LINKS B2B Marketing Simulation

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Chapter 1: Introduction

The LINKS B2B Marketing Simulation is a competitive business-to-business marketing simulation encompassing product development, service, generate demand (marketing), forecasting, and information technology, plus associated marketing research study resource options. This chapter introduces LINKS, provides a perspective on management simulation learning, and overviews the analysis-planning-implementation-evaluation cycle that you'll experience.

LINKS is based on the environment of a relatively high-priced durable or capital goods industry with product-line competition in multiple categories through a direct sales channel in multiple market regions. Specific marketing issues and topics which arise regularly during the LINKS B2B Marketing Simulation include:

- formulating and executing marketing strategy
- marketing opportunity assessment
- market entry strategies and tactics
- marketing analysis and marketing data interpretation
- competitive analysis, dynamics, and rivalry
- coping with uncertain environmental forces
- enhancing fact-based analysis and decision making.

In LINKS, you manage an on-going high-tech manufacturing business. Working with your teammates, you're in direct competition with other firms in your LINKS industry. Your goal is to improve your firm's overall financial, operating, and market performance.

In LINKS, a multi-factor quantitative performance evaluation system is used to assess your firm's performance. Various financial, operating, and customer performance measures are combined to create an overall measure of performance in the style of a balanced scorecard. This multi-factor quantitative performance evaluation system is described in Chapter 15.

Why Use Simulations?

"I hear and I forget; I see and I remember; I do and I understand." – Confucius

Why use simulations in management education? Why not use traditional classroom lectures, perhaps combined with case studies? Adults learn best by doing. "Doing" involves taking responsibility for one's actions, receiving feedback, and having an opportunity to improve through time. In management education and training settings, management simulations support learning in a non-threatening but competitive environment of the kind that real managers face every day.

For an educational and training activity, there would be nothing quite like actually taking over the management of a real company. Unfortunately, real life has real-life costs and consequences associated with it. Few companies would permit novices to run part or all of their business in real time. Perhaps more importantly, real life evolves slowly. It takes quite a while for management initiatives to be developed and implemented. Real life's feedback is slow in coming and often difficult or impossible to interpret.
Like an airline pilot flight simulator, a management simulator allows more rapid time compression, quick feedback to the learner, and is a low-risk process (except to one’s ego). A well-designed management simulator can provide the student with a realistic education and training experience in the relative safety of the simulation’s operating environment. And, perhaps more importantly, the lessons learned in the management simulator environment occur within hours or days, not the months, quarters, or years associated with real life.

Here are the classic reasons to favor management simulations in adult-learning environments. Compared to traditional lecture/case/discussion educational events, simulations:

- Reflect active not passive participation, enhancing learning motivation.
- Apply key management concepts, especially coordination and planning.
- Demand analysis and decisions in the context of market-based feedback in the presence of thoughtful, vigilant competitors.
- Provide rapid feedback, encouraging participants to learn from their successes and failures within a relatively low-risk competitive environment.
- Provide learning variety through novel learning environments.

The learning objectives implicit in the LINKS B2B Marketing Simulation include the following:

- Gaining exposure to all marketing elements individually and to their associated interactions in business-to-business markets
- Appreciating the need for balance and managing trade-offs in designing and executing effective and efficient marketing programs
- Experiencing competitive dynamics in an evolving marketplace
- Appreciating information flows and integration of information with decision making
- Enhancing and encouraging fact-based analysis and decision making
- Gaining familiarity with financial statements used routinely in for-profit businesses.

Beyond these learning objectives, other subtle learning goals include improving your ability to recognize and cope with uncertain environmental forces. For example, well-designed strategies, tactics, and plans can be thwarted by outside forces.

Since the management simulation learning environment is built around teams, small group functioning and decision making skills are emphasized in the background throughout this simulation exercise. Since most workplaces include healthy doses of project teams, the management simulation learning environment provides hands-on experience in identifying key principles and practices associated with high-performing teams.

**LINKS Overview**

LINKS firms manufacture and sell products, as well as provide post-sale customer service via regional service centers. The direct sales channel in LINKS provides a rich and challenging competitive milieu.

**Each decision period in LINKS is one calendar quarter.** Within LINKS, each calendar quarter in the year is assumed to have an equal number of calendar days. There is no known time-of-year seasonality within the product categories of interest in LINKS.

You assume control of your LINKS firm at the end of quarter 3. Thus, your first decisions will be for quarter 4. Although your firm has been operating for a number of years, detailed information is
only available about the recent past.

All firms in your industry started quarter 1 identically. This is consistent with an industry that has evolved over time with all competitors now emulating each other exactly. Decisions in quarters 1-3 were constant throughout these three quarters. Due to the normal random forces in the various markets in which your firm operates, the financial and market positions of the firms in your industry will vary somewhat at the end of quarter 3.

You manufacture and sell set-top boxes in three regional markets in LINKS. Your manufacturing plant is located in market region 1. Your distribution center in market region 1 inventories your products and fills orders from customers in all market regions, and stocks inventories of sub-assembly components for replacement parts for within-warranty failures. Customer service is provided via regional service centers in each market region. Your distribution center in market region 1 is located adjacent to your manufacturing plant and shares inventory of sub-assembly components with your manufacturing plant.

What Is a Set-Top Box?

The LINKS "product" is a set-top box. Set-top boxes in the LINKS B2B Marketing Simulation are high-tech electronics products purchased by a wide range of businesses for office and operations environment uses.

While set-top boxes are still evolving, there are some obvious product-class characteristics. According to Michael B. Quinion (http://www.quinion.demon.co.uk/words/turnsofphrase/tp-set1.htm): "This term describes a specialised computer which translates incoming digital signals into a form suitable for viewing on a standard television set. The source of the signals could be a digital satellite or terrestrial broadcast, a cable television channel or a video-on-demand programme sent down a telephone line. Other projected uses for the set-top box include control of interactive viewing, for example with a home-shopping channel or WebTV. It may also decrypt signals on subscription or pay-per-view channels. The term is an obvious compound, helped towards acceptance by its form and rhythm, even though, as one commentator remarked, it is normally found under the set rather than on top of it."

LINKS set-top boxes are "fourth generation" versions. Fourth-generation set-top boxes include telephony applications (such as internet-based long-distance calling, interactive video conferencing, and interactive TV), local-area wireless networking, control/monitoring of a wide range of within-area electrical appliances and devices, and digital media server, basic virtual reality, and teleportation enhancement capabilities.

Within LINKS, there are two set-top box categories: hyperware and metaware. These categories share many elements in common within your supply chain, so the same general product development, procurement, manufacturing, distribution, transportation, and service mechanisms exist. But, these categories are quite different products for customers. There is no direct competition across the hyperware and metaware set-top box categories.

Each LINKS firm in your set-top box industry has two products: one hyperware product (product 1) and one metaware product (product 2).
What Will You Do Within LINKS?

"Learning is not a spectator sport." – Unknown

The analysis-planning-implementation-evaluation cycle in LINKS, shown below in Exhibit 2, is fundamental to management and to management simulations. This analysis-planning-implementation-evaluation cycle repeats itself throughout the LINKS exercise. During each decision round (quarter), you will have the chance to learn from earlier analyses, decisions, and results. Indeed, extensive financial, operations and market feedback is perhaps the most dramatic component of a sophisticated management simulation like LINKS.

Exhibit 2: Analysis-Planning-Implementation-Evaluation Cycle

1. **Analysis**: Analyze current financial, operating, and market performance, which involves both individual and within-team analysis.

2. **Planning**: Based on prior analyses and working with your teammates, make decisions for the next round. These decisions represent your plan.

3. **Implementation**: Submit your decisions for the next round via the LINKS Simulations website.

4. **Evaluation**: Compare your plan to your actual results. What were you trying to accomplish? How well did you do? What corrective action is needed?

Decisions and Decision Forms

"The secret of getting ahead is getting started. The secret of getting started is breaking your complex, overwhelming tasks into small manageable tasks, and then starting on the first one." – Mark Twain

Included within Chapters 3-12 and Chapter 14 are copies of the various decision input forms that you will use to record your LINKS decisions. With the exception of research studies, all LINKS decisions are standing orders. That is, decisions are permanent until they are explicitly changed. Thus, you only need to enter decision changes each round. If you are satisfied with a current decision, there is no need to change it. This standing-order aspect of LINKS decisions means that you will be inputting only a few decisions each round, rather than reinputting all decisions.

You are responsible for your own LINKS input. Here’s advice from a past participant:

"Never ask just one person to input the data. The volume of input data is so extensive that even the most dependable individual will make mistakes. Our team president was responsible for data entry, but we always had one additional person verify the inputs. Even with this verification process, we still made input errors."

This participant’s manual for the LINKS B2B Marketing Simulation includes a large number of tabular exhibits. To facilitate convenient access to these exhibits for on-going referencing during your LINKS exercise, these exhibits have been included in an Excel spreadsheet. To
access/download this Excel spreadsheet, point your favorite browser to this case-sensitive URL:
http://www.LINKS-simulations.com/MK/ExhibitsMK_b2b.xls

General Advice

"The fight is won or lost far away from witnesses, behind the lines in the gym and out on the road, long before I dance under those lights." – Muhammad Ali

Based on extensive observations of the performance of thousands of past LINKS participants, these general suggestions and summary-advice nuggets are of well-proven value:

- Read and re-read this LINKS participant's manual (there's lots of good stuff in it).
- Regularly think about general business and management principles and how they might relate to and work within LINKS.
- You don't have to know every thing about the LINKS set-top box industry at the beginning of the exercise, but you must consistently increase your knowledge-base through time.
- "Share toys" (i.e., work hard at sharing your useful fact-based analyses and important insights with all members of your LINKS team). "Knowing" something important personally is only a part of the LINKS management challenge. Exploiting that knowledge effectively throughout all of your LINKS team's deliberations, with and through your whole LINKS team, is the key to harvesting the maximum ROI from your data, facts, analysis methodologies, insights, and knowledge.
- Get the facts and base your decisions on the facts, not on wishes, hopes, and dreams.
- Coordinate demand and supply by continually striving to see the whole demand-chain and supply-chain within the LINKS set-top box industry. Don't focus myopically on a single part of the LINKS demand-chain without regard for how it relates to, and is influenced by, other LINKS parts and to the "whole" of LINKS. The source of the "LINKS" name is the simulation's focus on managing the interrelationships, the linkages, among all supply-chain elements.
- Remember the Ferengi proverb (for Star Trek fans): "There is no honor in volume without profit." Volume, sales, and market share is easy to obtain, if there are no constraints on profitability. Profitable volume is the "holy grail" in business and in LINKS.
Chapter 2: Decision Variables and Perspective

"Project Phases in All Organizations: (1) enthusiasm; (2) disillusionment; (3) panic; (4) search for the guilty; (5) punishment of the innocent; and, (6) praise and honors for the uninvolved." – Unknown

This chapter overviews the decision variables available to you within LINKS and provides a variety of fundamental definitions of LINKS terminology. The full range of available LINKS decision variables covers a lot of ground: product development, manufacturing, service, generate demand, and forecasting. In addition, information technology, research studies orders, and other decisions exist. These decision areas and the specific decisions for which you are responsible in this version of LINKS are summarized in Exhibit 3.

Details about each decision area are provided in Chapters 3-12. Financial reports and research studies are detailed in Chapters 13 and 14. Given the detail in Chapters 3-14, you should expect to read and reread these chapters many times throughout your LINKS exercise.

Inherent in this architecture is a general strategic perspective in LINKS. Fine levels of implementation details (e.g., raw materials handling and storage, production scheduling, and hiring/deploying/training service center personnel) are left to others.

Perspective and Definitions

"You have exactly the same number of hours per day as Martin Luther King Jr., Marie Curie, Thomas Jefferson, or Bill Gates." – Unknown

At the beginning of the LINKS exercise, you and your teammates take over an on-going firm in the set-top box industry. Your goal is to improve the financial, operating, and market performance of this firm during the LINKS exercise.

Your firm has two products, referenced as "f-p" (for firm "f" and product "p"). For example, product 4-1 refers to product 1 of firm 4. For all firms, product 1 is a hyperware product and product 2 is a metaware product. Your firm has a manufacturing plant and distribution center in market region 1. Your manufacturing plant in market region 1 produces finished set-top boxes that are shipped via your distribution center in market region 1 to customers in all market regions served by your firm.

There are three regional markets in your set-top box industry. A direct sales channel is used to reach customers in these three regional markets. When you receive your initial financial reports for quarter 1, you will see the market region descriptors for the three market regions in your particular set-top box industry.
Exhibit 3: LINKS Decisions

<table>
<thead>
<tr>
<th>Decision Areas</th>
<th>Specific Decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Development</td>
<td>Product configuration</td>
</tr>
<tr>
<td></td>
<td>Research and development spending</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Production volumes</td>
</tr>
<tr>
<td>Service</td>
<td>Compensation</td>
</tr>
<tr>
<td></td>
<td>Staffing (hires and fires)</td>
</tr>
<tr>
<td></td>
<td>Service center operations level</td>
</tr>
<tr>
<td></td>
<td>Service outsourcing</td>
</tr>
<tr>
<td></td>
<td>Call center service representative time allocation to products</td>
</tr>
<tr>
<td>Generate Demand</td>
<td>Introduction/drop for each product and region</td>
</tr>
<tr>
<td></td>
<td>Price for each product and region</td>
</tr>
<tr>
<td></td>
<td>Marketing program for each product and region</td>
</tr>
<tr>
<td>Forecasting</td>
<td>Short-term sales volume forecasts</td>
</tr>
<tr>
<td>Information Technology</td>
<td>Information technology options</td>
</tr>
<tr>
<td>Research Studies</td>
<td>Ordering specific research studies</td>
</tr>
<tr>
<td>Other Decisions</td>
<td>Firm name</td>
</tr>
</tbody>
</table>

Currency Conventions in LINKS

The LINKS currency unit is the "LINKS Currency Unit." The LCU is abbreviated "$" and pronounced Ldollar ("el-dollar"). The "LINKS Currency Unit" (LCU) is a Euro-like multi-country currency.

In your travels, you might have encountered the "$" symbol associated with currencies in Australia, the Bahamas, Barbados, Belize, Bermuda, Brunei Darussalam, Canada, Cayman Islands, Fiji, Guyana, Hong Kong, Jamaica, Liberia, Namibia, New Zealand, Singapore, Solomon Islands, Suriname, Taiwan, Trinidad/Tobago, the United States, and Zimbabwe. That's merely a coincidence. The "$" currency symbol is widely known to have originated with the Ldollar.
Chapter 3: Product Development Decisions

“Someone’s sitting in shade today because someone planted a tree a long time ago.” – Warren Buffett

Your firm has two products. **Product 1 must always be a hyperware product; product 2 must always be a metaware product.** However, you have freedom to configure your products to meet varying customer requirements for hyperware and metaware set-top boxes.

**Set-Top Box Configurations**

“You can have the Model T in any color, so long as it's black.” - Henry Ford

Each set-top box product is defined by a configuration that is expressed as a six-character code with the following elements and interpretations:

1. **Product category:** "H" for hyperware, "M" for metaware
2. **Raw material Alpha:** 0-9 (number of kilograms)
3. **Raw material Beta:** 0-9 (number of kilograms)
4. **Bandwidth:** 1-7 (terahertz)
5. **Warranty:** 0, 1, 2, 3, or 4 (length of warranty in quarters)
6. **Packaging:** "1" (standard), "2" (premium), or "3" (environmentally sensitive premium).

For example, the product H55321 is a hyperware set-top box with 5 kilograms of raw material Alpha, 5 kilograms of raw material Beta, bandwidth of 3 terahertz, warranty of 2 quarters, and standard packaging.

Product configuration influences manufacturing, handling, and post-sale costs in known fashions, described in the next section. This six-element product configuration allows for rich interactions between product development, procurement, manufacturing, distribution, transportation, and post-sale service. In addition to these six configuration elements, two sub-assembly components must be included within set-top boxes. Details about these sub-assembly components are provided in Chapter 4. Exhibit 4 contains a schematic representation of the hyperware and metaware set-top box product configurations.

In addition to one Epsilon sub-assembly component, set-top boxes require a Gamma (hyperware) or a Delta (metaware) sub-assembly component. A variety of suppliers provide sub-assembly components and alternative suppliers’ offerings are fully interchangeable in manufacturing. Thus, since their particular "value" (supplier) doesn't impact configuration, sub-assembly components are not a formal part of the set-top box configuration.
Exhibit 4: Set-Top Box Configurations

<table>
<thead>
<tr>
<th>Configuration Elements</th>
<th>Product 1: Hyperware</th>
<th>Product 2: Metaware</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. &quot;H&quot;</td>
<td>1. &quot;M&quot;</td>
<td>Category [hyperware (&quot;H&quot;) or metaware (&quot;M&quot;)]</td>
</tr>
<tr>
<td></td>
<td>2. Alpha</td>
<td>2. Alpha</td>
<td>0-9 Kg of Raw Material</td>
</tr>
<tr>
<td></td>
<td>3. Beta</td>
<td>3. Beta</td>
<td>0-9 Kg of Raw Material</td>
</tr>
<tr>
<td></td>
<td>5. Warranty</td>
<td>5. Warranty</td>
<td>0-4 Quarters</td>
</tr>
<tr>
<td></td>
<td>6. Packaging</td>
<td>6. Packaging</td>
<td>Stnd (&quot;1&quot;), Prem (&quot;2&quot;), or ES Prem (&quot;3&quot;)</td>
</tr>
<tr>
<td>Sub-Assembly Components</td>
<td>Epsilon</td>
<td>Epsilon</td>
<td>Common Sub-Assembly Component</td>
</tr>
<tr>
<td></td>
<td>Gamma</td>
<td>Delta</td>
<td>Unique Sub-Assembly Component</td>
</tr>
</tbody>
</table>

You’ll need to conduct appropriate research to assess customers’ preferences for Alpha and Beta in set-top boxes. For bandwidth, warranty, and packaging, “more-is-always-better” for all customers and all markets. However, larger or smaller Alpha and Beta levels could be preferred by customers in particular market regions. Larger Alpha and larger Beta values are not necessarily preferred. Set-top box customers may prefer particular Alpha and Beta levels (not necessarily equal, of course), with deviations from preferred Alpha and Beta levels resulting in lower-quality customer perceptions.

