Good Accounting Augments Systems Engineering

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Financial Accounting

- For external reporting
- Provides financial statements for external stakeholders
- Satisfies management’s accountability to:
  - Owners and creditors
  - Regulatory agencies (SEC, FTC, IRS)
  - Customers and society

Managerial Accounting

- For internal planning and control
- Using accounting tools, provides information to help managers as they run a business:
  - Plant & equipment
  - Human resources
- Forward-looking
- Want to make accounting more actionable
What is ‘actionable’?

- Capacity utilization
- Local optimization
- Sprint capacity vs. buffers
- Short-term vs. long-term costs
- Indirect vs. direct information
- Step costs
- Discretionary costs
- Sunk costs
- Committed costs

→ Want to give others actionable data with greatest choices of freedom (short-term/long-term) for improvement
Accounting rules

- Auditors go over financial statements to ensure accounting principals (GAAP/FASB) followed.
- Cost accounting rule for financial reporting → all costs must be allocated to products
- Cost accounting rule for managerial accounting → wild card – manager’s choice
  - Usually try to simplify by grouping costs according to some common characteristic, e.g.
    - Element: material, labor, expenses (multiple interactions, hard to separate)
    - Direct vs. indirect costs
    - Function: administrative, production, R&D
    - Behavior: fixed, variable, semi-variable
Problems with costing systems

- Robert Kaplan and Michael Porter (HBR 2011) → “existing costing systems … encourage the shifting of costs” (p. 51).

- Find “underutilization of expensive equipment capacity is often not a conscious decision, but a failure of the costing system to provide visibility into resource utilization” (p. 58).

- Suggest focusing on cost of each resource used and the quantity of time a patient spends with that resource.
Managerial Accounting Paradigms

1. Traditional Cost Accounting
   - Uses allocated costs based on full absorption and (operations) and full allocation costing
   - Often uses allocated costs from non-operations
   - Time intensive to compile
   - Open to manipulation
   - Does not adapt

2. Activity Based Accounting (ABC)
   - Ignores bottlenecks, holistic effects, interactions and synergy among activities
   - Requires narrow focus to be relevant
3. Time-driven Activity Based Accounting (TDABC) – same problems as ABC depending on scope, plus...
   - Can be expensive operationally for clinical personnel and for accounting to collect and compile
   - Ignores step costs (more on these later)
   - Data could be irrelevant $\rightarrow$ misdirecting capital investment

4. Grenzplankostenrechnung (GPR)
   - Focus on cost centers
   - Focus on marginal costs, useful for constrained resources
   - Uses practical capacity as estimated volume for fixed costs
   - Emphasis on short-term decisions
... and more paradigms

5. Resource Consumption Accounting (RCA)
   - Builds on both ABC and GPR
   - Costs assigned to resource cost pool
   - Fixed and proportional cost rate
   - Uses theoretical capacity as estimated volume for fixed costs
   - Used for short-, medium-, and long-term decisions

6. Lean Accounting
   - Decreases costs and work in Accounting department
   - Data/information is designed and actionable to operators
   - Incorporates Constraint Theory
   - Can integrate well into financial reporting
   - Simplified box charts for experienced local and global decision tradeoffs
... and one last paradigm!

7. Throughput Accounting (work smart, not hard)
   - Focus on throughput (optimal capacity utilization of constraint) → step cost
   - Forces interaction with operators for relevant investments in labor, material, equipment
   - Good recognition of step costs
   - Does not help with financial reporting
Which accounting methodology to use?

- Depends on scope for each functional level.

- **Scope** relates to:
  - Level of assumptions
  - Experimentation
  - Evaluation
  - Feedback
  - Iteration

- The narrower the scope (context), the fewer and simpler the choices to evaluate (fewer possible actions).
For the systems engineer

• **Systems Design Goal**
  
  o Simplify, but limit options only to the extent necessary to clarify and coordinate with the larger goal

  o Leave room for experimentation when doing so does not interfere with the goal
Scope Compatible Accounting Paradigms

Costs are grouped at each level into intuitive actionable groupings of marginal costs, investments or revenue (opportunity costs)

- **Marginal costing** – simplest scope, small amount of data
- **Grenzplankostenrechnung (GPR)** – marginal costs, constrained resources, short-term decisions, practical capacity
- **Resource consumption accounting (RCA)** – theoretical capacity
... more scope compatible paradigms

- **Lean accounting** – operator collection and analysis of broad amount of cost and operation data; wider scope, less immediate than marginal costing

- **Throughput accounting** – Global perspective; prioritizes products to run through constraint based on revenue to process time ratio
CASH FLOW
(Controllers main worry)

• Without money to pay bills, a ‘profitable’ company can be forced into bankruptcy.

• A dollar in the hand (bank) is worth two in Accounts Receivable.

