



The Dollars and Cents of Automation- BBB (Borrow)

Automation and Control Systems Economics by Paul Friedmann

Reviewed by Nick Sands

Control improvement justification is a constant challenge to automation professionals. Paul Friedmann has updated *Automation and Control System Economics* as a guide to developing the economics of automation projects. Friedmann has over 40 years of experience developing and designing control systems for suppliers and users, including Leeds & Northrup, CRB systems, Mobil and Allied Signal. He has a BS in Chemical Engineering from Michigan, a MS from Penn, and is a Life Member of ISA.

The introductory chapters state the purpose of the book and introduce the important concepts of performance, cash flow, risk and probability. The next part of the book covers identification and estimation of benefits, cost estimation, and project evaluation. Friedmann lines up the usual suspects for benefits; increased capacity, lower utility costs, improved yield, reduced waste and pollution, improved quality, and safer operation. Estimation requires more information, such as the current performance, the estimated improvement, and system constraints. Except for quality, reduced variability itself is rarely a benefit. The benefit comes from shifting the mean, and making a process improvement as a result of reduced variability from a control improvement. The process improvement also needs to translate into business improvement.

The other half of the benefit to cost ratio is cost estimation. The estimate accuracy may start at an order of magnitude and evolve to a detailed estimate as a project moves from concept to detailed design. The typical cost categories include hardware, software, training, installation, operating and support costs. With both benefits and costs estimated, the project can be evaluated against other projects. Evaluation methods include payback period, return on investment, net present value and internal rate of return. Friedmann demonstrates benefit and cost estimation with an example project.

A more realistic approach to benefits and cost estimation includes risks like novelty, complexity, and resources. These factors may affect project benefits or costs directly or indirectly by impacting the schedule. Risk scenarios can be assigned probabilities and tied to cash flows for evaluations. With the risks and their potential impact identified, decisions can be made about options to mitigate the risks such as testing, simulation, and redundancy. Friedmann also demonstrates these methods with an example project.

The final chapters, specific to batch and discrete processes, are new in the second addition. The benefits for batch processes are similar to continuous processes, but capacity is usually related to batch cycle time and control often means tracking trajectories instead of fixed setpoints. In discrete processes, reducing rework, scrap parts, in-process inventory, and labor per part are typical benefits. The automation strategies may be very different from continuous or batch processes.

Friedmann outlines the process to assemble the economics and document the financial risks of a project proposal. There is no magic bullet that provides justification for automation projects. Automation professionals should understand the concepts in this book and perhaps a little more as Friedmann only provides an introduction to the subject in *Automation and Control System Economics*. It is worth borrowing (BBB) and is available for \$69 (member price) at ISA.Org.