Product Costs

Costs of raw materials and sub-assembly components are described in Chapter 4. Costs other than those related to raw materials and sub-assembly components are detailed below:

- **Bandwidth**: $10+0.5(T*T*T) where T is the terahertz rating of the product. A terahertz level of 1 costs $10.50 while bandwidth of 6 terahertz costs $118. You have the engineering capability to include any level of bandwidth in your set-top box products, within the technology range 1-7. Bandwidth is a "more-is-better" product attribute. Terahertz is just an industry-specific, generally-accepted metric describing the bandwidth performance of a set-top box. Customers will always prefer more bandwidth, but they might or might not prefer it enough to offset the additional bandwidth costs. You’d need to conduct appropriate research to assess customer preferences for higher bandwidth levels and then compare that preference to your input costs of providing higher bandwidth.

- **Warranty**: Set-top boxes may be configured with a warranty or with no warranty. With no warranty, there are no associated warranty costs. If you choose to offer a warranty, then the associated cost is $8+3(W*W), where W is the warranty length in quarters. For example, a one-quarter warranty costs $11, a two-quarter warranty costs $20, a three-quarter warranty costs $35, and a four-quarter warranty costs $56. Warranty coverage is outsourced to a reputable service provider in each market region. These warranty costs are paid directly to the outsourced warranty provider at the time the product is manufactured. Warranty costs do not depend on the failure rates of the sub-assembly components. Set-top box manufacturers are
responsible for the costs associated with replacing sub-assembly components that fail in the field during the warranty period associated with a set-top box product. Warranties are honored in the original calendar quarter of sale plus the additional number of quarters of the warranty associated with a product's configuration.

- **Packaging:** "1" (standard) packaging costs $10, "2" (premium) packaging costs $14 per unit, and "3" (environmentally sensitive premium) packaging costs $28. More expensive, premium packaging presumably has positive generate demand implications and provides greater physical protection during shipping, resulting in somewhat reduced failure rates in the field (i.e., lower failure rates to customers). "3" packaging denotes premium packaging with environmentally sensitive design, construction, and materials.

### FAQ

"What is the full cost of providing set-top box warranties?" The full cost of warranties to set-top box manufacturers is the sum of three elements:

- the direct warranty cost, $8+3(W^W), where W is the warranty length in quarters
- the indirect costs that arise when sub-assembly components fail (set-top box manufacturers provide replacement parts without charge to the customer when sub-assembly components fail in the field within the warranty-period protection included with the original product purchase)
- the indirect costs associated with call center activity when customers require within-warranty service/support when sub-assembly components fail.

---

**Reconfigurations**

"Get the product out there as soon as you can and let the market judge how good it is. You can fix it as you go along." – William R. Hambrecht, Founder/Chairman/CEO of WR Hambrecht & Co.

Changes in a set-top box product's configuration are reconfigurations. A **reconfiguration involves a change in one or more of Alpha, Beta, bandwidth, warranty, and packaging.** Any configuration change incurs charges of $1,000,000, plus an additional $100,000 per configuration element that is changed. These costs cover all of the necessary engineering, retooling, testing, and administrative activities related to implementing the reconfiguration request. If you reconfigure a set-top box by changing three of its elements simultaneously, the total associated reconfiguration cost is $1,300,000. **Reconfiguration occurs immediately, so the next quarter's production involves the reconfigured product.**

**Due to the workload associated with a reconfiguration, you are limited to reconfiguring at most one product per quarter.** This single product reconfiguration may involve changing more than one element of a product's existing configuration. Since you're limited to a maximum of one product reconfiguration in any quarter, once a product (e.g., product 1) is successfully reconfigured, no higher numbered product (e.g., product 2) will be reconfigured in that quarter.

Don't assume that everything stays the same forever in the set-top box industry. Customer preferences for set-top box product attributes may change through time in some/all regions. Patent royalty considerations might influence product reconfigurations too, with later competitors' reconfigurations creating patent space to permit a reconfiguration to a more desirable configuration. In addition, cost-structure changes that occur from time to time might require adjustments in lots of decisions, including product configurations. Thus, it may be necessary to
reconfigure set-top box products more than one time.

**Patent Royalties**

*"The best defense is to stay out of range." – Military Wisdom During Combat*

Patent royalties are payable whenever a product is reconfigured and that reconfigured product lies within the pre-existing protected patent zone for another set-top box product in the same product category. In the quarter of reconfiguration, the protected patent zone is the sum of the absolute values of the Alpha, Beta, bandwidth, warranty, and packaging differences in two product configurations. For example, the product configurations H32111 and H45212 have a patent zone difference of (4-3)+(5-2)+(2-1)+(1-1)+(2-1)=6.

**Patent royalties are as follows:**  patent zone differentials of 0, 1, 2, 3, 4, 5, 6, and 7 points involve patent royalties of $2,000,000, $1,000,000, $500,000, $250,000, $125,000, $62,500, $31,250, and $15,625. No patent royalties are payable for patent zone differentials of eight or more.

**Patent royalties are one-time payments made by manufacturers of patent-violating reconfigured products.** Patent royalties are only payable in the quarter in which a patent-violating reconfiguration occurs. Royalties are paid by patent-violating reconfigurations to competitors whose patents are violated. That is, one firm’s “royalties paid” are another firm’s “royalties received.”

Some additional considerations about patent royalties follow:

1. Protected patent zones are specific to a set-top box product category. Thus, the configurations H32121 and M32121 do not violate their respective patents because these product configurations are in different set-top box categories.

2. No patent royalties are paid by or paid to original quarter-1 product configurations by other firms’ quarter-1 product configurations. However, any reconfigurations violating still-existing patents of quarter-1 product configurations are subject to patent royalty payments according to the schedule described above.

3. Patent royalties are payable only to pre-existing patents, not to competitors’ products reconfigured simultaneously with your reconfiguration (i.e., in the same quarter that you reconfigure a product).

4. Multiple patent zone violations are possible on any reconfiguration. The patent royalty payments described above are payable for each patent zone violation.

5. Patent royalties (receipts and disbursements) are reported on your "Corporate P&L Statement."

---

**FAQ**

"If we reconfigure immediately by just one 'unit' (e.g., change Bandwidth by 1), what are the patent royalty implications?" Such a minor reconfiguration would violate all other firms' existing patent protection (in that set-top box category), since all firms' products are initially configured identically in each set-top box category. Thus, there would be some fairly substantial patent royalties to pay with such a minor reconfiguration.
Research and Development

You may allocate funds to support research and development to further refine and perfect your product configurations. R&D spending is product-specific, so you may choose to support products with varying amounts of R&D spending.

- If you choose to spend non-zero amounts on research and development, then it is generally recommended that you spend at least $100,000 per quarter per product on R&D. Amounts less than $100,000 are unlikely to have much noticeable impact on product quality.
- R&D spending has the potential to improve product quality by reducing failure rates of products in the field, during actual post-purchase usage by final end-users.
- Product quality improvements require sustained effort on the part of your research and development group over an extended time frame. A continual flow of funds tends to work much better than occasional large expenditure levels in support of research and development.

The value of research and development has never really been clearly established in the set-top box industry. There is no generally agreed-upon yardstick with which to measure the effectiveness of research and development spending. However, many industry analysts maintain that the impact of research and development expenditures is ultimately felt on the product quality perceptions that customers hold for set-top box products.

Product Development Decisions Form

What's the right combination of Alpha, Beta, bandwidth, warranty, and packaging for set-top boxes? The answer obviously depends on customers' preferences for these set-top box product configuration elements, customers' willingness and ability to pay for feature-sets, and the costs associated with providing these elements in a product's configuration. Surprisingly, sometimes the highest possible quality levels with the most cutting-edge technologies are not the best choices when customers' willingness and ability to pay for feature-sets are taken into account.

A blank "Product Development Decisions" form may be found on the next page. Complete this decision form during your team deliberations if you wish to reconfigure a product.

Case Study: Motorola Iridium

Motorola rolled out a product that was supposed to redefine mobile telephony. The Iridium, declared the company, would be the first mobile phone to provide uninterrupted wireless communication anywhere in the world, no matter what the terrain or country. It was a complete flop. In its rush to embrace a new technology, Motorola overlooked the product's many drawbacks: the phone was too heavy, it needed a host of attachments, and it couldn't be used in a car or building — exactly where jet-setting global executives needed it most. At $3,000, people couldn't see any compelling reason to switch from their $150 cell phones.

**Product Development Decisions**

<table>
<thead>
<tr>
<th></th>
<th>Product 1</th>
<th>Product 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Category (&quot;H&quot;=hyperware, &quot;M&quot;=metaware)</td>
<td>H</td>
</tr>
<tr>
<td>2</td>
<td>Alpha {0-9 kilograms}</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Beta {0-9 kilograms}</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bandwidth {1-7 terahertz}</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Warranty {0-4 quarters}</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Packaging (&quot;1&quot;=stnd, &quot;2&quot;=prem, &quot;3&quot;=ES prem)</td>
<td></td>
</tr>
</tbody>
</table>

**Research and Development (R&D) Spending**

**Notes:**

1. Your firm may reconfigure, at most, one product per quarter.
2. To reconfigure a product, enter new values for Alpha, Beta, bandwidth, warranty, and packaging.
3. You cannot change configuration element #1 (category). Product 1 must always be a hyperware product and product 2 must always be a metaware product.

**Reminders**

Only input changes. If you're happy with the current values of these decisions, leave the appropriate decision entries blank.

All decision inputs change the existing values to the values that you specify. Do not enter "+" or "-" values. Rather, enter new values only (new values replace the existing value of the decision variable with your designated value).
Chapters 4/5: Procurement/Manufacturing Decisions

Procurement and manufacturing costs and decisions in LINKS are described in this chapter. While no procurement decisions are required in the LINKS B2B Marketing Simulation, you are fully responsible for production orders.

The production sub-process within LINKS is of the build-to-plan (build-to-stock) variety, not the build-to-order customized production style popularized by Dell Computer, for example. You will have to plan ahead to create your production volume orders in light of downstream demand forecasts that you craft as part of your decision making. In a build-to-plan production system, the consequences of poor production planning are either too much inventory of unsold products or unfilled orders.

Raw Materials and Sub-Assembly Components

Procurement decisions are not required in the LINKS B2B Marketing Simulation. Raw materials and sub-assembly components are provided by one supplier. With just-in-time delivery, your firm always has sufficient procurements for your manufacturing requirements.

Raw materials Alpha and Beta are widely available single-grade commodities purchased at common world prices. Vendors of raw materials in the set-top box industry provide inbound transportation as part of their bundled prices. All raw materials are always delivered for use within the current quarter's production activities. The current prices of raw materials are $3/kg for Alpha and $4/kg for Beta. Vendors of raw materials provide inbound just-in-time transportation as part of their bundled prices, so you never have any raw materials inventory.

Hyperware products include sub-assembly component Gamma while metaware products include sub-assembly component Delta. Set-top boxes are composed of either one Gamma (for hyperware) or one Delta (for metaware) sub-assembly component. Each set-top box is manufactured with an Epsilon sub-assembly component. All sub-assembly components are sourced from one supplier (supplier "D").

By common practice, the customer (i.e., your firm) arranges and pays for the transportation associated with in-bound sub-assembly components. Gamma and Delta sub-assembly components cost $4/unit for transportation with the corresponding transportation per-unit cost for Epsilon units being $6. These in-bound transportation costs are in addition to the component (inputs) costs reported in Exhibit 5.

Exhibit 5 contains cost, delivery, and failure data for sub-assembly components. With air transportation, sub-assembly components are always received within the current quarter and may be used within the current quarter's manufacturing activities (thus, the 100% "Delivery" reliabilities). "Failure" refers to the per-quarter failure rate for each sub-assembly component.
Exhibit 5: Supplier D Sub-Assembly Component Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Cost</th>
<th>Delivery</th>
<th>Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gamma</td>
<td>$17</td>
<td>100%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Delta</td>
<td>$19</td>
<td>100%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Epsilon</td>
<td>$24</td>
<td>100%</td>
<td>4.8%</td>
</tr>
</tbody>
</table>

These failure rates refer to in-field failure faced by customers. Note that a 1% failure rate is interpreted as a probability of 0.01 that a specific sub-assembly component fails in any quarter. These failure rates are especially relevant during your products' warranty periods when your firm must bear any costs associated with sub-assembly component failure.

Sub-assembly components may fail in the field as customers use their set-top boxes. Within the warranty period associated with each product, replacement parts are provided without cost by set-top box firms.

Production

The costs associated with manufacturing are described in Exhibit 6. There is a fixed cost per order associated with setting up each production run at the manufacturing plant. In addition to these production-related costs, the implied costs associated with the configurations of the products are also added into the costs of the products.

**Production of each product can change by a maximum of 25,000 units from the previous quarter's value.** Production may be changed to 0 units at any time, but you'd be limited to a maximum production of 25,000 units in the following quarter due to load balancing requirements associated with long-term capacity utilization and labor force overtime scheduling requirements.

Exhibit 6: Manufacturing Costs (Per Unit)

<table>
<thead>
<tr>
<th></th>
<th>Fixed Costs (per order)</th>
<th>$67,500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Labor Costs (per unit)</td>
<td>$30</td>
</tr>
<tr>
<td></td>
<td>Production Costs (per unit)</td>
<td>$20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Fixed Costs (per order)</th>
<th>$73,500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Labor Costs (per unit)</td>
<td>$36</td>
</tr>
<tr>
<td></td>
<td>Production Costs (per unit)</td>
<td>$16</td>
</tr>
</tbody>
</table>
In addition to order-related and unit-related costs described in Exhibit 6, your firm absorbs costs associated with depreciation and maintenance of your set-top box plant capacity. These costs are $300,000/quarter for each production "shift" and they are recorded as "Plant Capacity FC" (plant capacity fixed costs) on your "Corporate Current P&L Statement." These costs are allocated equally among your products.

A production "shift" can accommodate up to 50,000 production units. If total production across all products including is less than 50,000 units per quarter, then only one production shift is needed that quarter, and the associated costs are $300,000. If total production across all products is 50,001 to 100,000 units, then two production "shifts" are needed in that quarter, with associated costs of $600,000. The LINKS software automatically schedules the appropriate number of production "shifts" based on total production. There must always be at least one production "shift" capability at all times, even if total production is zero units.

**Unfilled Orders**

Unfilled orders can exist in your set-top box industry. If demand for any product exceeds finished goods inventory, customer sales must be reduced (proportionately) by the amount that orders exceed finished goods inventory. The difference between potential customer sales (orders) and actual customer sales due to inadequate on-hand finished goods inventory is "unfilled orders" in LINKS.

**Unfilled orders are not backlogged orders. Unfilled orders are not guaranteed (i.e., contracted, pre-paid) future sales.** Unfilled orders occur at a particular time due to inventory shortages relative to potential customer demand (orders), given competitive conditions at that particular time.

Unfilled orders incur processing and handling costs of $25/unit.

Past experience suggests that current unfilled orders reflect three types of set-top box customers. Some customers immediately defect to another competitor's (available) product. Other customers decide not to buy any set-top product now or in the near-term future. A third segment of customers are inclined to wait and attempt to repurchase the preferred product having these unfilled orders again in the future when supply (i.e., inventory availability) is more favorable. The size of these three types of unfilled-orders customers is unknown. In all cases, however, it should be expected that unfilled orders negatively impacting downstream demand to some extent.

If competitive conditions change (e.g., if you raise your unfilled-orders product's price dramatically or competitors substantially improve their own product offerings and marketing programs), then the share of customers with unfilled orders who would have been inclined to attempt to repurchase your unfilled-orders product in the future can decrease. Additionally:
- If you drop a product with unfilled orders from active distribution in a region, the unfilled orders associated with that product in that region are completely lost.
- If you reconfigure a product with outstanding unfilled orders, those unfilled orders are lost.

Unfilled orders represent additional potential demand that might have been realized beyond "filled orders" (i.e., sales) if sufficient product supply had been available to meet all customer purchase requests. A high level of unfilled orders could also reflect industry-wide double-counting if multiple firms' products simultaneously have unfilled orders. If two products simultaneously have unfilled
orders, then some customers might have wished to purchase first one of the products and then the other product when the stockout situation for the first product was encountered. In such a situation, a single customer would have been counted as an unfilled order by both stocked-out products.

**Manufacturing Decisions Form**

A blank "Manufacturing Decisions" form may be found on the next page. Complete this decision form during your team deliberations.
## Manufacturing Decisions

<table>
<thead>
<tr>
<th>Manufacturing Decisions</th>
<th>Product 1</th>
<th>Product 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Each production volume may change by a maximum of 25,000 units from the preceding quarter's value. You may, however, change production to 0 at any time. However, note that with a production value of 0 units, the following quarter's production volume would be limited to a maximum of 25,000 units.

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### Reminders

Only input changes. If you're happy with the current values of these decisions, leave the appropriate decision entries blank.

Don't forget to zero-out prior production decisions if you don't wish them to continue on into the next quarter.

