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Developing a Dynamic Expense-Volume-Profit Model to Determine Break-Even Point

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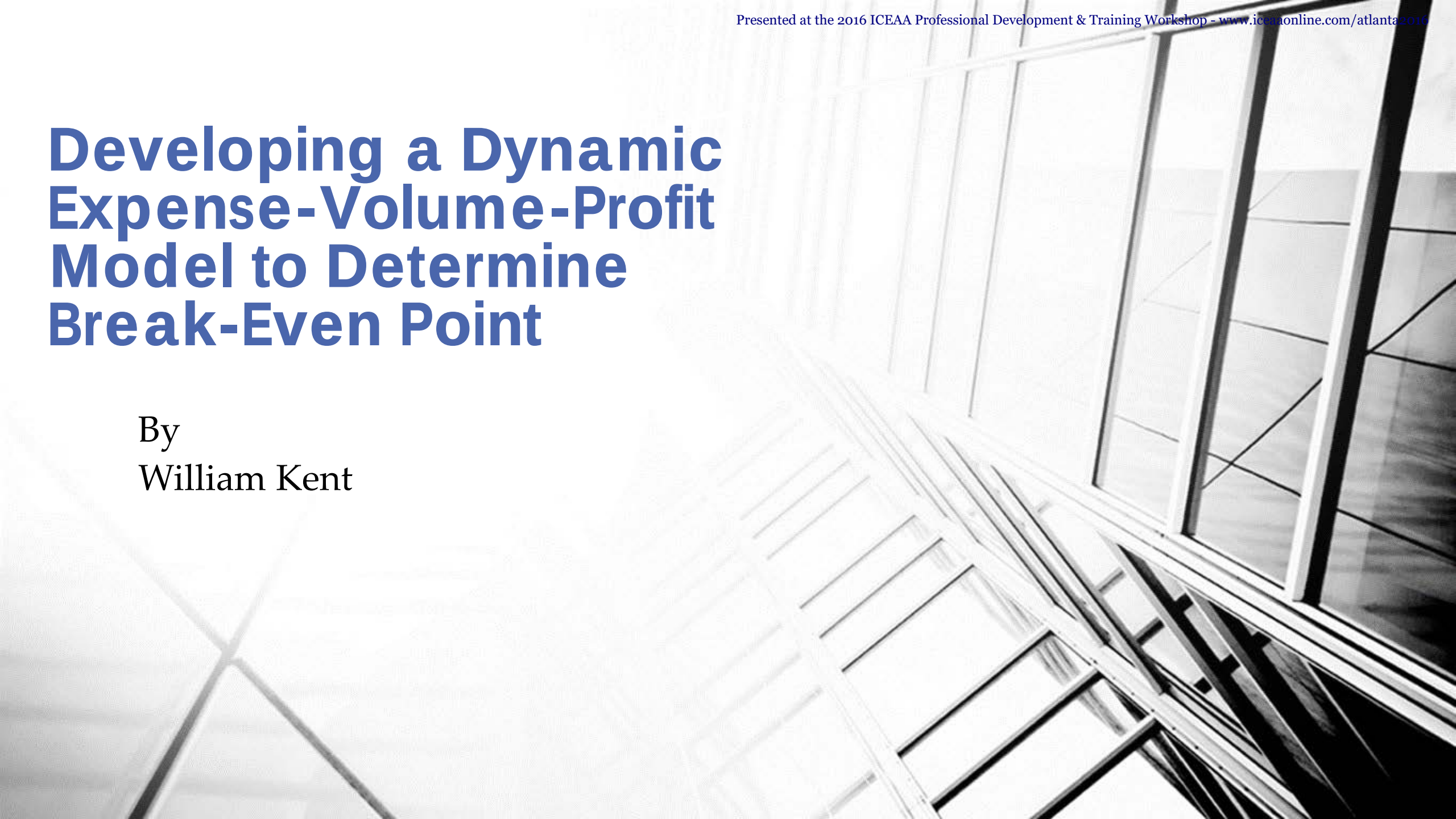


Understanding Value

- When settling contracts, identifying product placement, and determining pricing profitability must be considered
- One method is determining break-even point
- Break-Even analysis can drive product placement, marketing strategies, and partnerships

How do dynamic expenses and volumes drive profit

- To determine when a production system will be profitable complex dynamic expenses must be examined
- Sales volumes and capital expenditures must be examined with recurring cost drivers
- Once profitability can be modeled Break-Even Point can be determined
  - This can:
    - Drive supplier/distributor contract negotiations
    - Improve Product Pricing and positioning
    - Validate Marketing Strategy

Break-Even Point Theory

- Fundamentally the Break-Even point occurs when profits are equal to zero
  - Profit = Revenues – Costs
  - Break-Even point occurs when Total Profit = 0
  - Therefore @ Break-Even point
    - Revenues = Costs
- This drives a need to estimate projected revenues and costs
- Desired Break-Even point drives marketing and strategy campaigns
  - If a company desires to break even at an earlier point this impacts their amortization schedule for costs, the pricing of the product, placement in the market (premium vs value)
  - Larger profit margins will result in earlier break-even point – larger profit margins can be accomplished by reducing costs or increasing price.

Forecasting Future Revenues & Costs

- Many factors place pressure on product price, positioning and promotions.
  - To develop equitable and valuable contracts and partnerships cost drivers must be identified and modeled
- Limited historical data must be extrapolated over time horizon
  - Revenue
    - Projected volume of sales are established via regression analysis and comparison to historical performance.
    - Price is generally the focus of distributive negotiations, by understanding when a product will break even data driven negotiations can yield favorable results.
  - Expenses
    - Fixed Costs: Examining financial statements provides insights into capital expenses, PP&E, R&D
    - Recurring Costs: Labor, Material, Purchased Parts, Escalation, overheads and other indirect costs

How to leverage this knowledge?

