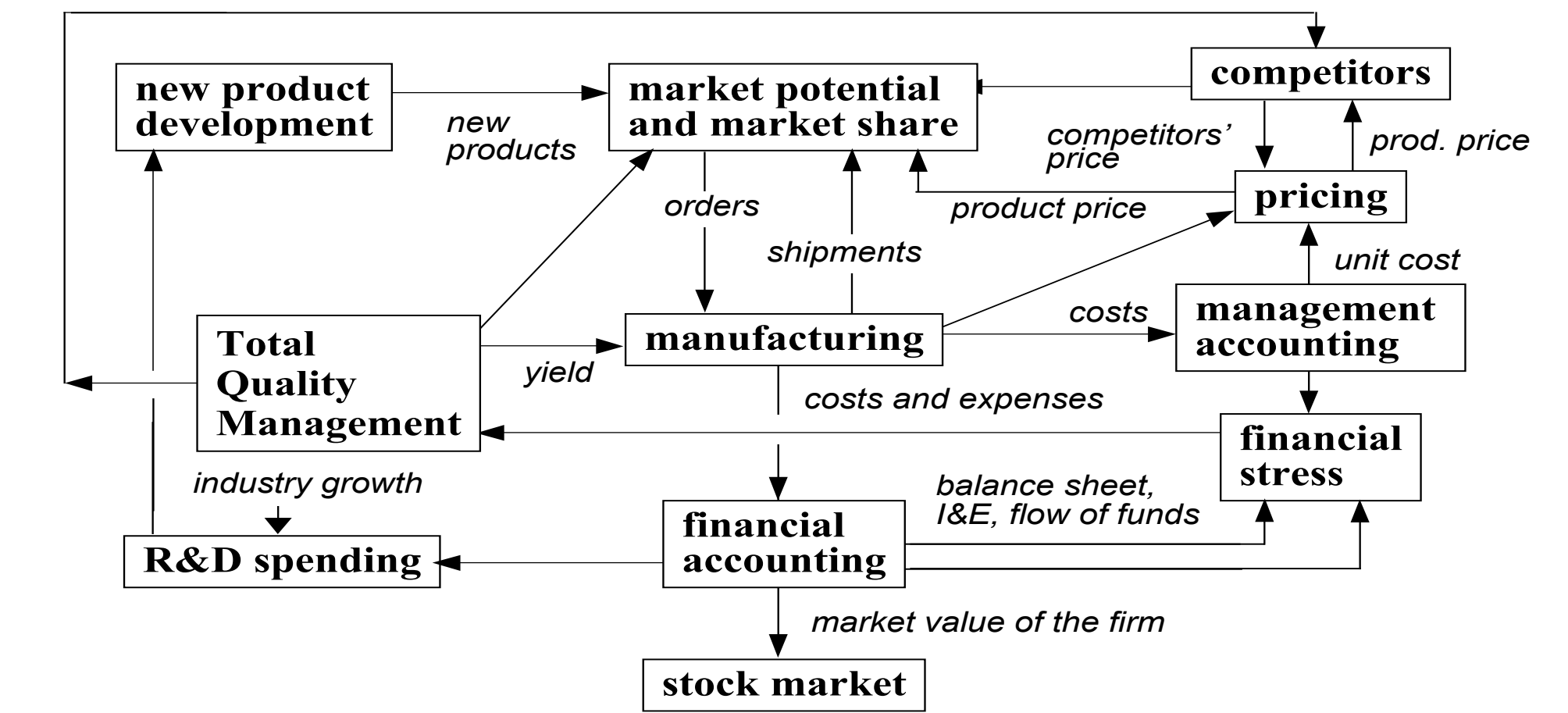
What cannot be controlled?
What can I do about that?

Can I limit my down-side risks?

Research goals

Enable executives to make high quality decisions by effective exploration of the decision and solution spaces using engineering methods ... particularly, design of experiments (DOE)