All decision inputs change the existing values to the values that you specify. Do not enter "+" or "+" values. Rather, enter new values only (new values replace the existing value of the decision variable with your designated value).
Chapters 6/7: Distribution/Transportation Decisions

Your firm owns a distribution center in market region 1, adjacent to your manufacturing plant. All finished goods and replacement parts are sourced from this distribution center.

Different institutional and customary arrangements exist throughout the set-top box industry regarding transportation decisions and practices.

- **Inbound Raw Materials**: Vendors of raw materials in the set-top box industry provide inbound transportation as part of their bundled prices. Thus, there are no transportation decisions for set-top box manufacturers to make with regard to raw materials.

- **Inbound Sub-Assembly Components**: In the LINKS B2B Marketing Simulation, sub-assembly components are transported by air to your manufacturing plant in market region 1. Costs are detailed in Chapter 4.

- **DC Shipments To Customers**: Set-top box manufacturers ship by surface from within-region DCs and ship by air for customer shipments where a local DC doesn't exist (and direct shipment from DC1 is required). Since corporate policy and set-top box industry custom dictates the transportation modes and the carriers used for these transportation requirements, there are no active decisions required within LINKS at this supply chain linkage. Since the standard costs associated with DC shipments to customers are borne by manufacturers, transportation activities impact the financial performance of manufacturers. If customers prefer expedited transportation above and beyond the standard transportation modes used, customers absorb any incremental costs associated with expedited transportation.

Transportation costs associated with various customer shipments are shown in Exhibit 7. The cost of shipping replacement parts to customers is 50% of the cost associated with shipping finished products to customers.

<table>
<thead>
<tr>
<th>Region 1 Surface Transportation Costs</th>
<th>Other Region Air Transportation Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Region 1</td>
<td>$8</td>
</tr>
<tr>
<td>Market Region 2</td>
<td>$28</td>
</tr>
<tr>
<td>Market Region 3</td>
<td>$36</td>
</tr>
</tbody>
</table>
Chapter 8: Service Decisions

"It matters not whether a company creates ... a computer, a toaster, or a machine tool, or something you can only experience, such as insurance coverage, an airplane ride, or a telephone call. What counts most is the service built into that something - the way the product is designed and delivered, billed and handled, explained and installed, repaired and received." – Ronald Henkoff, "Service Is Everybody's Business," *Fortune* (June 27, 1994), p. 48

Your firm has a service (call) center in each market region in which you sell set-top boxes. Inbound call centers are staffed by customer service representatives (CSRs) who interact with existing and potential customers. Language, cultural, and time zone differences are such that local (region-specific and region-dedicated) call centers are required in the set-top box business.

Your LINKS service decisions include CSR staffing (hiring and firing), CSR experienced hiring, CSR compensation, service operations level, service outsourcing, and CSR time allocation decisions. These service decisions are required in each market region in which you have a service (call) center.

Service quality derives from call center performance. Call center usage is the largest service quality driver. Higher call center usage levels are associated with lower perceived service quality due to service queuing, lack of time for CSRs to provide high-quality service, and related issues associated with high usage levels (including CSR turnover). There is a natural lag between perceived service quality and call center usage. Perceived service quality is a survey-based measure. Customers are surveyed about their service quality perceptions of all set-top boxes for which they have personal recent experience. Thus, the current quarter's perceived service quality is based on actual call center usage from the previous quarter.

**FYI: Customer Interaction Costs**

Estimates of representative customer interaction costs (in $US) are listed below:

- Self-Service (Voice Recognition, Web Interaction): $0.1-$0.4
- Direct-Mail Contact: $0.25-$5
- Telephone Interaction: $2-$5
- Fax/Mail Interaction: $3-$6
- Telemarketing Interaction: $8-$24
- Telephone Product Support Interaction: $4-$75
- Field Sales Interaction: $40-$400

Source: Adapted from Figure 2 in Jonathan Wright and Jerry Quinn, "Enterprise Service Management: The Key To Service Excellence," *Achieving Supply Chain Excellence Through Technology, Volume 4* (San Francisco: Montgomery Research, Inc., 2002), p. 190.

Service Salary Decisions

You may establish different service force salary levels in each region, if you choose. While cost-of-living considerations and competitive market forces might lead you to have a service salary with variations across regions, cross-regional service salaries which vary widely are likely to lead to morale problems not just in the regions where salary levels are particularly low.

Service salaries are expressed in terms of dollars per month. Thus, a $33,000 per year salary would be specified as a $2,750 salary per month. Service Overhead is based on total service force compensation. Service force salary (CSR base monthly salary) may not be changed by more than $500 in any quarter from its previous value.
Service Capacity and Hiring/Firing Decisions

Call center activity is driven by predictable elements of the set-top box buying and consumption processes related to pre-sale (potential customers) and post-sale (purchasers) forces:

- **Pre-Sale (Potential Customers):** General inquiries and product information requests.
- **Post-Sale (Purchasers):** Installation inquiries, usage questions, quality/performance problems, and warranty claims.

Based on past experience, each CSR can handle an average of 1,000 calls per month (3,000 calls per quarter).

You manage the size of your CSR complements in each region via hiring and firing decisions.

- **Hiring costs** are equal to two month's salary, representing the costs associated with recruiting, screening, and training.
- **Firing costs** incur a charge equal to three month's salary.
- **Hiring and firing costs** are recorded as "Service Hire&Fire" on your financial reports.
- **Service personnel** are hired immediately (i.e., at the start of the next quarter). However, they train in the first month (at full salary and benefits) so they don't begin to service calls until the following month. Thus, CSR hires in a quarter will only be two-thirds as productive as experienced CSRs.

There is a single hiring and firing decision in LINKS. Positive values of this decision variable in a region reflect hiring decisions while negative values reflect firing decisions. Obviously, you would never hire and fire CSRs in a region in the same quarter, so a single decision variable is all that's necessary to permit you to make region-specific CSR hiring and firing decisions.

There will be CSR turnover (resignations) on a regular basis. Thus, to maintain your existing CSR staffing levels, it may be necessary to hire personnel regularly. Recent experience in the set-top box industry is that CSRs resign at the rate of 9%-12% per quarter. Workload and compensation are thought to influence resignation rates, in positive and negative fashions respectively. If you work your CSRs at high levels of usage, resignations may result. As might be expected, higher-paid personnel resign with less frequency than lower-paid personnel.

When you hire service personnel, a month's training is required prior to those "new" personnel being fully functional in their new positions. New hires are paid their normal salaries in this training month, but they are not able to provide any service to customers during the first month.

The maximum number of new CSRs that may be hired in any quarter in any market region is 50. Any level of CSR service force size reduction may be implemented at any time via a firing decision. In particular, CSR size may be reduced to zero at any time.

Experienced CSR hiring is possible to a maximum of 9 experienced CSRs per quarter in any
market region. Experienced CSRs require minimal training so they are fully productive immediately (i.e., in the initial month after hiring). Hiring experienced CSRs has no impact on your regular CSR hiring decisions. Experienced CSRs incur one-time charges equal to twice that of the hiring of non-experienced CSRs.

Transferring service representatives from one market region to another is equivalent to firing the representatives in the originating market region and then hiring them in the destination market region. Thus, there are no cost savings associated with transferring service representatives from one market region to another market region.

If you decide to drop all active products from distribution in a market region, you may also wish to close your service center in that market region. You may close your service center in a market region by firing all of your remaining CSRs. There are no special costs associated with closing service centers in market regions, beyond the costs associated with firing CSRs.

**Service Operations**

Four options exist for service operations levels at each of your regional call centers. These cost impact figures reflect all of the incremental costs (CSR recruiting costs, CSR shift differentials for second- and third-shifts, and increased administrative costs associated with a higher mix of part-time CSRs within the service center staff) associated with call center operating hours outside of a traditional weekday 900a-500p schedule.

<table>
<thead>
<tr>
<th>Service Operations Level</th>
<th>Service Operations Code</th>
<th>Regional Call Center Hours of Operation</th>
<th>Cost Impact (incremental Service Overhead rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MF95</td>
<td>Monday-Friday, 900a-500p</td>
<td>0% [base case]</td>
</tr>
<tr>
<td>2</td>
<td>MF88</td>
<td>Monday-Friday, 800a-800p</td>
<td>10%</td>
</tr>
<tr>
<td>3</td>
<td>SS88</td>
<td>Sunday-Saturday, 800a-800p</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>24x7</td>
<td>24 hours/day, 7 days/week</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Service Time Allocation Decisions**

You direct your regional service managers to allocate available call center customer service representatives (CSRs) to support your products. You control the assignment of CSRs to your products via time allocation decisions (expressed in percentages) in each market region. These time allocations must sum to 100% across your products distributed in each market region. If your firm only has a single product in a market region, you will have 100% of your service force's time allocated to that single product. With two products in a market region, any combination of time allocation percentages (such as 50% and 50%, or 72% and 28%, or 10% and 90%) is possible as long as they sum to 100% across your products.

Service time allocations to products in regions are primary responsibility assignments. CSRs dedicated to primary support of one product have a reasonable knowledge base to support other
products in your product line. On-going CSR training includes your complete set-top box product line. Thus, if call center demand for one product exceeds the current capacity of that product’s dedicated service force, other products’ dedicated service personnel are used to serve the incoming calls to your call centers. It should be expected that such overcapacity situations result in service being provided by somewhat less-able service personnel, with consequent implications for service quality and on-line call duration time. In general, your service goal should be to align your service force time allocations and CSR service force sizes with service demand.

**Service Overhead**

Each service representative incurs direct and indirect overhead expenses in connection with providing customer service. Direct expenses include CSR fringe benefits (health insurance, government taxes of various kinds, and so on) and toll-free long-distance charges. Indirect costs to support service representatives include periodic service training activities, service management overhead, office support, infrastructure support related to call center technology, and the like. In total, these expenses are equal to three times the salary level of a CSR. Thus, if you have a monthly service force salary level of $2,750 in a market region, a further $8,250 of service overhead per month is also incurred to support the service representative.

Your firm is automatically billed for the direct and indirect costs associated with maintaining service representatives in each of the market regions. These service overhead expenses are recorded as "Service O/H" on your financial statements.

**Service Outsourcing**

Rather than actively managing service centers, you may choose to outsource service. Service outsourcing is provided by reputable call-center service providers in each region. Service outsourcing is region-specific so you may freely choose to actively manage your own service center in some regions while outsourcing service in other regions.

In each region, you either actively manage your own region-specific service center or you use service outsourcing. You never simultaneously use a combination of active service-center management and service outsourcing in a region.

- If you have zero CSRs in any region, no service will be provided unless you specify a service outsourcing level of "Minimum," "Standard," "Enhanced," or "Premium" in that region.
- If you have some CSRs in any region, then you are assumed to be actively managing service in that region and service outsourcing does not occur. In this case, all in-bound calls to your regional service center must be handled by your own CSRs.
- If you have some CSRs in a region and you change service outsourcing from 0 ("None") to 1, 2, 3, or 4, then all CSRs in that region will be fired immediately since it is presumed that you are switching from insourced to outsourced service in that market region.

There are no transition-specific costs associated with switching service between insourcing and outsourcing other than the costs associated with hiring/firing CSRs.

Service outsourcing levels and their per-call costs and associated guaranteed service quality performance levels ("SQ Guarantee") are detailed below:
Service Outsourcing Level

<table>
<thead>
<tr>
<th></th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Minimum&quot; [1]</td>
<td>Cost/Call</td>
<td>$6</td>
<td>$7</td>
</tr>
<tr>
<td>SQ Guarantee</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>SQ Guarantee</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>&quot;Enhanced&quot; [3]</td>
<td>Cost/Call</td>
<td>$16</td>
<td>$18</td>
</tr>
<tr>
<td>SQ Guarantee</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>SQ Guarantee</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
</tr>
</tbody>
</table>

These "SQ Guarantees" are long-run averages. Service outsourcers guarantee that perceived service quality won't vary by more than 3% from these averages in any quarter. Costs for call-center service outsourcing are reported as "Service Outsourcing" on your financial reports.

With service outsourcing, you receive an abbreviated summary "Service Center Operations Report" as part of your regular financial and operating reports. With outsourced service, only total calls are reported; region-specific calls are only reported with actively managed service centers (insourced service). You may also order the optional "Service Center Statistics Report" as an information technology option, if you wish.

Service insourcing decisions (compensation, hiring/firing, service operations, and CSR time allocations) in a region are irrelevant when you outsource service. With service outsourcing in a region, there are no service management decisions required in that region, with the exception of the level of service outsourcing ("Minimum" vs. "Standard" vs. "Enhanced" vs. "Premium").

**Service Insourcing Versus Outsourcing**

"If a customer has a bad experience with a CSR, or their needs are not being met, they will tell an average of thirteen people about the bad experience. And about one-third of the population will tell about twenty-eight people. You do not want people to be badmouthing your organization." - Dianne Durkin, President, Loyalty Factor

In reflecting on the relative merits of service insourcing (actively managing a region's service center) versus service outsourcing in LINKS, it's helpful to compare the two approaches to service management. The following listing catalogs the advantages and disadvantages of outsourcing generally (in all contexts, not just in the service domain):
Outsourcing Advantages

- Reduce/control on-going operating costs, since the external (expert) provider should have lower variable costs based on expertise, specialization, scale, and history.
- Lower and shared risks.
- Improved cash flow since no fixed-cost investments are required. Cash infusions where outsourcing involves the transfer of assets from customers to providers (equipment, facilities, and personnel), especially in non-core activities.
- Variablizing fixed costs, with metered pricing ("pay only for what you use" unless contractual fixed charges and minimum-usage guarantees exist).
- Relatively graceful management of peak loads, activity variability, and seasonality.
- Access to more advanced and specialized capabilities, skills, and technologies (world-class process capabilities).
- Technological obsolescence protection.
- Process management time is limited.
- Improved business focus, permitting redirection of resources away from non-core activities toward core competencies.

Outsourcing Disadvantages

- Supplier screening and selection effort is substantial, errors are possible, and advantage-quantification can be difficult.
- Long-term contracts limit flexibility.
- Inability to easily oversee the process.
- Loss of process control and quality control is possible and limited remedies exist if performance issues or disagreement arise.
- Less timely and less detailed process performance information, particularly if outsourced process is customer-facing.
- Sensitive business information is shared and risks arise regarding losing control of proprietary knowledge/information or the encouragement of potential competitors.
- Substantial increase in external communications costs and efforts.
- Potential for outsourcing competitive advantage, such as the classic case of IBM outsourcing the microchip (to Intel) and the operating system (to Microsoft).
- Outsourcing "hollows out" the firm and staff resistance must be managed in insourcing to outsourcing conversions.

In LINKS, service outsourcing involves these particular considerations and trade-offs:

- Service outsourcing reduces management efforts compared to the active service-center management implicit in service insourcing.
- Service outsourcing costs are more predictable than service insourcing costs.
- Service outsourcing provides predictable levels of perceived service quality.
- Service outsourcing yields only a limited and relatively low range of perceived service quality levels, from 10% to 40%. Active service-center management (i.e., insourcing) is required to achieve higher levels of perceived service quality than 40%.
- Service outsourcing provides more limited service activity and service-center statistics than service insourcing.

LINKS teams will need to decide whether service outsourcing or insourcing is the wisest strategy for service management. Service outsourcing and insourcing could, of course, vary by region.

### Service Decisions Form

A blank "Service Decisions" form may be found on the next page. Complete this decision form during your team deliberations.
## Service Decisions

<table>
<thead>
<tr>
<th>Service Decisions</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSR Salary $/Month</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSR Hiring (+) and Firing (-)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSR Experienced Hiring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Operations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Outsourcing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CSR Time Allocations</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Note:* Service center time allocations must sum to 100% in each market region.

## Reminders

Only input changes. If you're happy with the current values of these decisions, leave the appropriate decision entries blank.

**Don't forget to zero-out prior hiring and firing decisions if you don't wish them to continue on into the next quarter.**

All decision inputs change the existing values to the values that you specify. Do not enter "+" or "+" values except for CSR firings which would, by definition, be a negative number. Rather, enter new values only (new values replace the existing value of the decision variable with your designated value).
Chapter 9: Generate Demand Decisions

Your LINKS firm is responsible for generate demand (marketing) decisions for your set-top boxes: pricing, marketing spending, and marketing program details. This chapter provides the relevant details for all of these generate demand decisions.

Sales in the LINKS B2B Marketing Simulation are via a direct sales channel. In all regions, order processing costs are $20/unit.

Price Decisions

Prices affect customer demand in the usual fashion within the set-top box industry. Higher prices are normally associated with lower levels of customer demand in all markets. The specific price sensitivities in these markets that you face in LINKS are unknown. You will need to learn about the markets' responsiveness to price through your experience in LINKS and by exploiting available LINKS research studies. It's very easy to drop price to attempt to increase demand. However, it's always an interesting question whether that increased demand actually increases profits. Remember, the price drop that generates increased demand also reduces your margin on each unit sold. It's also easy for competitors to see and feel threatened by a price change.

In addition to the physical costs of producing and distributing updated price sheets, lists, and databases that accrue when a manufacturer changes price (so-called “menu costs”), a range of indirect and non-obvious costs arise with price adjustments.

- Managerial Costs: A manufacturer must gather information, analyze, assess, and ultimately communicate the logic associated with price changes throughout their firm. Managerial costs presumably increase with larger price changes, since there is more to assess/analyze and more organizational members become involved with larger price changes.
- Customer-Facing Costs: When implementing price changes, a communications program must be created and executed to portray a price change in the most favorable light to customers. In a B2B environment, price adjustments potentially involve (re)negotiation with those customers who are resistant to new (higher) prices.

