What does it take to grow a business?

Key Findings:
Commit to Superior Customer Value
- Quality & Price
- Innovation — Products & Services

Focus on Five Sources of Revenue Growth
- Base Retention
- Market Share Gain
- Market Position
- Adjacent Markets
- New Lines of Business

Manage a Growth Portfolio
- Hedge risks by investing in multiple initiatives
- Break the challenge into manageable pieces

Focus on Five Sources of Revenue Growth

- Base Retention
  - Keeping more of your current customers
  - “To grow we first have to stop shrinking”

- Share Gain
  - Use better value to take business directly from competitors
  - The toughest way to grow — to win, someone else must lose

- Market Positioning
  - Half of success is showing up where growth is going to happen
  - Find the new growth segments before anyone else

- Adjacent Markets
  - Attack neighboring markets
  - But, only when immediate and practical advantage is in hand

- New Lines of Business
  - Acquire in unrelated markets
  - But, only when management has superior investment skill

Companies struggle to identify and prioritize opportunities for growth
- Companies don’t know which ideas are winners – so they make many small bets
- Weak initiatives are difficult to kill
- ... many initiatives, few successes – high costs
Ambition Imbalance: Maximize the risk-adjusted return on innovation

**Risk vs. Impactful Results**

<table>
<thead>
<tr>
<th>Level of Innovation</th>
<th>Likelihood of Result</th>
<th>Impact of Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incremental</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Breakthrough</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

Innovation is risky
Innovation is rewarding

**Opportunities Are Often Squandered Because …**

- They go undiscovered
- Methods for prioritizing opportunities are faulty
- Opportunities are dynamic – they migrate over time
- Companies inherently focus on their core competencies, eventually making improvements when they are no longer needed

**Innovation Approach:** Opportunities get Discovered and Prioritized

- Market Surveys etc.
- Voice of the Customer
- Voice of the Technology
- Richer MPVs
- Technology Evolution Dynamics
- Market/Technology Trends Synergy
- Reduced Uncertainty

**Objective Trends of Evolution**

- Making It Work
- Making It Work Right
- Maximizing Performance
- Maximizing Efficiency
- Maximizing Reliability
- Minimizing Cost
- Development Limit

**Standard Approach**
Main Parameters of Value – Definitions and General Logic

- **Main Strategic Parameters of Value (MSPV)** are the Product attributes that define Customer behavior on the market.
- **Main Functional Parameters of Value (MFPV)** are objective technical (physical, chemical, geometrical, biological, etc.) parameters that are responsible for MSPV.
- Traditional parameters (like Performance, Convenience, Safety, Styling, Indulgence, Cost, etc.) are too general, and are not instrumental for innovation.
- Not all these parameters are equally important to customers (usually, only 2-3 SPV are really MSPV).
- There are some latent parameters that are not even recognized by the market as MSPV. Process the Voice of the Customer – do not take it literally.
- For different market segments, MSPV are different.

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**Main Parameters of Value – General approach**

<table>
<thead>
<tr>
<th>Strategic MPV</th>
<th>1 Level MPV</th>
<th>2 Level MPV</th>
<th>3 Level MPV (MFPV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerodynamic drag</td>
<td>Form drag</td>
<td>Resistance from friction against external surfaces</td>
<td>Air density</td>
</tr>
<tr>
<td>Cost-effectiveness of engine</td>
<td>Engine efficiency</td>
<td>Combustion temperature of combustible mixture</td>
<td>Combustible mixture density</td>
</tr>
<tr>
<td>Rolling resistance</td>
<td>Structure (composition) of road surface</td>
<td>Unevenness of road surface</td>
<td>Unevenness of tire surface</td>
</tr>
<tr>
<td></td>
<td>Truck weight</td>
<td>Shape (relief) of tire protector</td>
<td>Size (arrangement) of piston-rod group</td>
</tr>
<tr>
<td></td>
<td>Weight of cargo carried</td>
<td>Mechanical parameters (rigidity, elasticity) of tire</td>
<td>Size of particles of atomized fuel</td>
</tr>
<tr>
<td></td>
<td>Quality and number of rolling contact bearings</td>
<td>Metal density</td>
<td>Air temperature</td>
</tr>
</tbody>
</table>

**Product Value**

- **MPV Analysis**
  - Traditional Value Estimation
  - Customer Value Estimation
  - G3:ID Value Estimation
  - Main Strategic Parameters of Value (MSPV)
  - Main Functional Parameters of Value (MFPV)

- \[ \text{MSPV} = f(MFPV_1, MFPV_2, \ldots, MFPV_n) \]
- MFPV – quantitative evaluation of MSPV

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**Examples of parameters**

- **Fuel Economy**
  - How to increase combusting temperature of combustible mixture?
  - How to reduce the energy of activation of fuel oxidation reaction?
  - How to introduce additives into the fuel prior to feeding fuel into the combustion chamber?
  - How to make the catalyst act upon the fuel prior to feeding fuel into the combustion chamber or inside the combustion chamber?
  - How to raise the pressure of the fuel mixture inside the combustion chamber?
  - How to increase the oxidative activity of air?