A model of a real company, ADI

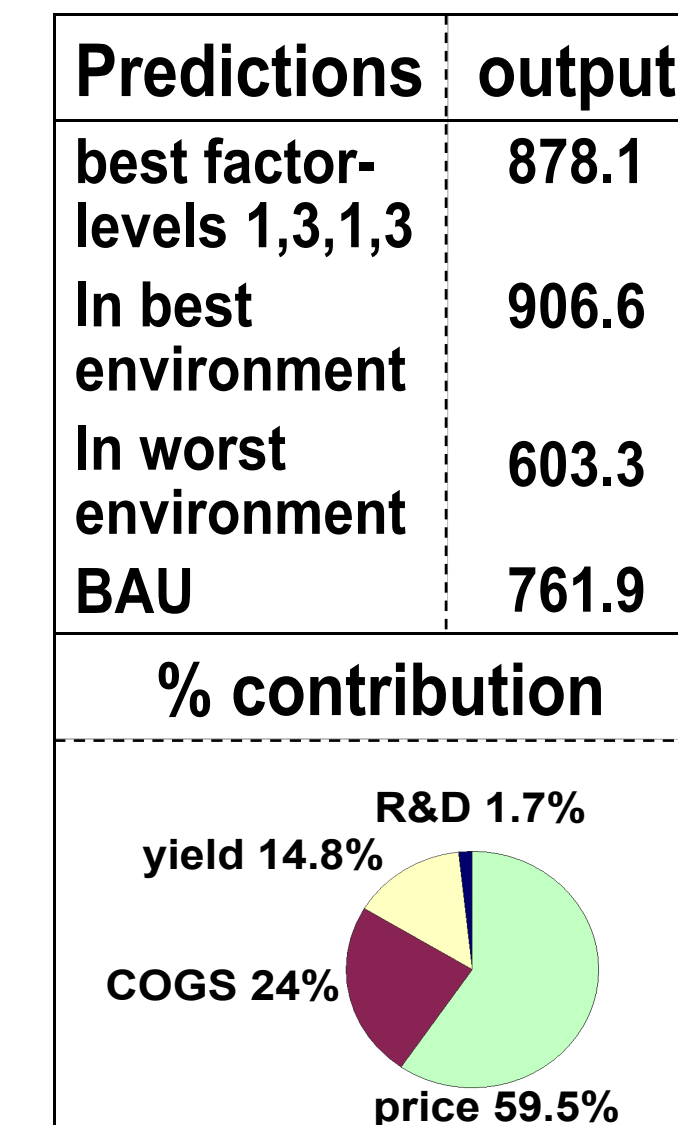


The problem in DOE normal form

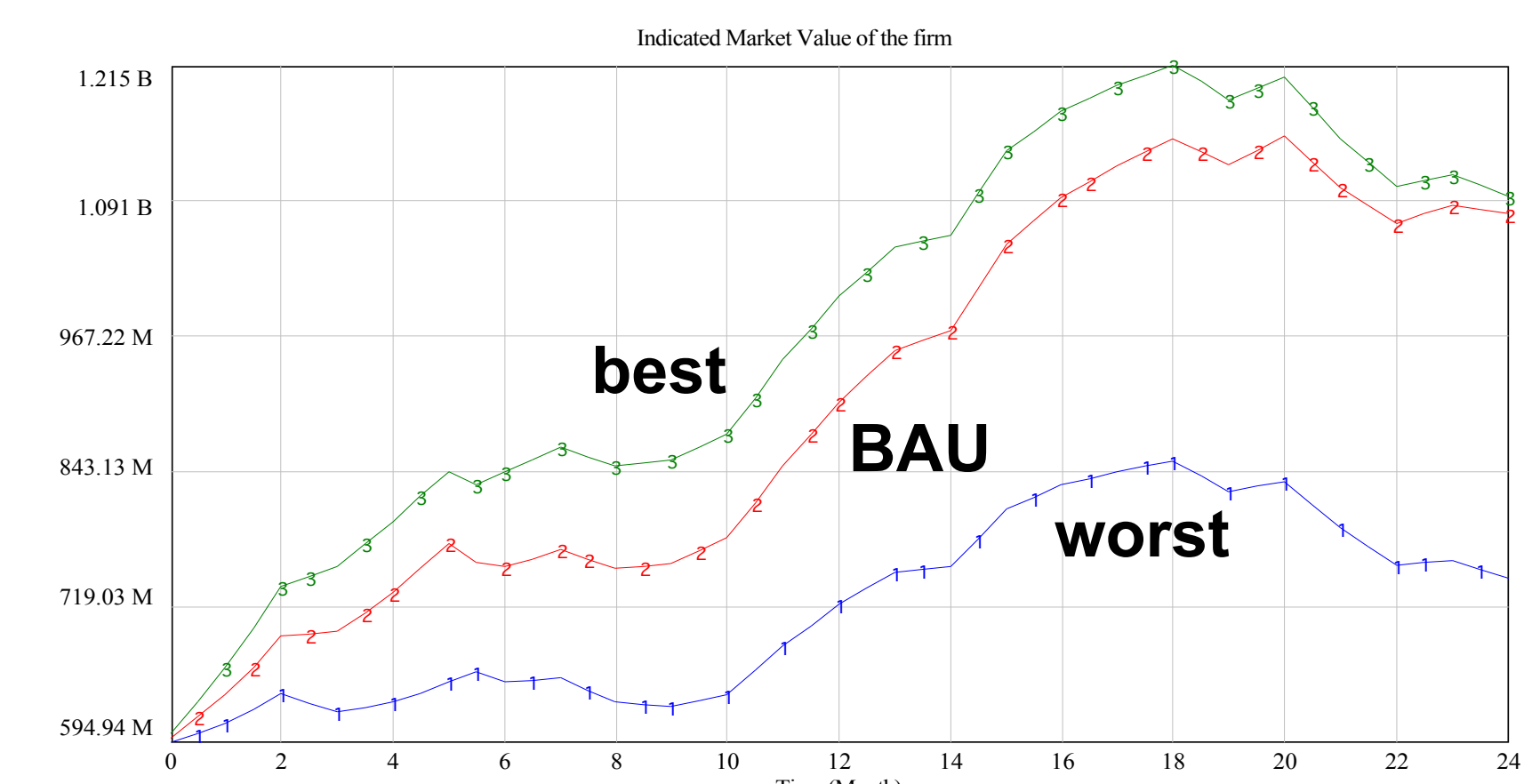
| | |
|---------------------------------|---|
| problem | threat of hostile take-over |
| outcomes | <ul style="list-style-type: none"> firm value stock price gross profit SG&A op. income |
| controllable variables | <ul style="list-style-type: none"> R&D IC yield COGS price |
| uncontrollable variables | <ul style="list-style-type: none"> industry growth competitors' attractiveness ADI orders |