In LINKS, each price change by your manufacturing firm for a product in a market region results in $10,000 in costs plus $200 in costs per-dollar change in price (increase or decrease in price) plus costs of 0.25% of current-quarter revenues. For example, a $75 change in price on a

---

1 Recent published research documents the range of direct and indirect costs associated with price adjustments for a large U.S. industrial manufacturer (more than one billion USD$ revenues selling 8,000 products [used to maintain machinery] through OEMs and distributors). The authors found that managerial costs are more than 6 times, and customer-facing costs are more than 20 times, the so-called “menu costs” (physical costs) associated with price adjustments. In total, price adjustment costs comprise 1.22% of the company’s revenue and 20.03% of the company’s net margin. {Source: Mark J. Zbaracki, Mark Ritson, Daniel Levy, Shantanu Dutta, and Mark Bergen, “Managerial and Customer Costs of Price Adjustment: Direct Evidence From Industrial Markets,” The Review of Economics and Statistics, Volume 86, Number 2 (May 2004), pp. 514-533.}

2 Price change costs only accrue for products that are already actively being sold in a region. No price
product with revenues of $4,500,000 in a particular region incurs price change costs of $10,000 + ($200)(75) + (0.0025)($4,500,000) = $10,000 + $15,000 + $11,250 = $36,250. These price change costs are recorded as “Price Changes” in the “Fixed and Other Costs” section of your firm’s profit-and-loss statements in the quarter in which the price change occurs.

**Marketing Spending Decisions**

A marketing spending budget is required for each set-top box product in each market region. This budget is managed by the relevant region managers in your firm and is used for advertising, promotion, and sales force efforts associated with your products. You are free to allocate funds to marketing spending as you see fit. Spending does not have to be equal in all regions.

Significant percentages of advertising and promotion budgets are automatically spent on digital marketing, as is typical practice in other comparable industries. This includes allocations to Facebook, YouTube, and Google, for example, as well as location-based mobile marketing.

Marketing spending is thought to increase customer demand for set-top box products in all market regions. Past industry practice has been to budget at least $50,000 per quarter in marketing spending in all market regions in which a set-top box product is actively distributed. It is thought that marketing spending's impact on customer demand declines somewhat at higher expenditure levels, but the precise form of the relationship between marketing spending and sales is unknown. You will have to learn about marketing spending's influence on sales through your experience within the set-top box industry.

If you drop a product from active distribution in a region, you must also reduce the marketing spending to $0. Otherwise, marketing spending will continue to occur, perhaps in anticipation of a future relaunch.

**Marketing Program Details**

In addition to choosing a marketing spending budget (total marketing spending) to support each product in each region, you must also make marketing mix allocation and marketing positioning decisions.

**Marketing Mix Allocation**

Marketing mix allocation refers to the distribution of your specified marketing spending budget across advertising, promotion, and sales force programs in support of each product in each market region. Obviously, these three percentages must sum to 100% for each product in each market region.

Advertising programs are implemented by your firm's advertising agency in each market region in which your firm operates. Your regional sales managers implement promotional and sales force programs in your market regions. Sales force programs can include both internal sales representatives (company employees) and external sales representatives (independent sales change costs accrue for price changes for a product as it is being introduced into a region (i.e., it was inactive in that region in the last quarter).
representatives who work for several non-competing companies simultaneously).

Your 6-digit marketing mix allocation (excluding "%" symbols) specifies the 2-digit percentage allocations of your total marketing spending budget to advertising, promotion, and sales force programs, respectively. **You must allocate at least 10% of your marketing spending budget to each of advertising, promotion, and sales force.** For example, the 6-digit marketing mix allocation 113653 specifies that 11%, 36%, and 53% of the total marketing spending budget is to be allocated to advertising, promotion, and sales force programs, respectively.

You are, of course, free to vary your marketing mix allocations across your products and regions, as you see fit.

**Marketing Positioning**

Each set-top box product in each market region has a marketing positioning to guide advertising, promotion, and sales force efforts. Marketing positioning communicates the value proposition that a product offers to customers in a market.

Marketing positioning includes both “how to say it” (competitive positioning) and "what to say" (benefit proposition). LINKS firms select a two-digit marketing positioning code for each product in each market.

<table>
<thead>
<tr>
<th>First Digit: “How To Say It” (Competitive Positioning)</th>
<th>Second Digit: “What To Say” (Benefit Proposition)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examples of “how to say it” include marketing communications claims of more benefits for the same price as competitors or equivalent competitive benefits but at a lower price.</td>
<td>Examples of “what to say” include marketing communications claims of superiority in product quality, service quality, or availability either individually or in combination.</td>
</tr>
</tbody>
</table>

Details follow about the specifics of “how to say it” (competitive positioning) and “what to say” (benefit proposition).

“**How to say it**” (competitive positioning), the first digit in a LINKS marketing positioning code, reflects a firm's decision about whether to focus on benefit(s) exclusively, price exclusively, or explicitly compare benefit(s) to price within marketing positioning. Your firm may use the adjectives "more," "same," or "less" to describe your product offering relative to competing products targeted at a specific market segment in a particular market region.

Different combinations of these competitive positioning options (benefits and price) produce eight meaningful marketplace positions. These eight competitive positioning options, and their associated LINKS codes, are described in the following table. Dominated options, such as less benefits at a higher relative price, are "blacked out" (i.e., infeasible) because they are always inferior to other competitive positioning options.
“What to say” (benefit proposition), the second digit in a LINKS marketing positioning code, is an articulation of the specific benefit(s) offered by a product. These benefits are what the customer receives from purchasing and using a set-top box product. For example, a set-top box product might provide benefits because it is better designed to match customer preferences, it delivers a superior service experience, or it is more accessible/available to customers. In LINKS, the specific benefit emphasis possibilities include product quality, service quality, and availability.

- "Product Quality" is perceived product quality, reflecting customers' perceptions of a product's configuration and its reliability and performance in actual usage.
- "Service Quality" is perceived service quality, reflecting customers' perceptions of a product's service quality. Service quality derives from experiences with a firm's regional call centers.
- "Availability" is perceived product availability, reflecting customers' perceptions of a product's top-of-mind awareness, ease of access, convenience to purchase, and general presence/prominence in the market place.

A product's marketing positioning may focus on one, two, or all three of these benefits. Note that price is not a benefit to customers, but rather reflects the economic cost incurred to obtain the offering's benefit(s). Price positioning is included within the first part of the marketing positioning decision, "how you say it" (competitive positioning).

Your firm may choose to emphasize Product Quality, Service Quality, and/or Availability individually, in pairwise combination, or collectively in a product's marketing positioning using these benefit(s) proposition codes.³

<table>
<thead>
<tr>
<th>Price</th>
<th>&quot;Benefit&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>More</td>
<td>Same</td>
</tr>
<tr>
<td>More</td>
<td>1</td>
</tr>
<tr>
<td>Same</td>
<td>2</td>
</tr>
<tr>
<td>Less</td>
<td>4</td>
</tr>
<tr>
<td>No Mention</td>
<td>8</td>
</tr>
</tbody>
</table>

Some examples of two-digit LINKS marketing positioning codes follow:

- A LINKS marketing positioning code of 81 is an exclusive benefit emphasis on product quality, presumably related to particular distinctive configuration/design elements of importance to customers.
- A LINKS marketing positioning code of 24 is a "more-benefits-for-same-price" competitive positioning with "benefits" referencing product quality and service quality.
- A LINKS marketing positioning code of 11 is a “more-benefits-for-more-price" competitive positioning with “benefits” referencing product quality. This is a “more-benefits-for-more-price-but-worth-it" kind of marketing positioning.

³ Exhibit 9 (Volume Drivers in LINKS) and Exhibit 10 (Availability Perception Drivers in LINKS) provide further details about the drivers of Product Quality, Service Quality, and Availability.
• A LINKS marketing positioning code of 71 is an exclusive price emphasis, presumably referencing low price compared to competitive offerings.\(^4\)

When marketing positioning changes, various costs accrue to update advertising, promotion, and sales force documents, materials, graphics, visuals, and media. In total, these marketing creative development costs equal the greater of $20,000 or 20% of marketing spending for a product in a market region. These marketing creative development costs are recorded as “Marketing Creative” costs on your firm’s profit-and-loss statements.

**Introduction/Drop Decisions**

You may introduce products into regions not currently active or drop products from regions as you see fit. Introduction incurs a one-time cost of $500,000 in any region. Dropping a product from active distribution in a region incurs no special costs. Introduction costs are recorded under "Introductions" on your financial statements.

If you wish to "activate" a product in a region, you must issue a specific introduction decision. Change the "Active Product?" status to "Yes" to introduce a product into a specific region. To drop a product from active status in a region, change its "Active Product?" status to "No." **You only have to introduce a product into a region once. Once a product is active in a region, it will continue to be active until you make an explicit drop ("No") decision.**

You must explicitly introduce or drop a product from a region, regardless of your marketing spending and your sales volume forecasts. Setting marketing spending to zero does not result in the associated product being dropped from that market region.

If you drop a product from a region, you must change marketing spending to $0. Otherwise, marketing spending continues to occur, in anticipation of a future relaunch.

A reconfiguration isn't a launch if that product is already actively distributed in a region.

**Generate Demand Decisions Form**

Blank "Generate Demand Decisions" forms may be found on the next two pages. Complete these decision forms during your team deliberations.

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\(^4\) If you choose an exclusive price emphasis for your competitive positioning (i.e., first digit of 7), then the second digit of the marketing positioning code (benefit proposition) is irrelevant.
## Generate Demand Decisions

![Firm](Firm) ![Quarter](Quarter)

### Product 1

<table>
<thead>
<tr>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Product? {Yes</td>
<td>No}</td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing Spending</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing Mix Allocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Product 2

<table>
<thead>
<tr>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Product? {Yes</td>
<td>No}</td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing Spending</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing Mix Allocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Reminders

Only input changes. If you're happy with the current values of these decisions, leave the appropriate decision entries blank.

All decision inputs change the existing values to the values that you specify. Do not enter "+" or "+" values. Rather, enter new values only (new values replace the existing value of the decision variable with your designated value).
Chapter 10: Forecasting Decisions

Forecasting prowess reflects understanding of the generate demand drivers of any business. In LINKS, quarterly sales volume forecasts are required for each of your products in every market region.

Administrative overhead costs increase by 1% for every 1% inaccuracy in your sales volume forecasts. For example, a forecast error of 10% (whether positive or negative) for a product in a region increases the administrative overhead costs for that product in that region by 10%.

- The maximum administrative overhead penalty associated with sales forecasting inaccuracy for each product in each region is a doubling of administrative overhead.
- Forecast error costs are recorded as “Forecast Inaccuracy” costs on your firm’s profit-and-loss statements, so the reported base administrative overhead costs are always $240,000/quarter per product in all market regions.

Within LINKS, short-term sales volume forecasts are required for the next quarter. These forecasts are for each product in each region.

Sales forecasting is only a part of the process of launching a product. You must also explicitly activate that product. See the discussion in the Generate Demand Decisions chapter regarding launching products into regions in which they aren't currently active.

Forecasting accuracy is one of the components of the multi-factor performance evaluation scorecard described in Chapter 15. Forecasting accuracy influences operation performance both directly (via adjustments in base administrative overhead for forecasting inaccuracies) and indirectly (via inventory pipeline inefficiencies in the form of too much or too little inventory).

Forecasting accuracy is equal to 100*(1-(abs(Forecast-Actual)/Actual)) expressed in percentage terms, where "abs" is the absolute value function. Thus, a forecast value of 11,000 and an actual value of 8,000 result in a forecast accuracy of 100*(1-abs(11,000-8,000)/8,000) = 100*(1-(3,000/8,000)) = 100*(1-0.375) = 62.5%. The minimum possible value of forecasting accuracy is 0.0%. For example, with an Actual sales volume of 8,000, a Forecast above 16,000 results in a forecasting accuracy score of 0.0%.

Given the importance of forecasting in running your LINKS business, you might find that reading the following article has a positive return on your reading-time investment:
- J. Scott Armstrong, "The Forecasting Canon: Generalizations To Improve Forecast Accuracy,".forecastingprinciples.com/paperpdf/The_Forecasting_Canon.pdf

The following page contains a judgmental sales forecasting worksheet that provides a template for systematically approaching the sales forecasting process. Judgmental adjustments are challenging, but at least you’re explicitly taking into account that your generate demand program changes, and those of your competitors, influence your sales.
Judgmental Sales Forecasting Worksheet

Sales forecasting drives everything in demand and supply chains. Unfortunately, sales forecasting is extraordinarily challenging due to the many factors influencing your sales (your current and recent generate demand programs, current and recent competitors’ generate demand programs, and exogenous market forces).

Here’s a judgmental sales forecasting process that, at a minimum, provides an organizational template to systematically approach the sales forecasting process. Judgmental adjustments are challenging, but at least you’re explicitly taking into account that your generate demand program changes, and those of your competitors, influence your sales.

• **Step 1** (the "easy" part): Construct a trend-line extrapolation of past sales realizations based on a crucial assumption: future market and environmental forces will continue as they have existed in the recent past. Be watchful for structural considerations like unfilled orders and backlogged orders.

• **Step 2** (the "hard" part): Make adjustments for planned changes in your generate demand programs. The potential impacts of changes in product, price, distribution, communications, and service on your sales must be quantified.

• **Step 3** (the "subtle" part): Account for foreseeable competitors’ changes in their generate demand programs. It’s easy to overlook competitors in forecasting. Assume that competitors are vigilant and thoughtful and present.

<table>
<thead>
<tr>
<th></th>
<th>Trend-Line Extrapolation of Past Sales Realizations (Base-Line Forecast)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Adjustments For Planned Changes In Generate Demand Program (list specifics, with judgmental estimates of sales impacts <em>expressed in +/- %s</em>)</td>
</tr>
<tr>
<td></td>
<td>Product Changes</td>
</tr>
<tr>
<td></td>
<td>Price Changes</td>
</tr>
<tr>
<td></td>
<td>Distribution Changes</td>
</tr>
<tr>
<td></td>
<td>Communications Changes</td>
</tr>
<tr>
<td></td>
<td>Service Changes</td>
</tr>
</tbody>
</table>

| 3 | Adjustments For Foreseeable Changes In Competitors’ Generate Demand Programs (list specifics, with judgmental estimates of sales impacts *expressed in +/- %s*) |
|   | Product Changes                                                          |
|   | Price Changes                                                            |
|   | Distribution Changes                                                     |
|   | Communications Changes                                                   |
|   | Service Changes                                                          |

**Adjusted Sales Forecast**

A blank "Forecasting Decisions" form may be found on the following page. Complete this decision form during your team deliberations.
Forecasting Decisions

<table>
<thead>
<tr>
<th>Short-Term (i.e., Next Quarter) Sales Volume Forecasts</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reminders

Only input changes. If you're happy with the current values of these decisions, leave the appropriate decision entries blank.

All decision inputs change the existing values to the values that you specify. Do not enter "+" or "-" values. Rather, enter new values only (new values replace the existing value of the decision variable with your designated value).
Chapter 11: Information Technology Decisions

LINKS information technology (IT) options provide elaborations/extensions of traditional within-firm information technology systems or additional operating reports. These IT options are available for varying costs. Currency of information is a consideration in some IT options, with more current information involving higher costs. The costs associated with your IT decisions are recorded on your "Corporate P&L Statement" under the heading "Information Technology."

Product Cost Report

The "Product Cost Report" information technology option provides a report documenting all costs associated with production for all products. Decision options and associated costs for the "Product Cost Report" are as follows:

- Decision Option "0": Do not provide a "Product Cost Report."
- Decision Option "1": Provide a "Product Cost Report" at a cost of $750.

A sample "Product Cost Report" is shown below.

```
FIRM 1: ??????????????????????????????????????????????????        INDUSTRY Z
PRODUCT COST REPORT, QUARTER 3
PAGE 7

ORIGINAL (PLANT) MANUFACTURING COST Product 1-1 Product 1-2
-----------------------------------------------
Alpha          2.00     4.00
Beta           3.00     6.00
Bandwidth      10.50    14.00
Warranty       11.00    35.00
Packaging      10.00    10.00
Gamma          17.00    0.00
Delta          0.00     19.00
Epsilon        34.00    34.00
Labor Cost     42.00    48.00
Production Cost 32.00    28.00

-----------------------------------------------
161.50   198.00
```

Replacement Parts Demand Report

The details of replacement parts demand by region and product are provided in the "Replacement Parts Demand Report." This report shows the current-quarter replacement parts demand levels to provide a fact-oriented basis for preparing replacement parts forecasts for future quarters. Of course, you may wish to reference past quarters' replacement parts demand to establish a longer-term view of trend lines for replacement parts demand.
Decision options and associated costs for the "Replacement Parts Demand Report" are as follows:

- Decision Option "0": Do not provide a "Replacement Parts Demand Cost Report."
- Decision Option "1": Provide a "Replacement Parts Demand Cost Report" at a cost of $1,250.

### Service Center Statistics Report

A top-line "Service Center Operations Report" is part of your financial and operations reports. See Chapter 13 for details of this report. This report does not provide a detailed breakdown of the types of calls received by your service center, only the total volume of calls received.

You may wish to receive more detailed service center activity tracking data. A "Service Center Statistics Report" provides a detailed breakdown of the calls in various categories that may have useful diagnostic value (configuration, installation, introduction, miscellaneous, packaging, product quality, service quality, unfilled orders, and warranty). Decision options and associated costs for the "Service Center Statistics Report" are as follows:

- Decision Option "0": Do not provide a "Service Center Statistics Report."
- Decision Option "1": Provide a "Service Center Statistics Report" for the previous quarter with associated costs of $5,000 per quarter plus a one-time initiation charge of $10,000 in the first quarter in which this option is selected.
- Decision Option "2": Provide a "Service Center Statistics Report" for the current quarter with associated costs of $10,000 per quarter plus a one-time initiation charge of $15,000 in the first quarter in which this option is selected.