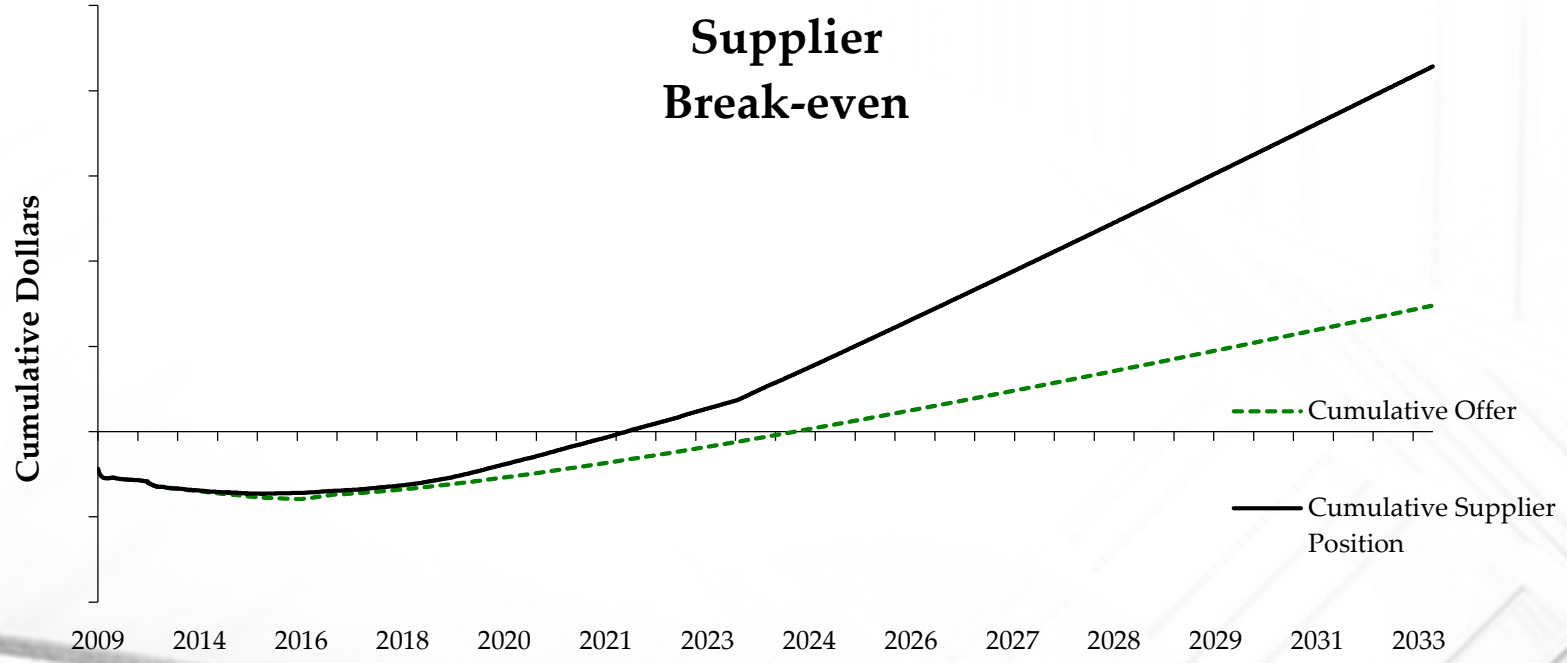
- Market factors drive much of the revenue stream
  - Historical market data and correlation based upon regression drives projected sales volume and price assumptions.
  - Variations can be modeled however established markets are generally inelastic and highly responsive to price adjustments.
- Thus modeling cost drivers allows teams to determine break even point
  - CapEx & other fixed costs are difficult to calculate with out additional information from financial statements
    - This model utilizes correlation of process and comparison to similar industry data to estimate this cost.
  - Labor, material consumption, procurement behavior, and R&D costs were estimated using learning curve analysis and regression models based upon historical industry performance
  - Recurring Costs: Labor, Material, Purchased Parts, Escalation, overheads and other indirect costs

Modeling Costs

- Major cost drivers were broken into categories
  - These categories have learning curve improvement assumptions applied to them.
    - Unit cost (N) = $T_1 * N^{Log(X)/Log(2)}$
      - N – Unit Number
      - T_1 – Cost of first unit produced by production system
      - X – Expected improvement based upon statement of work, industry, and historical performance.
  - Cost categories are then tallied to generate total unit cost
  - Labor - Manual labor & Assembly experience most significant improvement
    - This is due to efficiency improvement of human processes from the first build
    - Escalation for living wage was applied by using an escalation factor
      - Escalation factor = $(1+E)^{(Current\ Yr - Baseline\ Yr)/2}$
      - Where E – escalation factor (e.g. 3%)
  - Material – machining and production costs follow a flatter improvement but should show significant improvement over product life
  - Contracted Procurement – Contracts are generally flat pricing, however they should include step downs mirroring learning improvements
  - Indirect labor and overheads – indirect labor and overheads are usually transferable between programs implying little to no learning. These costs were modeled as a flat expense with no expected improvements.

Modeling Costs Continued

- By combining these costs it is possible to estimate total cost.
- Break-Even point can now be calculated dynamically.
  - Varying the volume * Price = Total Cost
  - By repeating the process with different assumptions multiple positions can be compared



Recommendation

- Break-Even Analysis should be considered as one of many tools but it can be useful in comparison and analysis.
- Dynamic expense-volume-profit models can be powerful in identifying viability of contracts, pricing and market positioning
- Moving forward there is a need to generate more robust models which will allow break-even point analysis to be quickly and easily transformed to any industry and sector.