

Supplemental Digital Content

Problem-solving and decision quality

Plan-Do-Study-Act (PDSA) problem-solving is a series of decisions (Figure 6): finding and selecting the most important problems to tackle; identifying and prioritizing the consequences caused by the unresolved problem(s); identifying (or discovering) and prioritizing the root causes of the problem(s); selecting effective countermeasures for each level (problem, root causes, and consequences); and deploying and evaluating the effectiveness of the countermeasures where evaluation is a type of causal analysis.

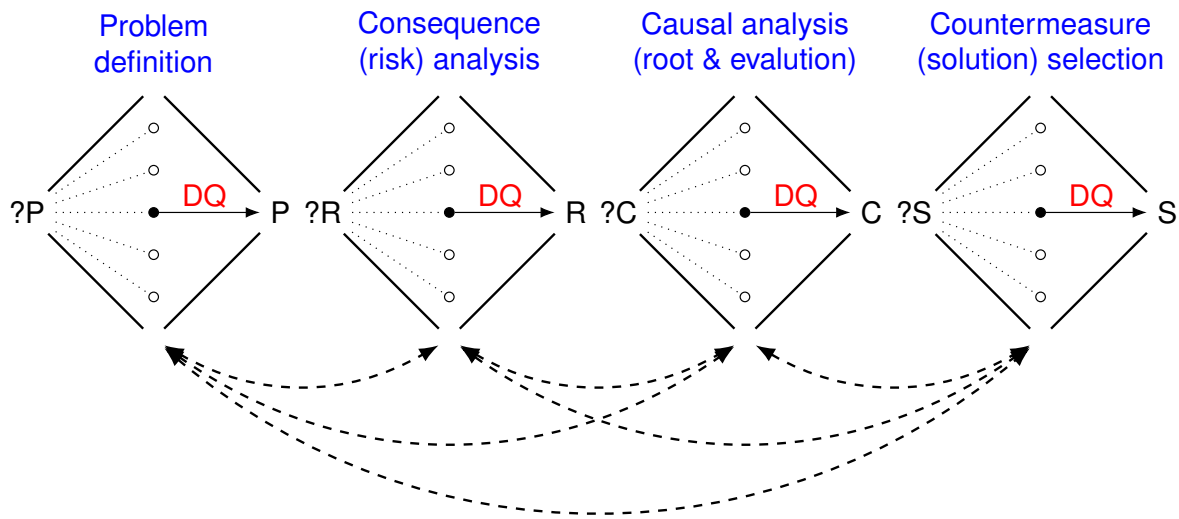


FIGURE 6 Problem solving is a series of linked decisions with the opportunity to improve decision quality

Strategy Table

The Consequent Table (Table 5) in main article organizes how to select the best alternative to achieve multiple objectives. In contrast, a Strategy Table (Table 6) organizes for deliberation and evaluation different *combinations* of alternatives (called strategy or policy options).

Table 6: Strategy Table example applied to SARS-CoV-2 pandemic: Strategy options (column 1), Alternatives (columns 2 to 6), and costs and health benefits (columns 7 and 8) which can be quantitative or qualitative. (Y = yes, N = no, FM = face covering or face mask, N95 = N95 respirator)

Strategy (or policy) options	Shelter-in-place (Y/N)	Face mask type (N/FC/N95)	Physical distancing (Y/N)	Hygiene & disinfection (Y/N)	Ventilation mitigation (Y/N)	Costs	Health benefits
A. “Do nothing”	N	N	N	N	N	low	low
B. “Do droplets”	N	FC	Y	Y	N	low	med
C. “Do airborne”	N	N95	Y	Y	Y	med	high
D. “Do everything”	Y	N95	Y	Y	Y	high	high

The (*HELP*)² checklist

For high stake decisions you need to devote attention and effort to multiple dimensions (Table 7). This checklist will help. For clarity, efficiency issues include, for example, cost-effective analysis ratios: maximize health outcomes in the numerator, and eliminate waste and lower costs in the denominator.

Table 7: The (*HELP*)² checklist supports decision intelligence applied to complex problems and decisions

Health outcomes	Health equity
Ethical issues	Efficiency issues¹
Legal issues	Logistical issues
Public trust	Political support

¹Efficiency issues includes concepts such as cost-effectiveness analysis or cost-benefit analysis.

Recommended reading

Here are a few reading recommendations. The Roberto and Marcus books focus on crisis decision-making during real disasters.

1. Roberto MA. Why Great Leaders Don't Take Yes for an Answer: Managing for Conflict and Consensus. 2nd ed. FT Press; 2015. *How leaders can build consensus and make decisions in the face of disasters. Reviews catastrophic decisions and how to avoid them.*
2. Marcus LJ, McNulty EJ, Henderson JM, Dorn BC. You're It: Crisis, Change, and How to Lead When It Matters Most. PublicAffairs; 2019. *Comprehensive framework for how to lead during disasters. Based on empirical research during actual disasters.*
3. Sunstein C. Wiser: Getting Beyond Groupthink to Make Groups Smarter. Boston, Massachusetts: Harvard Business Review Press; 2015. *How to use behavioral economics to improve team decisions.*
4. Hammond JS, Keeney RL, Raiffa H. Smart Choices: A Practical Guide to Making Better Decisions. Crown Business; 2002. *Classic book on making better decisions when faced with multiple competing objectives and trade-offs.*
5. Keeney R. Give Yourself a Nudge: Helping Smart People Make Smarter Personal and Business Decisions. Cambridge University Press; 2020. *This book extends the Hammond book and includes how to influence others' decisions that impact you.*
6. Marquet LD. Leadership is Language: The Hidden Power of What You Say—and What You Don't. Portfolio / Penguin; 2020. *Practical tools for leading teams under adversity. Concrete focus on the language we use to motivate and empower others.*
7. Edmondson AC. The Fearless Organization: Creating Psychological Safety in the Workplace for Learning, Innovation, and Growth. Wiley; 2018. *Reviews the science of psychological safety and its critical role in decision-making, learning, and continuous improvement.*
8. Spetzler C, Winter H, Meyer J. Decision Quality: Value creation from Better Business Decisions. Wiley; 2016. *Covers the basics of decision analysis including how to avoid cognitive biases.*
9. Hess E. Humility is the New Smart: Rethinking Human Excellence in the Smart Machine Age. Berrett-Koehler Publishers, a BK Business Book; 2017. *Introduction to the importance of humility, especially intellectual humility, for having self-awareness, learning, improving, and building trust.*
10. Pearl J, Mackenzie D. The Book of Why: The New Science of Cause and Effect. Basic Books; Reprint Edition (August 25, 2020), ISBN-13: 978-1541698963. *Conceptual introduction to causal thinking, reasoning, and inference. This book should be required reading for all public health and medical professionals.*