The higher costs for current-quarter data are based on development and maintenance costs associated with a more elaborate and time-sensitive internal IT system. There are no charges associated with terminating the ordering of a "Service Center Statistics Report." To terminate ordering the "Service Center Statistics Report," you would change your decision variable to 0 (zero). If you choose to order a "Service Center Statistics Report," it will be included among your financial and operations reports immediately after your "Service Center Operations Report."

### Information Technology Decisions Form

A blank "Information Technology Decisions" form may be found on the next page. Complete this decision form during your team deliberations.
### Information Technology Decisions

<table>
<thead>
<tr>
<th></th>
<th>Firm</th>
<th>Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Cost Report?</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Replacement Parts Demand Report?</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Service Center Statistics Report?</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**Note:** See the descriptions of these information technology options for the interpretation of each possible decision option.

---

**Reminders**

Only input changes. If you're happy with the current values of these decisions, leave the appropriate decision entries blank.
Chapter 12: Other Decisions

This chapter details other decisions not described elsewhere in Chapters 3-11 of the LINKS participant's manual. "Other decisions" include establishing a firm name and research ordering decisions.

Your firm may choose a firm name. Any firm name with up to 40 characters is acceptable. This firm name is printed on the top of all financial, operating, and research reports. Firm names have no cost or known demand-side implications, so you are free to choose (or change) your firm's name as you wish.

Chapter 14 describes the available research studies within LINKS. Research studies decisions must be made every quarter, like all other LINKS decisions. Your research studies requests will be executed and the associated results will be reported to you with your regular financial and operating reports after each LINKS quarter.

A blank "Other Corporate Decisions" form may be found on the next page. Complete this decision form during your team deliberations.
### Other Corporate Decisions

<table>
<thead>
<tr>
<th>Firm Name (max of 40 characters)</th>
</tr>
</thead>
</table>

#### Reminders

Only input changes. If you're happy with the current values of these decisions, leave the appropriate decision entries blank.
Chapter 13: Financial and Operating Reports

The LINKS financial and operating reports are described in this chapter. These are the standard reports that you receive after each quarter of the LINKS exercise. Recall, too, that several of the information technology options described in Chapter 11 yield additional financial and operating reports.

Profitability Drivers

"A company can outperform rivals only if it can establish a difference that it can preserve. Competitive strategy is about being different, deliberately choosing a different set of activities to deliver a unique value mix." – Michael Porter

The financial and operating reports described in this chapter are lengthy and detailed. To provide an overall roadmap for thinking about the drivers of profitability, the three charts in Exhibits 8-11 decompose net income into its underlying components.

In Exhibit 8, the principal drivers of net income are revenues and costs. Taxes and non-operating income play lesser roles. Exhibit 9 provides a breakdown of the drivers of volume, one of the two key drivers of revenues. Exhibit 10 provides further details about the drivers of availability perceptions. Exhibit 11 provides a roadmap to the drivers of variable costs. Collectively, these exhibits provide a sense of the DNA of net income in LINKS.

Performance Evaluation Report

"If you're riding ahead of the herd, take a look back every now and then to make sure it's still there." – Cowboy philosophy

Please consult Chapter 15 for a detailed discussion of the "Performance Evaluation Report" that forms the first page of your financial and operating reports.

P&L Statements

The "Corporate P&L Statement" aggregates all of the product-specific profit-and-loss statements into an overall corporate profit-and-loss statement. A variety of line items appear on the "Corporate P&L Statement" only, because it is not possible to unambiguously allocate those costs to specific products in specific regions.

Definitions of non-obvious line items on the "Corporate Current P&L Statement" follow:

- Administrative overhead ("Administrative O/H") is $240,000/quarter per product in all market regions.
Exhibit 8: Net Income Drivers in LINKS

- **Volume** → **Revenues**
- **Price** → **Revenues**
- **Variable Costs** → **Costs**
- **Fixed Costs** → **Costs**

**Net Income**

- **Non-Operating Income**
  - Interest Rates
  - Loans
  - Marketable Securities
  - Patent Royalties
- **Taxes**
Exhibit 9: Volume Drivers in LINKS

- Price
  - Price Volatility (Over Time)

- Product Configuration
  - Failure Rate
  - R&D Spending

- CSR Call Capacity
  - Service Center Call Volume
  - Service Operations
  - CSR Compensation Program
  - Service Outsourcing Program

- Marketing Program
  - (Marketing Spending, Mix Allocation, Positioning)
  - Unfilled Orders

- Competitors' Generate Demand Programs
  - Exogenous Factors
    - (Customers, Economy, Regulatory Environment, Technology, Etc.)

- Uncontrollables

- "Product Quality" Perception

- "Service Quality" Perception

- "Availability" Perception

- Volume
Exhibit 10: Availability Perception Drivers

- Own Marketing Program
  - Marketing Spending
  - Marketing Mix Allocation
  - Positioning

- Competitors’ Marketing Programs

- Unfilled Orders

"Availability" Perception

"Awareness" Perception

"In-Stock" Perception
Exhibit 11: Variable Cost Drivers in LINKS

- Product Configuration
  - Raw Materials Costs
  - Components Costs
  - Labor Costs
  - Production Costs

- Past Sales Volume
  - Warranty
  - Failure Rate

- Transportation Modes
  - Distribution Centers

- Product Costs
  - Transportation Duties and Tariffs
  - Replacement Parts Demand
  - Order Processing

- Variable Costs
- Transportation
- Duties and Tariffs
"Consulting Fees" may be positive or negative. "Consulting Fees" are adjustments to income or expenses. Conversations with your coach/instructor are normally without charge, so don't worry about "Consulting Fees" associated with these consultations. In LINKS, the "Consulting Fees" line item represents a convenient mechanism for making adjustments to income or expenses. For example, a research billing problem can be corrected via an appropriate negative "Consulting Fee."

Corporate overhead ("Corporate O/H") is $750,000 per product per quarter. This per-product charge is incurred if a product is actively distributed in one or more market regions.

"Disposal Sales" reflect costs associated with finished goods inventory disposal sales associated with reconfigurations. Note that disposal sales due to reconfigurations do not generate sales revenues. Rather, disposal sales are asset-side transactions on your firm's balance sheet, with finished goods inventory being exchanged for cash. The loss associated with such disposal sales is recorded as an expense on your "Corporate P&L Statement" under "Disposal Sales."

"Distribution FC" reflects the fixed costs associated with operating distribution centers.

"Duties & Tariffs" are a percentage of the average selling price for finished goods that are imported into any market region. If a firm is based in a market region (i.e., if a firm has a manufacturing plant in a region), there are no duties and tariffs payable. The current duties and tariffs rates are 0% for market region 1, 8% for market region 2, and 12% for market region 3. By definition, all finished goods sold in market region 1 are "local," since your firm's manufacturing plant is located in market region 1. "Duties & Tariffs" are levied on sales in a market region (orders from customers).

"Forecast Inaccuracy" records the costs associated with forecasting errors.

"Information Technology" records all IT charges. Your IT charges include a $1,000/page charge for all financial and operating reports. This charge is per-firm and is not related to the number of members of your firm's management team. Each quarter's charge is based on the previous quarter's actual page counts (e.g., the quarter-32 charge is based on the quarter-31 page count).

"Introductions" reflects costs when products are introduced into market regions.

Inventory charges arise for finished goods. These costs are recorded under the heading "Inventory Charges" on the "Corporate P&L Statement." This inventory charge is equal to 3% per quarter for owned distribution centers (such as your distribution center in market region 1, adjacent to your firm's manufacturing plant) based on the value of inventory as recorded on your firm's balance sheet. Inventory charges are levied on the average of beginning-of-quarter and end-of-quarter inventory values, and include all costs related to storage, handling, waste, and insurance.

"Marketing" equals total marketing spending.

"Non-Operating Income" derives either from interest earned on " Marketable Securities" (from the previous quarter's "Balance Sheet") or from interest paid on "Loans" (from the previous quarter's "Balance Sheet").

"Operating Income" equals "Gross Margin" minus "Total Fixed Costs."

"Order Processing" are order processing costs which are $20/unit in all market regions.

"Patent Royalties" include patent royalties that your firm pays to other firms, as well as patent royalties received from other firms.

"Plant Capacity FC" represents the costs associated with production "shifts" in your manufacturing plant. These costs cover all depreciation and maintenance associated with your plant capacity. These costs are allocated equally among your products.

"Production FC" includes the fixed costs associated with production orders. Fixed costs for production are included in the "Production FC" line item.

"Reconfiguration" equals the total costs associated with product reconfigurations.
• "Research Studies" reflects the total costs associated with last quarter's research study requests. Note that the current quarter's research studies are executed after the current quarter's financial reports are prepared. Thus, research study billings are lagged a quarter.
• "Service Salaries" is the total salary cost associated with service centers.
• "Service O/H" is the service center overhead cost levied on service center compensation.
• "Service Hire&Fire" costs are the service center hiring and firing costs.
• "Taxes" represents the corporate taxes payable in the market region in which your firm has its manufacturing plant. Your manufacturing plant is located in market region 1, which has a corporate tax rate of 50%.
• "Total Fixed Costs" is the sum of all fixed costs. Note that "Total Fixed Costs" does not sum correctly down and across since some fixed costs are not allocated to specific products.
• "Unfilled Handling" costs are the unfilled orders handling costs.

Balance Sheet

Your balance sheet records the usual assets and liabilities associated with your firm at the end of each quarter. Among other things, current levels of procurement and finished goods inventories are reported on the balance sheet.

On the "Balance Sheet":
• "Cash" represents your cash balance. Cash in excess of 10% of revenues is automatically invested in short-term " Marketable Securities" which earn 1.5% per quarter in "Non-Operating Income" on the "Corporate P&L Statement" in the following quarter. If cash falls below 5% of revenues, a loan is automatically arranged to increase cash to 5% of revenues. You pay interest of 3% per quarter on "Loans" and this interest payment is recorded as "Non-Operating Income" (a negative value of "Non-Operating Income") in the following quarter's "Corporate P&L Statement."
• "Corporate Capitalization" is the Ldollar-value of the original capital invested by your shareholders to start your firm.
• "Dividends" are cash payments to shareholders. In any quarter in which "Net Income" is positive, 30% of the "Net Income" is allocated to "Dividends."
• "Plant Investment" represents the Ldollar-value of your firm's investment in a manufacturing plant to produce set-top box products. The normal per-unit production charges that you pay for producing set-top boxes includes a component to cover the maintenance and depreciation of your plant. Thus, your "Plant Investment" value will also be the same through time.
Cash Flow Analysis Report

Sources and uses of cash are reported in your firm's "Cash Flow Analysis Report." The most important source of cash within any on-going business is revenues derived from sales, but you have lots of costs to pay to earn those revenues. Recent experience with "dot.com" businesses notwithstanding, margin management (revenues less costs) is still the fundamental management challenge for all for-profit businesses.

Cash sources include profits from operations and reductions in inventory holdings. Uses of cash include funding operating losses, increases in inventory holdings, and payment of dividends. Obviously, you require cash to run your set-top box business. You can't run out of cash within LINKS. As necessary, loans are automatically issued to bring your cash requirement up to minimum acceptable.

Of course, you do have to pay interest on loans. Each quarter in which your firm is profitable, corporate policy is to allocate 30% of net income to dividends.

Forecasting Accuracy Report

The "Forecasting Accuracy Report" provides details of the forecasting accuracy associated with your short-term (next-quarter) sales volume forecasts.

In addition, the sales history for all of your firm's products (product-unit sales by product and region) for the last six quarters is displayed at the end of this report.

Forecasting accuracy is equal to 100*(1-(abs(Forecast-Actual)/Actual)) expressed in percentage terms, where "abs" is the absolute value function. Thus, a forecast value of 11,000 and an actual value of 8,000 results in a forecast accuracy of 100*(1-abs(11,000-8,000)/8,000) = 100*(1-(3,000/8,000)) = 100*(1-0.375) = 62.5%. The minimum possible value of forecasting accuracy is 0.0%. For example, with an Actual sales volume of 8,000, a Forecast above 16,000 results in a forecasting accuracy score of 0.0%.

Set-Top Box Industry Bulletin

The "Set-Top Box Industry Bulletin" provides current-quarter industry-related information. Information reported includes things that a set-top box industry manager could easily observe without additional cost or with nominal effort during the course of events that comprise a normal
quarter's work. To drill down below these headlines, you will need appropriate research studies.

Sample Reports

"The meaning of life is to do the best you can with what you've got." – Anonymous

The following pages provide samples of the standard LINKS financial and operating reports. In addition to these reports, you'll receive the results of any research studies that you order on additional pages after the last page of your financial and operating reports.

These samples are provided to familiarize you with the style and format of the reports that are provided to your firm after each LINKS round. The data reported in these sample reports are only illustrative of reports formatting. These data aren’t specific to your particular LINKS industry. Please do not interpret these samples as suggested guidelines or benchmarks for good decisions and performance within LINKS.

If you’d like some further background on interpreting LINKS financial statements, please access Tutorial #1 ("P&L Statements") on the LINKS website and spend 45 minutes or so working through it prior to (or close to) the beginning of your LINKS event.
For Your Information

You receive the LINKS scorecard (shown above) automatically each quarter as the first page of your financial and operating reports. This scorecard provides comparatives to assess how your firm’s data compares to the industry averages and industry bests on every Key Performance Indicator (KPI).

Historical plots of all KPIs are provided in your firm’s supplementary results Excel spreadsheet (“KPIcharts” worksheet), accessible within the LINKS Simulation Database on the LINKS website. Data from the past six quarters are displayed, to the extent available in your industry’s historical archives, to create quarter-by-quarter plots for each of the LINKS performance evaluation metrics (KPIs) compared to the relevant quarter-specific industry best, industry average, and industry worst for your LINKS industry.
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<th>Product 1-1</th>
<th>Product 1-2</th>
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<td>R&amp;D</td>
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<td>Net Income</td>
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</tr>
</tbody>
</table>
## FIRM 5: SET-TOP BOXES R US  
**INDUSTRY CDE**

### HISTORICAL CORPORATE P&L STATEMENT, QUARTER 17  
**PAGE 3**

<table>
<thead>
<tr>
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<th>Previous (Quarter 16)</th>
<th>Current (Quarter 17)</th>
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<td>Sales Volume</td>
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**LINKS B2B Marketing Simulation**

**FIRM 1: Unlimited Set-Tops**

**PRODUCT 1-1: P&L STATEMENT, QUARTER 12**

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<tr>
<th></th>
<th>All Regions (TOTAL)</th>
<th>Region 1 (U.S.A.)</th>
<th>Region 2 (Europe)</th>
<th>Region 3 (Pacific)</th>
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<td>Active?</td>
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**For Your Information**

The standard LINKS quarterly reports include separate product P&L statements for each of your products. In this sample display, only the report for product 1 is included.
### FIRM 1: ABC Inc.  
**INDUSTRY EUR**

**BALANCE SHEET, QUARTER 9**  
**PAGE 5**

#### ASSETS

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<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>3,075,019</td>
</tr>
<tr>
<td>Marketable Securities</td>
<td>0</td>
</tr>
<tr>
<td>Finished Goods Inventory:</td>
<td></td>
</tr>
<tr>
<td>Plant &amp; DCI: Product 1-1 (10,485 units @ 157.50/unit)</td>
<td>1,651,387</td>
</tr>
<tr>
<td>Plant &amp; DCI: Product 1-2 (0 units @ 0.00/unit)</td>
<td>0</td>
</tr>
<tr>
<td>Plant Investment</td>
<td>105,000,000</td>
</tr>
<tr>
<td>Total Assets</td>
<td>109,726,406</td>
</tr>
</tbody>
</table>

#### LIABILITIES AND EQUITIES

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Capitalization</td>
<td>100,000,000</td>
</tr>
<tr>
<td>Dividends, Current Quarter</td>
<td>-1,043,694</td>
</tr>
<tr>
<td>Dividends, Cumulative Prior To This Quarter</td>
<td>0</td>
</tr>
<tr>
<td>Loans</td>
<td>7,291,119</td>
</tr>
<tr>
<td>Retained Earnings, Current Quarter</td>
<td>3,478,981</td>
</tr>
<tr>
<td>Retained Earnings, Cumulative Prior To This Quarter</td>
<td>0</td>
</tr>
<tr>
<td>Total Liabilities and Equities</td>
<td>109,726,406</td>
</tr>
</tbody>
</table>

### CASH FLOW ANALYSIS REPORT, QUARTER 9

**PAGE 6**

**Starting "Cash" Balance (Final "Cash" Balance, Quarter 8)**  
-5,000,000

**+ Marketable Securities (Converted To "Cash" In Quarter 8)**  
0

**- "Loans" (Liquidated During Quarter 8)**  
0

**+ "Finished Goods Inventory" Changes:**  
| Product 1-1 (From 0 To 1,651,387) | -1,651,387 |
| Product 1-2 (From 0 To 0)          | 0          |