• A systems improvement that increases positive cash flow is more valuable than one that increases accounting income.
What counts as cash flow?

Account entries can represent conceptual increases in cash flow, NOT actual cash flow

- **Cash Flow (actual)**
  - Bank Accounts
    - Cash inflow → cash into the bank account
    - Cash outflow → cash out of the bank

- **NOT cash flows (conceptual)**
  - Increase in Accounts Receivable
  - Decrease in Costs or Expenses
  - Depreciation
  - Decrease in Accounts Payable
  - Increase in Sales or Revenues made on credit
  - Increase in Net Income
Cost (cash flow) Controllability

Do you need to control the cash flow? / How easily can you control the cash flow?

- **SUNK costs** – Too late now!
- **VARIABLE costs** – may or may not be controllable
- **FIXED costs** – non-contractual/contractual
- **MIXED VARIABLE/FIXED**
How to Improve Cash Flow of Entire Company

- Increase:
  - **Revenue** [global, local]
    - Recognize and rank margin per constraint
    - Increase margin
    - Increase quantity
Improving Cash Flow (con.)

- **Decrease:**
  - **Overhead expenses** [global]
    - Optimize existing equipment usage
    - Recognize and take advantage of step costs
    - Optimize capacity utilization
  - **Variable expenses** [local]
    - Materials (engineering design, experience effect)
  - **Time to accomplish individual activities** (to increase production)
    - Employees (lean, experience effect)
    - Equipment (lean, experience effect)
  - **Throughput time**
    - Sprint capacity
    - Buffers
    - Scheduling (gantt charts)
Changes in Healthcare Reimbursement Criteria

**Cost Plus**
- Revenue guaranteed to cover costs
- Steady increase in price
- Emphasis on collections
- Processes can be inefficient and uncoordinated at every level
- Gross mismanagement necessary for bankruptcy

**Target Price**
- Based on competition or government fiat
- No guarantees of net income
- Dual emphasis:
  - Increasing production of most profitable products
  - Improving processes at every level to decrease costs
- Analysis of step costs for changing production
- Good management can still go bankrupt
Analyzing Step Costs

• **Requires input from several functional areas**
  - Significant interactive effects on current and future cash flow

• **Need to quantify what is being measured**
  - Reliance on cost accounting systems
    - Kaplan and Porter (2011) found “existing costing systems … encourage the shifting of costs”
What is needed...

- Accounting costing methods that:
  - make intuitive sense
  - help clarify actionable choices of those with expertise within any specific functional area of the company

- Techniques will vary with:
  - activity
  - process
  - functional area

- Techniques should work towards achieving the overriding goals of the company
Key Players

**Administrative**
- Cost accountants
- Controller
- Internal Auditor
- CFO/CEO

**Systems Engineers**

**Operators**
- Clinicians/physicians
- Surgical technicians
Control

Budgets, Allocated Costs
Collaboration

Rolling Forecasts, Throughput/Lean Accounting
Cost Variability and Constraint Analysis

• “If you are aware of the two concepts of **cost variability and constraint analysis**, you will have an excellent understanding of how a company creates a profit, and which actions or events will change that profit.”

Steven Bragg*

CT Scanner Example
Roles of the players

- Physicians need better access to CT scanner
- CFO needs cost and cash flow data to perform cost/benefit analysis
- Systems Engineer can provide information regarding usage and alternatives
CT Scanner
Step Cost Decisions

Cost and revenue variability the financial analyst can calculate from data given by systems engineers:

- **POSITIVE CASH FLOW**
  - Opportunity cost of not getting the CT scanner
    - Decrease in patient admissions due to lack of CT
    - Decrease in OR overtime costs by having CT
  - Increase in patient admissions due to CT scanner being available
  - Increase in other cash flows due to CT scanner revenue
    - Increased patient diagnosis and treatment
    - Decrease in step costs from discontinuing older technology equipment
CT Scanner – Step Cost Decisions (con.)

- **NEGATIVE CASH FLOW**
  - More non-paying trauma
  - Non-payment or decreased payment for other reasons
  - CT tech labor

- **NOTE:** These inputs are primarily step cost decisions
  … **NOT** allocated cost decisions.
Experience Curves

- **Experience curves** – look at increase in productivity, through measuring reductions in average and marginal costs. Take into account both fixed and variable costs.

- Accountants do not have the experience with medical equipment and procedures; by providing clinical personnel with actionable accounting and operational information, the experience curve can be facilitated, expedited and extended.
Everyone benefits!

- Operators (clinicians) are able to provide information based on their experience curves which will help accountants.

- Likewise, systems engineers have experience curves based on their interaction with equipment and operators that will assist accountants in preparing their work.

- Working in a collaborative manner, all three parties can benefit the organization as a whole through better use of accounting systems.