9 experiments, 27 points → predictions

| R&D | yield | COGS | price | environment | | | output |
|-----|-------|------|-------|-------------|-------|-------|--------|
| | | | | BAU | worst | best | |
| 1 | 1 | 1 | 1 | 718.9 | 553.0 | 852.1 | 708.0 |
| 1 | 2 | 2 | 2 | 783.7 | 607.3 | 912.5 | 767.8 |
| 1 | 3 | 3 | 3 | 820.6 | 641.9 | 954.1 | 805.5 |
| 2 | 1 | 2 | 3 | 789.3 | 613.1 | 927.4 | 776.6 |
| 2 | 2 | 3 | 1 | 691.5 | 511.5 | 748.3 | 650.4 |
| 2 | 3 | 1 | 2 | 830.5 | 653.5 | 952.7 | 812.2 |
| 3 | 1 | 3 | 2 | 694.4 | 532.9 | 813.3 | 680.2 |
| 3 | 2 | 1 | 3 | 849.6 | 670.1 | 969.9 | 829.9 |
| 3 | 3 | 2 | 1 | 717.9 | 566.9 | 862.6 | 715.8 |



Configuration of controllable variables can favorably impact a firm's performance, under good and bad environments



9-step hill-climbing: a very effective process

| R&D | yield | COGS | price | environment | | | output |
|-----|-------|------|-------|-------------|-------|-------|--------|
| | | | | BAU | worst | best | |
| 1 | 2 | 1 | 2 | 815.7 | 937.4 | 944.0 | 799.1 |
| 1 | 2 | 1 | 3 | 865.1 | 677.6 | 984.0 | 842.3 |
| 1 | 2 | 1 | 1 | 740.8 | 581.8 | 885.8 | 736.1 |
| 1 | 2 | 2 | 3 | 829.1 | 647.7 | 960.7 | 812.5 |
| 1 | 2 | 3 | 3 | 795.9 | 617.3 | 931.3 | 781.5 |
| 1 | 3 | 1 | 3 | 899.8 | 707.5 | 1003. | 870.1 |
| 1 | 1 | 1 | 3 | 835.2 | 650.7 | 965.7 | 817.2 |
| 2 | 3 | 1 | 3 | 910.0 | 693.2 | 989.9 | 864.4 |
| 3 | 3 | 1 | 3 | 872.7 | 689.8 | 982.6 | 848.4 |

Summary of key findings

- Our study suggests that this engineering method for designing decisions can be applied to enterprise decisions.
- Sparcity, hierarchy, and inheritance - all properties of complex engineering systems - are also exhibited by an enterprise - a socio-technical system.

Case studies underway

- How to optimize client satisfaction for a risky Web-based development project for a global manufacturing company?
- How to raise profit level by \$xx M in the next six months for a global electronics outsourcing company?