**+ "Plant Investment" Changes**  
0

**+ "Net Income"**  
3,478,981

**= Preliminary "Cash" Balance**  
-3,172,406

**- "Dividends" (Paid at End of Quarter 9)**  
-1,043,694

**= Actual "Cash" Balance (End of Quarter 9)**  
-4,216,100

**- Operating "Cash" Excess (To "Marketable Securities")**  
0

**+ Operating "Cash" Deficit (From "Loans")**  
7,291,119

**= Final "Cash" Balance (End of Quarter 9)**  
3,075,019

**Notes:**

1. "Marketable Securities" and "Loans" refer to the values on last quarter's balance sheet.
2. Investment changes can be positive, negative, or zero. A positive (negative) (zero). Investment change corresponds to an increase (a decrease) (no change) in the dollar value of the investment from last quarter to this quarter which leads to a decrease (an increase) (no change) in current-quarter "Cash" balance.
3. At most, one of Operating "Cash" Excess and Operating "Cash" Deficit will be non-zero; it is possible for both to be zero. Recall that "Cash" must be between 5.0% and 10.0% of current-quarter sales revenues. Excess "Cash" (above 10.0% of revenues) is invested in "Marketable Securities"; shortfalls in "Cash" (below 5.0% of revenues) result in "Loans."
FIRM 8: Worldwide Pty.  INDUSTRY BBB  
FINISHED GOODS INVENTORY REPORT, QUARTER 8  PAGE 7  

<table>
<thead>
<tr>
<th>Product 8-1</th>
<th>Product 8-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLANT/DC1 FG INVENTORY</td>
<td></td>
</tr>
<tr>
<td>Beginning Inventory</td>
<td>7,431</td>
</tr>
<tr>
<td>+ Production</td>
<td>130,000</td>
</tr>
<tr>
<td>= Available Inventory</td>
<td>137,431</td>
</tr>
<tr>
<td>- Sales, Region 1</td>
<td>-28,342</td>
</tr>
<tr>
<td>- Sales, Region 2</td>
<td>-17,496</td>
</tr>
<tr>
<td>- Sales, Region 3</td>
<td>-56,644</td>
</tr>
<tr>
<td>= Ending Inventory</td>
<td>34,949</td>
</tr>
</tbody>
</table>
**------------------------------------------------------------------------------------------------------------**
FIRM 8: Set-Top Boxes Worldwide                                              INDUSTRY UMT
SERVICE CENTER OPERATIONS REPORT, QUARTER 11                                PAGE 8
**------------------------------------------------------------------------------------------------------------**

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STAFFING REPORT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Beginning CSRs</strong></td>
<td>50</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Resignations</strong></td>
<td>-4</td>
<td>-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Firing</strong></td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>+ Experienced Hires</strong></td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Available CSRs</strong></td>
<td>46</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>+ CSR Hiring</strong></td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ending CSRs</strong></td>
<td>49</td>
<td>49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**------------------------------------------------------------------------------------------------------------**

**PRODUCT 8-1**

<table>
<thead>
<tr>
<th></th>
<th>Calls</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calls</strong></td>
<td>103,223</td>
<td>34,824</td>
<td>24,555</td>
<td>43,844</td>
</tr>
<tr>
<td><strong>Time Allocation</strong></td>
<td>50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Productivity</strong></td>
<td>3,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hires Productivity</strong></td>
<td>2,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Capacity</strong></td>
<td>72,000</td>
<td>72,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Usage [Q#1]</strong></td>
<td>48%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Usage [Q#10]</strong></td>
<td>48%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Cost/Call</strong></td>
<td>16.29</td>
<td>23.45</td>
<td>12.00</td>
<td>13.00</td>
</tr>
<tr>
<td><strong>CSR Turnover</strong></td>
<td>4%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PRODUCT 8-2**

<table>
<thead>
<tr>
<th></th>
<th>Calls</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calls</strong></td>
<td>67,590</td>
<td>23,504</td>
<td>15,067</td>
<td>29,019</td>
</tr>
<tr>
<td><strong>Time Allocation</strong></td>
<td>50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Productivity</strong></td>
<td>3,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hires Productivity</strong></td>
<td>2,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Capacity</strong></td>
<td>72,000</td>
<td>72,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Usage [Q#1]</strong></td>
<td>33%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Usage [Q#10]</strong></td>
<td>33%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSR Cost/Call</strong></td>
<td>20.34</td>
<td>34.75</td>
<td>12.00</td>
<td>13.00</td>
</tr>
<tr>
<td><strong>CSR Turnover</strong></td>
<td>12%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FIRM 1: Global International Inc.
TRANSPORTATION COST REPORT, QUARTER 16
PAGE 9

| SUB-ASSEMBLY | Surface |  | Air |  | Emergency |  |
|--------------|---------|--------|-----|--------|---------|
| COMPONENTS   | Cost    | Volume| Cost| Volume| Cost    | Volume|
|--------------|---------|--------|-----|--------|---------|
| Plant/DC1:   | Gamma   | 4.00   | 0   | 4.00   | 0       | 4.00   |
|              | Delta   | 4.00   | 0   | 4.00   | 0       | 4.00   |
|              | Epsilon | 6.00   | 0   | 6.00   | 0       | 6.00   |

CUSTOMER SHIPMENTS
Region 1       (53,844 units @ $8.00/unit) 430,752
Region 2       (35,564 units @ $28.00/unit) 995,792
Region 3       (65,654 units @ $36.00/unit) 2,363,544

REPLACEMENT PARTS SHIPMENTS TO CUSTOMERS
Region 1       (16,446 units @ $4.00/unit) 65,784
Region 2       (10,622 units @ $14.00/unit) 148,708
Region 3       (19,968 units @ $18.00/unit) 359,424

TOTAL TRANSPORTATION COSTS 6,248,998

FIRM 1: Global International Inc.
OTHER DECISION VARIABLES REPORT, QUARTER 16
PAGE 10

<table>
<thead>
<tr>
<th>MANUFACTURING</th>
<th>1-1</th>
<th>1-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>105,000</td>
<td>60,000</td>
</tr>
</tbody>
</table>

INFORMATION TECHNOLOGY
Product Cost Report? 0
Replacement Parts Demand Report? 0
Service Center Statistics Report? 0
Region    Forecast     Actual     Accuracy
------    ----------    ----------    -------
Product 2-1 1          36,610      38,698      94.6%
Product 2-1 2          20,770      25,221      82.4%
Product 2-1 3          35,193      13,280      0.0%
Product 2-2 1          13,885      16,082      86.3%

SUMMARY: For 4 forecasts, average forecasting accuracy is 65.8%

Note: Forecasts count within the calculation of forecasting accuracy only if the "actual" value being forecast is greater than 100 for sales volumes (to not penalize you for "small" forecasts). Otherwise, the relevant values of "forecast" and "actual" are only reported for reference purposes, but such forecasts are not counted for forecasting accuracy scoring. This is the reason why the number of forecasts referenced in "SUMMARY" may be less than the detailed line-by-line reporting of forecasts.

<table>
<thead>
<tr>
<th>Product-Specific</th>
<th>Product 2-1</th>
<th>Product 2-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecasting Accuracy</td>
<td>Overall</td>
<td>2-1</td>
</tr>
<tr>
<td>Forecasting Accuracy</td>
<td>65.8%</td>
<td>59.0%</td>
</tr>
<tr>
<td>Number of Forecasts</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region-Specific</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecasting Accuracy</td>
<td>Overall</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Forecasting Accuracy</td>
<td>65.8%</td>
<td>90.5%</td>
<td>82.4%</td>
</tr>
<tr>
<td>Number of Forecasts</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
Welcome to the quarter 16 issue of the Set-Top Box Industry Bulletin. Notable set-top box industry developments are highlighted in the Bulletin.

**INDUSTRY NEWS HEADLINES**

Total industry MKT profits were $7,400,324 this quarter. Firm 6 leads industry MKT in market share (22.7%). Firm 2 has the second-highest market share in industry MKT (18.3%).

Industry MKT inventory investment increased from $6,125,983 to $8,181,965 this quarter.

Total industry MKT research study spending was $345,700 this quarter.

**PRODUCT LAUNCHES AND "UNLAUNCHES"**

No products were introduced this quarter.

No products were "unlaunched" (dropped) this quarter.

**RECONFIGURATIONS**

No products were reconfigured this quarter.
Chapter 14: Research Studies

This chapter describes the available research studies the LINKS B2B Marketing Simulation. These research studies provide further information about competitors and about the set-top box markets. These studies are typical of the kinds of research resources that exist in manufacturing-based industries, and the associated costs are typical of the approximate magnitude of the costs associated with such research studies in real industries. However, there's no reason to believe that every research study is appropriate and useful at all times or worth the associated costs. You'll have to decide whether these research studies are worth their stated costs.

Research studies requests are submitted along with your other decision variable changes. Although LINKS research studies are ordered prior to the beginning of the next quarter, research studies are executed during and after the next quarter, as appropriate. Thus, research studies reports always reflect the just-completed quarter's experience.

An overview of the available LINKS research study resources is provided in Exhibit 12. Exhibit 13 provides a catalog of these research studies organized by application area.

In the following research study descriptions, sample output illustrates the style and formatting of research study output. These samples are only for illustrative purposes. The output should not be viewed as providing any specific insight into your particular set-top box industry.

Which research studies should you purchase? When should you purchase these research studies? Two snappy but uninformative responses would be "purchase exactly the research studies that you need and no others" and "it depends." Unfortunately, these responses are not very constructive counsel. Heavy-duty anticipatory thinking is needed before deciding on research study purchases.

Bruce Henderson, noted strategist, author, and management consultant, offers the following insightful process-based suggestion for conducting research: "Define the problem and hypothesize the approach to a solution intuitively before wasting time on data collection and analysis. Do the first analysis lightly. Then, and only then, redefine the problem more rigorously and reanalyze in depth. Don't go to the library and read all the books before you know what you want to learn." The problem "reanalysis" stage is particularly relevant since that is where research studies may play a role, once you have determined that the information provided in the research may provide useful insight into the problem.

In thinking about research studies strategy and tactics, some generalizations are possible:

- Excellent strategy can only be developed based on excellent analysis. Since research provides the raw data for excellent analysis, research should be an important component of your LINKS decision-making process. Do not relegate your research studies pre-ordering decisions to the last five minutes of team meetings. Rather, treat research studies ordering decisions as a fundamental part of your whole LINKS decision-making process.
- Plan ahead. To identify patterns and trends, you will probably need to order some research studies on a more-or-less regular basis. A formal research studies plan should be a part of your management planning process.
- Systematize the post-analysis of research studies. This might involve, for example, the
• Share insights derived from particular research studies with all of your team members. These may require research studies' "experts" to assume coaching roles with research studies "novices." This is a natural state of affairs. Given the complexity of LINKS, it is not possible to be an "expert" on everything.

Exhibit 12: Overview of LINKS Research Studies

<table>
<thead>
<tr>
<th>#</th>
<th>Research Study</th>
<th>Cost</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Benchmarking - Earnings</td>
<td>$500</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Benchmarking - Balance Sheets</td>
<td>$1,000 per firm</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Benchmarking - Product Development</td>
<td>$1,500 per product</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Benchmarking - Generate Demand</td>
<td>$5,000</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Benchmarking - Operating Statistics</td>
<td>$2,500</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Regional Summary Analysis</td>
<td>$5,000 per region</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Customer Satisfaction</td>
<td>$10,000</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Concept Test</td>
<td>$15,000 per concept per region</td>
<td>8</td>
</tr>
<tr>
<td>24</td>
<td>Price Sensitivity Analysis</td>
<td>$20,000 per product per region</td>
<td>4</td>
</tr>
<tr>
<td>28</td>
<td>Marketing Program Experiment</td>
<td>$12,500 per experiment</td>
<td>7</td>
</tr>
<tr>
<td>31</td>
<td>Self-Reported Preferences</td>
<td>$20,000</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Retention Statistics</td>
<td>$10,000</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Benchmarking – Product Variable Cost Estimates</td>
<td>$500 per actively distributed product per firm</td>
<td></td>
</tr>
</tbody>
</table>
### Exhibit 13: Research Studies Catalog

| Competitive Benchmarking | 1. Benchmarking - Earnings  
2. Benchmarking - Balance Sheets  
3. Benchmarking - Product Development  
9. Benchmarking - Generate Demand  
11. Benchmarking - Operating Statistics  
39. Benchmarking - Product Variable Cost Estimates |
|--------------------------|--------------------------------------------------|
| Competitive and Market Monitoring | 14. Regional Summary Analysis  
20. Customer Satisfaction  
27. Marketing Program Benchmarking  
38. Retention Statistics |
| Product Development | 3. Benchmarking - Product Development  
23. Concept Test |
| Generate Demand Program Evaluation | 9. Benchmarking - Generate Demand  
14. Regional Summary Analysis  
24. Price Sensitivity Analysis  
28. Marketing Program Experiment  
31. Self-Reported Preferences |
Research Study #1: Benchmarking - Earnings

Purpose: This research study provides earnings benchmarks for your industry. The current-quarter earnings, cumulative-to-date earnings, and current-quarter dividends of each firm in your industry are reported. In addition, a variety of financial market statistics are reported.

Information Source: These data are based on public information.

Cost: $500.

---

Research Study #2: Benchmarking - Balance Sheets

Purpose: This research study provides summary balance sheet benchmarks for your industry. These balance sheets must be requested for specific firms in your industry.

Information Source: These summary balance sheets are provided by your research supplier based on public information.

Cost: $1,000 per firm.

Additional Information: These summary balance sheets contain the level of information available from public sources. For example, aggregate inventory levels are reported, but there is no disaggregation of aggregate inventory information by product.

---

Research Study #3: Benchmarking - Product Development

Purpose: Current configurations are reported for all products actively sold in at least one region. The last quarter in which each product was reconfigured is reported, with quarter "0" referencing reconfigurations which occurred prior to quarter 1. In addition, per-product research and development spending benchmarking statistics for your set-top box industry are reported.
Information Source: These research study results are based on reverse engineering efforts by your research supplier and on information sharing arrangements among members of the Set-Top Box Industry Trade Association.

Cost: $1,500 per competitor product.

**Research Study #9: Benchmarking - Generate Demand**

Purpose: This research study provides generate demand benchmarks for your industry. Price and marketing statistics (minimum, average, and maximum) for each product category and market region are provided for each of the last four quarters.

Information Source: This research study is based on information sharing and pooling agreements among all firms in the set-top box industry administered by the Set-Top Box Industry Trade Association.

Cost: $5,000.

**Research Study #11: Benchmarking - Operating Statistics**

Purpose: This research study provides a variety of operating statistics benchmarks for your industry. Various "Corporate P&L Statement" figures are reported as percentages of revenues for your firm and for three industry aggregates (minimum, average, and maximum). In addition, industry-wide call center statistics are reported.

Information Source: This research study is based on information sharing and pooling agreements among all firms in the set-top box industry administered by the Set-Top Box Industry Trade Association.

Cost: $2,500.
Research Study #14: Regional Summary Analysis

**Purpose:** This research study provides a regional summary analysis for each specified market region, including current-quarter market shares, prices, and perceptions of product quality, service quality, and availability of all active products:

- "Product Quality" is perceived product quality, reflecting customers' perceptions of a product's configuration and its reliability and performance in actual usage. Failure of sub-assembly components in usage (after purchase) would presumably be reflected in reductions in product quality perception.
- "Service Quality" is perceived service quality, reflecting customers' perceptions of a product's service quality. Service quality derives from experiences with each firm's regional call centers. High usage rates of call centers presumably leads to lower service levels, since customers must queue for service and be served by more harried CSRs.
- "Availability" is perceived product availability, reflecting customers' perceptions of a product's top-of-mind awareness, ease of access, convenience to purchase, and general market place prominence.

**Information Source:** Perceived product quality, perceived service quality, and perceived availability are based on a survey of set-top box customers. These perceptual ratings are the percentages of survey respondents rating product quality, service quality, and availability as "excellent" on a 4-point "poor"-"fair"-"good"-"excellent" rating scale.

**Cost:** $5,000 per region.

Research Study #20: Customer Satisfaction

**Purpose:** This research study provides customer satisfaction estimates of all products in all regions for the last four quarters.

**Information Source:** Customer satisfaction is based on a customer survey of current users. Customer satisfaction is the percentage of survey respondents rating their overall satisfaction with a product as "excellent" on a 4-point "poor"-"fair"-"good"-"excellent" rating scale.
Cost: $10,000.

Research Study #23: Concept Test

Purpose: This research study provides concept test scores for a range of set-top box configurations "around" a designated configuration in a specified region.

Information Source: This research study is based on end-user customer surveys.

Study Details: These concept test scores are "top-box" scores. They represent the percentage of end-user customers surveyed assessing the hypothetical set-top box concept as being "excellent" on a 4-point "poor"-"fair"-"good"-"excellent" rating scale.

Concept test scan searches are conducted "around" the specified configuration. Here, "around" means that 243 concept tests are executed (subject to prevailing set-top box technology limits), one for each of the set-top box configuration attributes that are tested in concept tests (Alpha, Beta, bandwidth, warranty, and packaging), varying the values up and down one from the specified configuration for each attribute. Concept test scores are reported for all scanned concepts whose scores exceed that of the designated configuration by at least 1%.

As may be noted from the sample output, the concept test score for the specified configuration is reported, along with all of the results for the concept test scanning search around that specified configuration. Only those scanned concept scores exceeding the specified configuration by at least 1% are reported.

In this sample output, the configuration M99632 is apparently an unattractive configuration in region 1, thus accounting for the generally low concept test scores for the specified configuration and for its scanned variants.

Cost: $15,000 per concept test per region for up to four concept tests in a quarter. Concept tests beyond four in a single quarter cost double the standard cost of $15,000 (per concept test per region).

Limitations: A maximum of eight (8) research studies of this type may be executed each quarter. Each of these research study requests must reference a specific region; this research study cannot be executed for "all" regions, but only for a single region. Concept test scans ordered for all regions (region "0") will not be executed.