- **Cost-effectiveness of engine**
  - How to introduce additives into the fuel prior to feeding fuel into the combustion chamber?
  - How to make the catalyst act upon the fuel prior to feeding fuel into the combustion chamber or inside the combustion chamber?
  - How to raise the pressure of the fuel mixture inside the combustion chamber?
  - How to increase the oxidative activity of air?
Main Parameters of Value. S-curve Analysis

The main parameters of an engineering system change as the system evolves over time, forming S-shaped curves.

1. Operating Speed (kg/r p m)

- Magnetic bearings
- Air bearings
- Existing mechanical bearings

2. 1/Damping (m/N.s)

- Air bearings
- Magnetic bearings
- Existing mechanical bearings
Main Parameters of Value.
S-curve Analysis

- Operating Life (hours)

Existing mechanical bearings
Air bearings
Magnetic bearings

Stage 1
Stage 2
Stage 3
Today
Time

Opportunity Mapping
(Main Parameters of Value)

Portfolio Value Landscaping
MPV Performance-Price Landscape

- Products Landscape shows:
  1) How products in the portfolio perform relative to market requirements
  2) How products are priced relative to competitors

- Market requirements are expressed in terms of Main Parameters of Value — attributes of a product seen as valuable by the customer
- For each product family, an estimate is made with regard to:
  - Customer requirements for each Main Parameter of Value (MPV)
  - The actual performance of product with respect to each MPV
- MPV Performance is the single measure of the extent to which a product achieves customer requirements (see definition and example on next page)
- The gap between actual performance and customer requirements is a measure of scope for improving the performance of a product
- Relative Price is the ratio of the Client's pricing to average pricing by competitors
- Both of these elements will be used as foundation to derive various perspectives on the product portfolio
Portfolio Value Landscaping

MPV Performance-Price Landscape

- MPV Performance ($P$) is the average of performance relative to each MPV, weighted by the importance of each MPV. A perfect score is 1.0

$$P = \frac{1}{10} \sum_{i=1}^{N} \alpha_i p_i; \quad \sum_{i=1}^{N} \alpha_i = 1; \quad p_i \in [0..10], \quad N = \text{number of MPV}$$

$$p_i = \text{performance relative to MPV}_i$$

$$\alpha_i = \text{importance of MPV}_i$$

Definition — Relative Price

- Relative Price is the ratio of the Client’s price to the average price of competitors

$$\text{Price}_{\text{relative}} = \frac{\text{Price}_{\text{client’s}}}{\langle \text{Price}_{\text{comp}} \rangle}$$

$$\langle \text{Price}_{\text{comp}} \rangle = \text{Average of Competitor Price}$$

Products Landscape

- Products Gross Profit Potential maps:
  1) The value products in the portfolio deliver to customers
  2) The aggregate profit potential from each product category

- The vertical axis represents the total profit pool available to participants in the market. It is the theoretical maximum profit to be gained from a player with 100% market share. Products to the north have the greatest financial potential

- The horizontal axis represents the value delivered to the customer. Products to the west have the lowest value delivered to customer requirements. Products to the east are delivering high value to customers

- Note: Other determinants of market share will be introduced in later stages of the Innovation Agenda process
Gross Profit Potential

Gross Profit Potential (GPP) is the projected market size (current market size adjusted for three years of compound growth) multiplied by the projected gross margin percentage.

\[ GPP = M \times (1+\Delta M)^3 \times GM \]

- \( M \) = Current market size (millions)
- \( \Delta M \) = Rate of market growth
- \( GM \) = Gross Margin

Customer Value

Customer Value is the MPV Performance of Client’s product divided by relative price.

\[ Value = \frac{Performance_{Client's}}{Price_{relative}} \]

Portfolio Value Landscaping

Gross Profit Potential-Customer Value Landscape

Different Innovation Strategies for Different Products

The appropriate innovation strategy for a given product depends on its position on the Portfolio Map:

- High profit potential, vulnerable to competitive products with superior value:
  - High priority for performance improvement
- High profit potential, not vulnerable to competitive products:
  - Products deliver significant value
- Low profit potential, low market share:
  - Products deliver low value to unattractive markets
  - Same as low profit potential products to improve profit margin and/or expand application to attractive markets
- Low profit potential, high market share:
  - Improve profit margin
  - Most likely to be profitable products

Division of portfolio map into quadrants
Portfolio Value Landscaping
Gross Profit Potential-Customer Value Landscape

- Improve product features to gain greater share of category profits
- Improve profit margin
- Innovate to expand price/margin or overall category demand

Relative Customer Value

Evolution of Science of Innovation

- TRIZ Body of Knowledge
- Did I solve the right problem correctly?
  - Resolving Contradictions
  - ARIZ
  - TESE
  - Standard Inventive Solutions

- Did I solve the problem correctly?
  - Functional Modeling
  - Trimming
  - Feature Transfer
  - Cause-and-Effect Chain Analysis

- Did I deliver significant movement along the product’s MPV?
  - MPV Analysis
  - Innovation Roadmaps
  - Business Impact Justification
  - MT/Trends of Engineering Systems Evolution
  - Synergy Index

TRIZ 1960 1980 2000 Today

Evolution of Science of Innovation

Cornerstones of G3:ID Product Innovation

Problem Identification

Problem Substantiation

The G3:ID Product Innovation Roadmap

Problem Identification

- G3 Benchmarking
- Function Analysis
- Flow Analysis
- Cause-Effect Chains Analysis
- Evolutionary Trends Analysis
- Key Problem Analysis

Problem Solving

- ARIZ Application
- Clone Problem Application
- Inventive Principle Application

Concept Substantiation

- Conceptual Direction Development
- Function-Oriented Search
- Standard Solution Application
- Scientific Database Application

- Secondary Problem Solving
- Idea Substantiation
- Supereffect Analysis
- Concept Evaluation
**TRIZ Position on the S-Curve**

- **Transitional Stage**

**Going Beyond Classical TRIZ**

- **Problem Identification:**
  - Function Analysis
  - CECA
  -Trimming

- **Market Analysis:**
  - MPV Determination & Analysis
  - G3-ID Benchmarking

- **TRIZ Concept Substantiation:**
  - Failure Anticipation Analysis
  - Secondary Problem Solving
  - Function-Oriented Search

- **Classical TRIZ Tools Development:**
  - TESE (trends, sub-trends, and their mechanisms)
  - Feature Transfer
  - Function-Oriented Search
  - Micro-ARIZ
  - Rules and Recommendations for Trimming

- **Utilizing TRIZ in New Applications:**
  - IP Strategies
  - Long-term Technology Forecasting
  - Design for Recycling & Reuse

**Trends of Engineering System Evolution**

- **Hierarchy of Trends**
  - Trend of S-curve evolution
  - Trend of Increasing Value
    - Trend of Transition to the Supersystem
    - Trend of Increasing Completeness of System Components
    - Trend of Increasing Degree of Trimming
    - Trend of Optimization of Flows
  - Trend of Increasing Coordination
  - Trend of Uneven Development of System Components
  - Trend of Increasing Controllability
  - Trend of Increasing Dynamicity

- **Trend of Increasing Value and S-Curve Evolution**
  - 1st stage
  - 2nd stage
  - 3rd stage
  - 4th stage
Some Directions of TRIZ Future Development

1. Pragmatic S-Curve Analysis – the time axis.
3. Open Innovation.

Open Innovation

Open Innovation, as it is approached now, is difficult to implement, since world of challenges is weakly connected to the world of existing expertise, capabilities, knowledge, and technologies.

Open Innovation becomes straightforward in a Functionally Structured World

Open Innovation
Open Innovation

• Business Goals
• Challenges
• Problems
• Expertise
• Capabilities
• Knowledge
• Technology

Problems

Solutions

Functionally Structured Platform

Company

Demand Network

Supply Network

Demand Focusing

Supply Focusing

Expertise Indexing

Functionally Structured Solutions

Company

Company

Company

Company

Demand Focusing

Portfolio Analysis

MPV Determination

MPV ➔ Physical Parameters

Problem Identification

Functionally Structured Problem Statement

Functionally Structured Solutions

Expertise Capabilities

Knowledge Technology

Problem-Solution Matching

Solutions Ranking

Discrepancy Analysis

Portfolio Analysis

Expertise Capabilities

Knowledge Technology

Technology ➔ Physical Parameters

Directions for Future TRIZ Development and Applications

Thank you!

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