Additional Information: You need baseline concept test scores to interpret concept test scores. A concept test score of 40% is interesting, but there is no way to tell if that score is associated with a configuration that offers competitive advantage unless you have corresponding concept test scores for existing products that are already on the market. Current configurations or the configurations of leading products are obvious baselines. Of course, you would have to execute concept tests on such baseline configurations (in addition to the hypothetical concepts of interest) if you want access to such baseline-configuration concept test scores.
Research Study #24: Price Sensitivity Analysis

"Any sufficiently advanced technology is indistinguishable from magic." – Arthur C. Clarke

**Purpose:** This research study provides a price sensitivity analysis for a specific product in a specific region (or all regions). This research study permits the simultaneous testing of a reconfiguration of an existing, actively-distributed product and an associated price level of the user’s choosing. Thus, Research Study #24 is a focused test marketing experiment with user-specified configurations and prices.

**Information Source:** This research study is based on surveys of customers, using advanced marketing research techniques.

**Study Details:** These price sensitivity analyses isolate the impact of price on market share, while holding other market share drivers constant (product quality, service quality, and availability perceptions).

Nine price levels are used in this research study. With no user-specified price input, these price levels are automatically centered around the current price (the “Reference Price”) of the product in each region for which this research study is executed. Values of -20%, -15%, -10%, -5%, 0% (i.e., current price), +5%, +10%, 15%, and +20%, relative to the product's “Reference Price,” are used.

If configuration and price are left at their default values (“?…?” and 0, respectively), then Research Study #24 is executed with the existing product centered around the region-specific current price of the specified product. Otherwise, the user-specified configurations and prices (with the specified price being the “Reference Price”) are used. Market share predictions are provided for all tested prices in Research Study #24.

Research study output includes market share and gross margin estimates in research study requests with no configuration change. With a configuration change, research study output only includes estimated market shares. Users will need to calculate/estimate their own product and other variable costs (and, therefore, gross margin) associated with any configuration change.

**Cost:** $20,000 per price sensitivity analysis (per product per region). If you execute this research study for all products and regions in a 2-product and 3-region LINKS environment, the total cost would be $120,000.
Sample Output With No Configuration Change:

<table>
<thead>
<tr>
<th>Price</th>
<th>$232</th>
<th>$247</th>
<th>$261</th>
<th>$276</th>
<th>$290</th>
<th>$304</th>
<th>$319</th>
<th>$333</th>
<th>$348</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$171</td>
<td>$171</td>
<td>$171</td>
<td>$171</td>
<td>$171</td>
<td>$171</td>
<td>$171</td>
<td>$171</td>
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<tr>
<td>Margin</td>
<td>$60</td>
<td>$75</td>
<td>$89</td>
<td>$104</td>
<td>$118</td>
<td>$132</td>
<td>$147</td>
<td>$161</td>
<td>$176</td>
</tr>
<tr>
<td>Sales Volume</td>
<td>30,577</td>
<td>25,879</td>
<td>21,985</td>
<td>19,002</td>
<td>16,459</td>
<td>14,269</td>
<td>12,513</td>
<td>11,086</td>
<td>10,533</td>
</tr>
<tr>
<td>Market Share</td>
<td>9.9%</td>
<td>8.4%</td>
<td>7.1%</td>
<td>6.2%</td>
<td>5.3%</td>
<td>4.6%</td>
<td>4.1%</td>
<td>3.6%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Margin Chang</td>
<td>-49.2%</td>
<td>-36.4%</td>
<td>-24.6%</td>
<td>-11.9%</td>
<td>0.0%</td>
<td>11.9%</td>
<td>24.6%</td>
<td>36.4%</td>
<td>49.2%</td>
</tr>
<tr>
<td>MS Change</td>
<td>85.8%</td>
<td>57.2%</td>
<td>33.6%</td>
<td>15.4%</td>
<td>0.0%</td>
<td>-13.3%</td>
<td>-24.0%</td>
<td>-32.6%</td>
<td>-36.0%</td>
</tr>
<tr>
<td>Net Change</td>
<td>-5.5%</td>
<td>-0.1%</td>
<td>0.7%</td>
<td>1.8%</td>
<td>0.0%</td>
<td>-3.0%</td>
<td>-5.3%</td>
<td>-8.1%</td>
<td>-4.5%</td>
</tr>
<tr>
<td>Gross Margin (in $000s)</td>
<td>$1,834</td>
<td>$1,940</td>
<td>$1,956</td>
<td>$1,976</td>
<td>$1,942</td>
<td>$1,883</td>
<td>$1,839</td>
<td>$1,784</td>
<td>$1,853</td>
</tr>
</tbody>
</table>

These estimated per-unit costs of $171.09 include these cost components:
- Product Costs $155.47
- Order Processing Costs $ 4.00
- Replacement Parts Costs $ 11.62
- Duties & Tariffs $ 0.00

Sample Output With A Reconfiguration:

<table>
<thead>
<tr>
<th>Price</th>
<th>$320</th>
<th>$340</th>
<th>$380</th>
<th>$380</th>
<th>$400</th>
<th>$420</th>
<th>$440</th>
<th>$460</th>
<th>$480</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Volume</td>
<td>6,508</td>
<td>4,603</td>
<td>4,398</td>
<td>2,778</td>
<td>3,319</td>
<td>2,432</td>
<td>2,564</td>
<td>2,487</td>
<td>1,781</td>
</tr>
<tr>
<td>Market Share</td>
<td>10.1%</td>
<td>7.2%</td>
<td>6.8%</td>
<td>4.3%</td>
<td>5.2%</td>
<td>3.8%</td>
<td>4.0%</td>
<td>3.9%</td>
<td>2.8%</td>
</tr>
</tbody>
</table>

This price sensitivity analysis involves a product reconfiguration. Margin Estimates are not provided due to the many cost-related assumptions required To estimate variable product costs associated with a reconfigured product.

Limitations: A maximum of four (4) research studies of this type may be executed each quarter. Each of these price sensitivity analysis research study requests must reference a single product and one or all regions. This research study may only be conducted for products that are already actively distributed in a region. This research study may not be used for products prior to their introduction into a region.

Additional Information: These market share predictions and subsequent estimates of gross margins are based on the assumption that competing products don't change their generate demand programs. Obviously, large price changes will tend to evoke competitive responses. The reported market shares in Research Study #24 are long-run estimates of market
shares if you continue with all of your current customer-facing initiatives (configurations, marketing spending, service levels, etc.) as they are now and so do competitors. Market infrastructure issues (like unfilled order status) are not considered. Only your price is "manipulated" in Research Study #24. Thus, these Research Study #24 estimates of market share will not correspond exactly to your current actual market shares (as reported, for example, in Research Study #14).

**Research Study #27: Marketing Program Benchmarking**

**Purpose:** This research study provides marketing program benchmarking information for all active products in specified regions. You may execute this research study for one region, any combination of regions, or all regions.

**Information Source:** This research study is based on analyses conducted by your research supplier.

**Cost:** $500 per category per region plus $500 per active product in each category and region.

**Study Details:** For each active product in each category in each specified market region, product-specific marketing program benchmarks are provided: total marketing spending, advertising spending ("Advertis"), promotion spending, sales force spending ("SalesFor"), and marketing positioning ("Pos").

```
Sample Output

=======================================================================
RESEARCH STUDY #27 (Marketing Program Benchmarking)
=======================================================================

REGION 1, HYPERWARE
Product 1-1 500,000 250,000 150,000 100,000 53
Product 2-1 900,000 180,000 360,000 360,000 12
Product 3-1 450,000 180,000 135,000 135,000 23
Product 4-1 600,000 210,000 210,000 180,000 21
```
Research Study #31: Self-Reported Preferences

**Purpose:** This research study provides self-reported importance weights for a variety of generate demand elements for the hyperware and metaware categories for each market region. In addition, self-reported attribute preferences for various levels of raw materials Alpha and Beta are provided for each market region, as well as Alpha-Beta positioning maps of customer ideal points for each market region.

**Information Source:** This research study is based on end-user customer surveys.

**Study Details:**
These self-reported importance weights are the averages across all survey respondents. Seven-point rating scales are used in this end-user customer surveying, where "1" is anchored by "Not Important" and "7" is anchored by "Very Important."

The self-reported attribute preferences reflect the distribution of customers' self-reported preferences across the range of 0-9 kg. for raw materials Alpha and Beta. The positioning maps graphically display customer preferences for Alpha-Beta combinations for category in each market region. Current product Alpha-Beta positionings are displayed relative to the customer ideal-points in the market regions.

**Cost:** $20,000.

**Other Comments:** Self-reported importance weights are easy things to ask survey respondents. There is, however, considerable debate about the usefulness of such measures. Customers may have trouble distinguishing low-importance and high-importance elements. Customers may report that everything is important, failing to provide the differentiation that is of interest to marketing managers. It’s also not clear how to use self-reported importance weights to predict future buying behavior, since self-reported importance weights aren't developed from actual behavior. Perhaps they’re only meant to be directional in nature, identifying only really low and really high importance factors.

Self-reported importance weights and self-reported attribute preferences are of uncertain quality. It’s easy for customers to report “what they want” on such survey instruments, but the statistical veracity of these self-reported weights and self-reported attribute preferences has been questioned by many professional marketing researchers.

**Additional Information:** In this research study, self-reported attribute preferences are reported
only for Alpha and Beta and not for bandwidth, warranty, and packaging. Bandwidth, warranty, and packaging are “more-is-better” product attributes. There’s no doubt as to the “best” (most preferred) level of each of these product attributes. Rational end-user customers should naturally always prefer the highest possible level of bandwidth, warranty, and packaging.

The self-reported attribute preferences reported in this research study represent one approach to assessing customer preferences for specific possible Alpha and Beta levels in set-top box products’ configurations. These self-reported attribute preferences provide a general scan of customer preferences across the full range of set-top box technology for raw materials Alpha and Beta. Based on the results of this research study, other research studies should be executed to refine reconfiguration options and possibilities. For example, after reviewing the results of this research study, one or more research study #23 (“Concept Test”) reports might be executed.

Relatively sharp preference distributions for Alpha and Beta are indicative of homogeneous customers (who all want about the same raw material level) or strong preferences (they are quite insistent about their requirements for raw materials). Relatively flat preference distributions for raw materials signal heterogeneous customers (there is wide variation in customer preferences for raw material levels) or weak preferences (they are tolerant to variations in raw materials).
Research Study #38: Retention Statistics

**Purpose:** This research study provides retention rates for all actively marketed products in all market regions for the last four quarters.

**Information Source:** Retention rates are estimated based on a customer survey of current purchasers of set-top boxes. Retention rates are customers’ stated intentions of probability of future repurchase of the just-purchased set-top box.

**Cost:** $10,000.

**Other Comments:** Retention rates are measures of long-run average customer loyalty to a just-purchased product. They are estimates of the average current purchaser’s stated intention of probability of repeat purchase. Retention rates are also used by marketing analysts to estimate customer lifetime value (CLV).
Interpreting Retention Statistics and Customer Lifetime Value: A Tutorial

Customer lifetime value (CLV) is calculated as the net present value of expected future cash flows over the lifetime of an individual customer. The equation (shown below) explicitly accounts for customer churn or turnover by adjusting the cash flow for each time period by the probability that the customer will be retained (r):

\[
CLV = \sum_{t=1}^{T} \frac{(GM_t)r^t}{(1+d)^t}
\]

- \(GM_t\) = gross contribution margin per customer in time period \(t\)
- \(r\) = retention rate
- \(d\) = discount rate
- \(t\) = a time index (e.g., a quarterly time index)

Calculating Customer Lifetime Value

The steps in calculating CLV are as follows:
1. Determine annual profit (or cash) flow pattern for customers over time.
2. Establish customer defection/retention pattern.
3. Calculate customer NPV using firm’s discount rate.

It is preferable to calculate CLV using gross contribution margin per customer in the numerator. However, in some instances, firms have difficulty assigning their costs to specific customers, so gross contribution margin per customer is replaced by revenue per customer.

Different market segments may have very different cash flow characteristics (that is, different gross contribution margins and retention rates). Hence, it is useful to calculate CLV separately for the typical customer in each market segment.

Interpreting Customer Lifetime Value

The CLV framework is a useful way of thinking about managing customer relationships to maximize shareholder value. From a managerial standpoint, there are three ways for a company to increase aggregate CLV (and consequently shareholder value) next year: (1) Acquire new customers; (2) Increase retention of existing customers; or, (3) Increase gross margin (through cross-selling or changes in cost-structure, for example).

Firms generally consider customers with a high CLV to be most attractive and – if these customers perceive the firm’s product to have a high value – it will be profitable for the firm to invest in marketing to them. Firms generally undertake defensive strategies to retain customers with a high CLV who do not perceive the firm’s product to have a high value because they are vulnerable and may be lost to competitors.

Recent research has shown that the CLV framework (i.e., using forecasts of acquisition, retention, and margins) can be used to calculate the value of the firm’s current and future customer base. Gupta, Lehmann and Stuart (2004) used publicly available information from annual reports and other financial statements to calculate a customer-based valuation of five companies. They compared their estimates of customer value (post-tax) with the reported market value for each of
the companies. Their estimates were reasonably close to the market values for three firms, and significantly lower for two firms (Amazon and eBay). They inferred that these two firms are either likely to achieve higher growth rates in customers or margins than they forecast, or they have some other large option value that the CLV framework doesn’t capture.

Sample Customer Lifetime Value Calculation

An auto dealership tracks customers who use its service facility. New customers represent $50 in 1st-year margins, $100 in 2nd-year margins, $125 in 3rd-year margins, and $100 in margins in subsequent years. The dealership estimates that customers defect at a rate of 20% per year. That is, only 80% of new customers continue to use the automobile dealership's services in the second year, only 60% of new customers continue to use the automobile dealership's services in the third year, etc. Assume the firm’s discount rate is 20%. We can calculate the CLV for the average customer as follows:

\[
\begin{align*}
\text{CLV} & = \frac{50}{1.20} + \frac{100 \times 0.80}{(1.20)^2} + \frac{125 \times 0.60}{(1.20)^3} + \frac{100 \times 0.40}{(1.20)^4} + \frac{100 \times 0.20}{(1.20)^5} \\
& = 50/1.20 + (100x0.80)/(1.20)^2 + (125x0.60)/(1.20)^3 + (100x0.40)/(1.20)^4 + (100x0.20)/(1.20)^5 \\
& = 167.96.
\end{align*}
\]

Suppose the auto dealership was able to reduce customer defections from 20% to 15% per year. Then, CLV for the average customer would be $205.10. Thus, a 5% reduction in the rate of customer defections (a 5% increase in the customer retention rate) increases profitability by 22.1%. Note that, in this example, we discount cash flows back to “year 0” and assume there was no acquisition cost at year 0.
Research Study #39: Benchmarking – Product Variable Cost Estimates

Purpose: This research study provides product variable cost estimates of competitive products for your industry. These product variable cost estimates must be requested for one or more specific firms in your industry.

Information Source: These product variable cost estimates are provided via an information sharing arrangement managed by the Set-Top Box Trade Industry Association.

Cost: $500 per actively distributed product. When you specify a particular firm for this research study, product variable cost estimates are provided for all that firm’s actively distributed products.

Additional Information: As may be noted from the Sample Output, total product (variable) cost is reported for each product as well as the associated cost elements of configuration cost, labor cost, and production cost.

Research Studies Table of Contents

Research studies are output in numerical order so you always know the general location of any research study in your output (e.g., lower numbered research studies are printed closer to the front of your research studies output). However, since the research studies ordered vary through time and the space required for research studies also varies, the specific page number of any particular research study is not precisely known ahead of time. For your convenience, a Research Studies Table of Contents is included as the last page of your research studies output.

Research Studies Decision Forms

Blank "Research Studies Decisions" forms may be found on the next two pages. Complete these decision forms during your team deliberations.
# Research Studies Decisions (1)

<table>
<thead>
<tr>
<th></th>
<th>Study</th>
<th>Firm(s)?</th>
<th>Region(s)?</th>
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<tbody>
<tr>
<td>1</td>
<td>Benchmarking - Earnings</td>
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<tr>
<td>2</td>
<td>Benchmarking - Balance Sheets</td>
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<tr>
<td>3</td>
<td>Benchmarking - Product Development</td>
<td></td>
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<tr>
<td>9</td>
<td>Benchmarking - Generate Demand</td>
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<td>11</td>
<td>Benchmarking - Operating Statistics</td>
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<tr>
<td>14</td>
<td>Regional Summary Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Customer Satisfaction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

(1) Circle the number of each research study that you wish to order. If additional information is required for a research study, provide that information in the designated space(s).

(2) When region numbers are required, enter a single region number. Use region "0" as designations to run a research study for all regions. See the research study descriptions for details about the associated multi-region costs.

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**Reminders**

Research study requests are for one quarter only. If you wish to reorder a research study in a subsequent quarter, you must reenter that research study request.
# Research Studies Decisions (2)

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<thead>
<tr>
<th></th>
<th>Firm</th>
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<table>
<thead>
<tr>
<th></th>
<th>Marketing Program Benchmarking</th>
<th>Region(s)?</th>
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<tbody>
<tr>
<td>27</td>
<td></td>
<td></td>
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<tr>
<td>31</td>
<td>Self-Reported Preferences</td>
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<td>38</td>
<td>Retention Statistics</td>
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<td>39</td>
<td>Benchmarking - Product Variable Cost Estimates</td>
<td>Firm(s)?</td>
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</tbody>
</table>

**Notes:**

1. Circle the number of each research study that you wish to order. If additional information is required for a research study, provide that information in the designated space(s).
2. When region numbers are required, enter a single region number. Use region "0" to run a research study for all regions. See the research study descriptions for details about the associated multi-region costs.

**Reminders**

Research study requests are for one quarter only. If you wish to reorder a research study in a subsequent quarter, you must reenter that research study request.
Chapter 15: Performance Evaluation

Profitability measures obviously matter in assessing the long-run performance of a business. However, "other things" are leading indicators of future profitability and root causes of profitability. As you'll note from the details that follow, current performance and change in performance are considered in the LINKS multi-dimensional performance evaluation scorecard.

The LINKS scorecard is perhaps described more aptly as a boardroom-level scorecard. It focuses on top-line boardroom financial, operational, and customer performance measures and sub-measures. The LINKS scorecard includes the measures and weights described in Exhibits 14-16. Each firm in your set-top box industry submits their raw data to the Set-Top Box Trade Association, which provides your firm's personal scorecard every quarter.

The LINKS scorecard is based on a ranking of performance on each sub-measure. These rank-order comparisons across all competing firms within your industry avoid the undue influence of particularly extreme values of individual sub-measures. This LINKS scorecard is a within-industry performance evaluation system. Comparisons across industries are problematic due to variations in environmental and competitive milieu.

Your firm receives weighted points for each competitor for whom your performance on a sub-measure is better. For example, if your firm's ratio of "Net Profits" to "Revenues" is better than three other firms' ratios, your firm receives 9 points. (Of course, the top-performing firm on "Net Income" to "Revenues" ratio in a 6-firm industry would receive 15 points.) In general, the maximum available points on any sub-measure are \( W \times (N-1) \) where "W" is the sub-measure's weight and "N" is the number of firms in the industry. Points accumulate each quarter throughout the LINKS exercise.

To avoid an overemphasis on minor quarter-to-quarter variations in the calculation of the ranking of firms on the performance sub-measures in the LINKS scorecard, minor differences in the sub-measures are treated as ties in the calculation of ranking points. The thresholds for differences to be treated as meaningful are listed in Exhibits 14-16 for each sub-measure. For example, differences of 0.2% or less for "Ratio of Net Income to Revenues" are considered to be statistically insignificant, and firms within 0.2% of each other would be treated as being tied. Thus, two firms with ratios of Net Income to Revenues of 4.5% and 4.6% would be treated as being tied in the calculation of ranking position and associated points received in any quarter.

You receive the LINKS scorecard automatically each quarter as the first page of your financial and operating reports. This scorecard provides comparatives to assess how your firm's data compares to the industry averages on every KPI. In addition, historical plots of past performance are provided. Data from the past six quarters are used, to the extent available in your industry's historical archives, to create quarter-by-quarter plots for each of the LINKS performance evaluation metrics. For each metric and quarter, the range of values the range of values across all firms in your LINKS industry is shown and your firm's position in these ranges is identified.
Exhibit 14: Scorecard Financial Measures

<table>
<thead>
<tr>
<th>Sub-Measures</th>
<th>Weight</th>
<th>Sub-Measure Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of Net Income to Revenues</td>
<td>3</td>
<td>Current profitability is the best overall signal of business performance, hence its high weight. Firms are &quot;tied&quot; if their scores are within 0.2% of each other.</td>
</tr>
<tr>
<td>Change in Ratio of Net Income to Revenues</td>
<td>1</td>
<td>Improvement in profitability is important but less important than current profitability. Firms are &quot;tied&quot; if their scores are within 0.2% of each other.</td>
</tr>
</tbody>
</table>

Exhibit 15: Scorecard Operational Measures

<table>
<thead>
<tr>
<th>Sub-Measures</th>
<th>Weight</th>
<th>Sub-Measure Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecasting Accuracy</td>
<td>2</td>
<td>Forecasting accuracy is a relatively pure signal of management skill and expertise (in this case, in the area of understanding customers and customer demand generating forces). Firms are &quot;tied&quot; if their scores are within 0.5% of each other.</td>
</tr>
<tr>
<td>Ratio of (Marketing + Service Spending) to Revenues</td>
<td>-1</td>
<td>Service spending is service outsourcing costs. Marketing spending is an easy way to boost short-run sales volume without necessarily contributing to long-run profitability. Relative to revenues, spending less in marketing and service is desirable. Firms are &quot;tied&quot; if their scores are within 0.2% of each other.</td>
</tr>
</tbody>
</table>

Exhibit 16: Scorecard Customer Measures

<table>
<thead>
<tr>
<th>Sub-Measures</th>
<th>Weight</th>
<th>Sub-Measure Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Market Share</td>
<td>1</td>
<td>Change in market share is an overall measure of customer reaction to the firm's offerings. (&quot;Market share&quot; equals customer purchases in all regions.) Firms are &quot;tied&quot; if their scores are within 0.1% of each other.</td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td>1</td>
<td>Customer satisfaction is a clear measure of customer performance and a long-run leading indicator of repeat purchasing behavior and customer retention. Average customer satisfaction across all products and regions is used here. Firms are &quot;tied&quot; if their scores are within 0.5% of each other.</td>
</tr>
</tbody>
</table>

Notes: Positive "weights" are associated with sub-measures where "more is better" and negative "weights" are associated with sub-measures where "less is better." "Change" measures are based on quarter-to-quarter changes.
Chapter 16: Firm Management and Advice

“Success doesn’t come to you. You go to it.” – Marva Collins

This chapter reviews a variety of relevant topics related to managing your LINKS firm. Issues related to planning are discussed. Several worksheets are provided to assist you in your planning-related tasks within LINKS. In addition, some suggestions regarding your decision making near the end of the LINKS exercise are offered. Specific and general advice is offered regarding your participation in LINKS.

Planning

“Direct, simple plans, and clear concise orders are essential to reduce the chances of misunderstanding and confusion. Other factors being equal, the simplest plan executed promptly is to be preferred over the complex plan executed later.” – U.S. Army Field Manual 100-5

Planning occurs throughout the LINKS exercise. Your decisions are your plans. But that’s not the whole story. How are plans developed? And, much more importantly, how are good plans developed?

Planning and plans are the consequence of careful analysis and formulation of appropriate strategies and tactics. Your plan is, therefore, the natural consequence of considerable prior analysis and thinking. This analysis-planning-implementation-evaluation sequence iterates through time as the results of your plans are revealed in the market place (and in your financial and operating statements).

The essence of planning involves answering these questions (and in this order):
(1) What is happening?
(2) How are we doing?
(3) How and what are "they" (our major competitors) doing?
(4) What factors are important for success?
(5) What are we going to do? Why? With what effect? At what cost?
(6) Who - specifically - is to do what to make the plan work?

Two worksheets help you in LINKS planning.
• The SWOT Analysis Worksheet is the classic strengths-weaknesses-opportunities-threats template for organizing your thoughts under the "What is happening?" and "How are we doing?" questions.
• The KPI Worksheet is a template to structure your thinking and analysis related to specific KPIs that you might wish to improve as a result of your planning efforts. Use the KPI Worksheet frequently to organize your thoughts on performance drivers.

These worksheets may be found on the following two pages.
# SWOT Analysis Worksheet

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are your firm's strengths relative to your competitors? What are your most important strengths? Why?</td>
<td>What are your firm's weaknesses relative to your competitors? What is impeding you from achieving your desired results? Prioritize your weaknesses.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>How can you convert these strengths, weaknesses, and threats into opportunities for your firm? What considerations are most important for your success?</td>
<td>What organizational, competitive, and environmental threats do you face now and in the near future?</td>
</tr>
</tbody>
</table>
**KPI Worksheet**

Key Performance Indicators (KPIs) are central to managing processes and sub-processes, such as those that comprise supply chain management. Use this worksheet to analyze a specific sub-process for your LINKS firm. Develop specific action plans for improving your performance on this KPI.

<table>
<thead>
<tr>
<th>What KPI?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>How/Why Is This KPI Relevant To Customers and Customer Requirements?</td>
<td></td>
</tr>
<tr>
<td>Why Is This KPI Noteworthy Now?</td>
<td></td>
</tr>
<tr>
<td>What Is Your Standing on This KPI Now?</td>
<td></td>
</tr>
<tr>
<td>What Are Leading/Key Competitors' Standings on This KPI Now?</td>
<td></td>
</tr>
<tr>
<td>What Is Your KPI Future Objective?</td>
<td></td>
</tr>
<tr>
<td>What Can You Do To Influence This KPI? (What Drives This KPI?)</td>
<td></td>
</tr>
<tr>
<td>What's Your Specific Action Plan To Achieve Your KPI Future Objective?</td>
<td></td>
</tr>
</tbody>
</table>
Team Management and Organization

"Great leaders are almost always great simplifiers, who can cut through argument, debate and doubt, to offer a solution everybody can understand." – General Colin Powell

You are a member of a team in LINKS. Managing your team to obtain the best efforts of all team members is a continuing management challenge.

- Your most limited resource within LINKS is your team's available time. Well-performing teams inevitably manage their management time carefully and thoughtfully. You will need to think carefully about how to allocate your management time to necessary tasks that exist within LINKS.
- As you gain experience with LINKS, it may well appear that a review is needed of an earlier group decision about how to allocate tasks, responsibilities, and available management time. Don't be shy within your LINKS team about asking the question: "Are we organized in the best way for the tasks ahead?" This is always a good question.

There are predictable signals of well-performing teams in simulations (and in real life!). Pamela Van Rees (Boston University MBA student), provided the following list of characteristics of well-functioning simulation teams:

- The firm's long-term well-being is the top priority of all members.
- Relevant issues are fully and adequately explored.
- Proposals and objectives are clearly explained.
- Members feel comfortable and spontaneous.
- Feedback is given freely and directly.
- Members feel respected, supported, and listened to.
- Disagreements are tactfully stated without being offensive.
- Differences and misunderstandings are resolved in such a way as to strengthen and deepen rather than weaken relationships (by exploring the origins and implication of ideas).
- Everyone's judgment is acknowledged and explored.
- Interruptions are minimal.
- Everyone's schedule is accommodated as fully as possible.
- At any given time in a group meeting, each firm member is either engaged in holding the focus (proposing an idea or decision), listening to another's focus, giving feedback about the focus, or facilitating (creating the structure or leading) the discussion.

The principal causes of poor team performance in the simulation are a combination of the following factors:

1. uncoordinated supply chain management;
2. not really meeting customer requirements for set-top boxes (i.e., failure to establish any meaningful differential advantage, particularly regarding product configuration);
3. lack of focus (capacity, reconfiguration, time, and human resource constraints combine to favor concentrated effort in fewer than "all" market regions);
4. limited research and/or limited efforts to interpret the research studies that are available;
5. limited attention to competitive developments (i.e., lack of in-depth competitor analysis to discover the underlying drivers of market behavior);
6. financial mismanagement related to cost structure management (variable and fixed costs management, covering corporate-wide overheads, etc.), production and inventory levels, and capacity management;
7. not understanding the simulation's structure/environment (i.e., treating the participant's manual
in a cursory, fashion rather than something to be studied and referenced regularly);
(8) poor work ethic (not spending enough time on the simulation); and,
(9) team mismanagement (not spending enough time thinking about and discussing team
management issues and related human resource deployment strategies and tactics).

General Advice

"The fight is won or lost far away from witnesses, behind the lines in the gym and
out on the road, long before I dance under those lights." – Muhammad Ali

Based on extensive observations of the performance of thousands of past LINKS participants,
these general suggestions and summary-advice nuggets are of well-proven value:

- Read and re-read this LINKS participant's manual (there's lots of good stuff in it).
- Regularly think about general business and management principles and how they might relate
to and work within LINKS.
- You don't have to know everything about the LINKS set-top box industry at the beginning of
the exercise, but you must consistently increase your knowledge-base through time.
- "Share toys" (i.e., work hard at sharing your useful fact-based analyses and important insights
with all members of your LINKS team). "Knowing" something important personally is only a part of the LINKS management challenge. Exploiting that knowledge effectively throughout all
of your LINKS team's deliberations, with and through your whole LINKS team, is the key to
harvesting the maximum ROI from your data, facts, analysis methodologies, insights, and
knowledge.
- Get the facts and base your decisions on the facts, not on wishes, hopes, and dreams.
- Coordinate demand and supply by continually striving to see the whole demand-chain and
supply-chain within the LINKS set-top box industry. Don't focus myopically on a single part of
the LINKS demand-chain without regard for how it relates to, and is influenced by, other
LINKS parts and to the "whole" of LINKS. The source of the "LINKS" name is the simulation's
focus on managing the interrelationships, the linkages, among all supply-chain elements.
- Remember the Ferengi proverb (for Star Trek fans): "There is no honor in volume without
profit." Volume, sales, and market share is easy to obtain, if there are no constraints on
profitability. Profitable volume is the "holy grail" in business and in LINKS.

Should you do anything special or unusual at or near the end of your LINKS exercise? Behave as
if the simulation will not end at any specific pre-announced quarter. Keep a long-run view and
continuously try to improve your firm's performance. Attempts to end-game the simulation can
easily be counter-productive, resulting in substantial last-minute deteriorations in hard-earned
market share, margins, and profits. Also, how do you know for sure that the simulation will really
end after a particular quarter? Perhaps there will be an unexpected and unannounced change at
the last minute, resulting in a longer or shorter simulation exercise. All in all, taking a long-run
view seems like the only sensible and prudent thing to do.

The best counsel about end-gaming is simply to manage your firm to improve its profitability
through time. You don't have to get it perfect (i.e., achieve "optimal" profits, whatever that is), but
you must improve through time. You take over a LINKS firm that is profitable as of quarter 1.
Seek to improve your firm's profitability through time ... and that time extends to and beyond the
actual end of your particular LINKS exercise.
Appendix: Web-Based LINKS Access

LINKS has no software to download/upload/install. Point your favorite web browser at the LINKS Simulations website to interact with LINKS  
http://www.LINKS-simulations.com 
and then access the LINKS Simulation Database using your firm's case-sensitive passcode. 
You'll be e-mailed your LINKS firm's passcode just before your LINKS event begins.

LINKS uses e-mail to communicate with all LINKS participants. Please ensure that your preferred e-mail software is configured to receive e-mail messages from domains ending with:  
@ChapmanRG.com  @LINKS-simulations.com  @LINKS-simulations.info 
Your may wish to consult your personal information technology advisor to ensure that your e-mail software is configured appropriately to receive LINKS e-mail from these domains.

While the LINKS Simulation Database works with all web browsers, Microsoft's Internet Explorer is recommended. **LINKS website access requires a Java-enabled browser.**

**Output Retrieval After a LINKS Round:** You'll be advised via e-mail when LINKS game-run results are available on the LINKS Simulations website. Links within the LINKS Simulation Database permit you to access your Word doc and Excel results after a game run.

**Inputs For the Next LINKS Round:** When you're ready to input decisions for the next LINKS round, access the LINKS Simulation Database and make your input changes.

- While any number of members of a LINKS firm may access the LINKS Simulation Database simultaneously to “browse,” only one team member at a time can input new decisions. If multiple members of a LINKS firm attempt to make inputs simultaneously, problems can arise; all decision inputs might not be saved successfully on the LINKS server with simultaneous inputs from multiple members of a LINKS firm.
- You may make some inputs now and others later. Only your final LINKS inputs at the input submission deadline for your LINKS industry are included in the next LINKS round.
- Within the LINKS Simulation Database, current decision values are displayed on the input screens. You only need to make changes. All LINKS decision variables are "standing orders" and remain in effect until changed. However, you must input specific instructions each LINKS round for ordering research studies. Otherwise, research studies will be executed only once since "standing orders" don't exist for research studies.
- Inputs are checked for input integrity, including upper and lower bounds on permissible numeric inputs. Invalid entries result in an error message reporting valid minimums and maximums. And, informative messages are reported at the bottom of each web screen.
  - Save Input Changes on a LINKS input web screen before moving to another input screen in the LINKS Simulation Database. Review reminder, warning, and error messages reported at the bottom of the regenerated web screen after the inputs are processed by the LINKS web server.
  - Decision Inputs Audit: To provide decision inputs auditing support, the LINKS Simulation Database includes
a Decision Inputs Audit.
Accessible on the initial login and Exit web screens in the LINKS Simulation Database, the Decision Inputs Audit checks a firm’s current decision inputs for potential problems and inconsistencies. This LINKS Simulation Database audit function is not an audit of the individual quality of each decision input (e.g., there’s no attempt to assess whether a price of $345 is good or bad). But, possible problems are flagged for attention. For example, forecasts that haven’t been changed since the last decision round are noted in the audit display because forecasts are normally updated every decision round.

Accessing LINKS Results Files Via a Browser on a Public Computer: Web browsers leave “tracks” to previously accessed web-pages in browser history files. If you access LINKS results files on a public computer (e.g., in a public PC lab), others could access your results too via the browser history.

Instructions for cleaning the cache in Internet Explorer follow. Other web browsers have similar browser-cache cleaning protocols.

If you access LINKS results files on a public computer, follow these steps to clear Internet Explorer’s browser history (cache):
1. Exit/close Internet Explorer after accessing your LINKS results file.
2. Re-start Internet Explorer.
   a. Click on “Tools” and then “Internet Options.”
   b. On the “Internet Options” screen, look for the “Browsing History” sub-section. Check “Delete browsing history on exit” (it may already be checked).
   c. Click the “Delete” button in the “Browsing History” sub-section.
   d. Check the “History” box on the “Delete Browsing History” screen (it may already be check).
   e. Click the “Delete” button at the bottom of the “Delete Browsing History” screen.
   f. Wait until the “Internet Options” screen re-appears.
   g. Click the “OK” button.
3. Exit/close Internet Explorer.
These steps clear the browsing history from Internet Explorer on any computer and preserve the security and privacy of your LINKS results files.
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