LINKS Multi-Channel Management Essentials Simulation

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Chapter 1: Introduction

The LINKS Multi-Channel Management Essentials Simulation simulates a relatively high-priced durable or capital goods industry with product-line competition with branded products in multiple categories through parallel competing indirect and direct channels in multiple market regions. Specific issues and topics which arise regularly during the LINKS Multi-Channel Management Essentials Simulation include:

- formulating and executing marketing strategy and tactics
- assessing opportunities in multi-channel environments
- multi-channel outbound logistics management (distribution and transportation management)
- developing and implementing plans
- competitive analysis, dynamics, and rivalry
- coordinating marketing programs and operations capabilities
- coping with uncertain environmental forces.

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.**

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.

What Will You Learn?

"The ability to learn faster than competitors may be the only true sustainable competitive advantage." – Arie P. De Geus

Learning objectives in the LINKS Multi-Channel Management Essentials Simulation include:

- Experiencing marketing and out-bound logistics interactions in multi-channel environments
- 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.

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

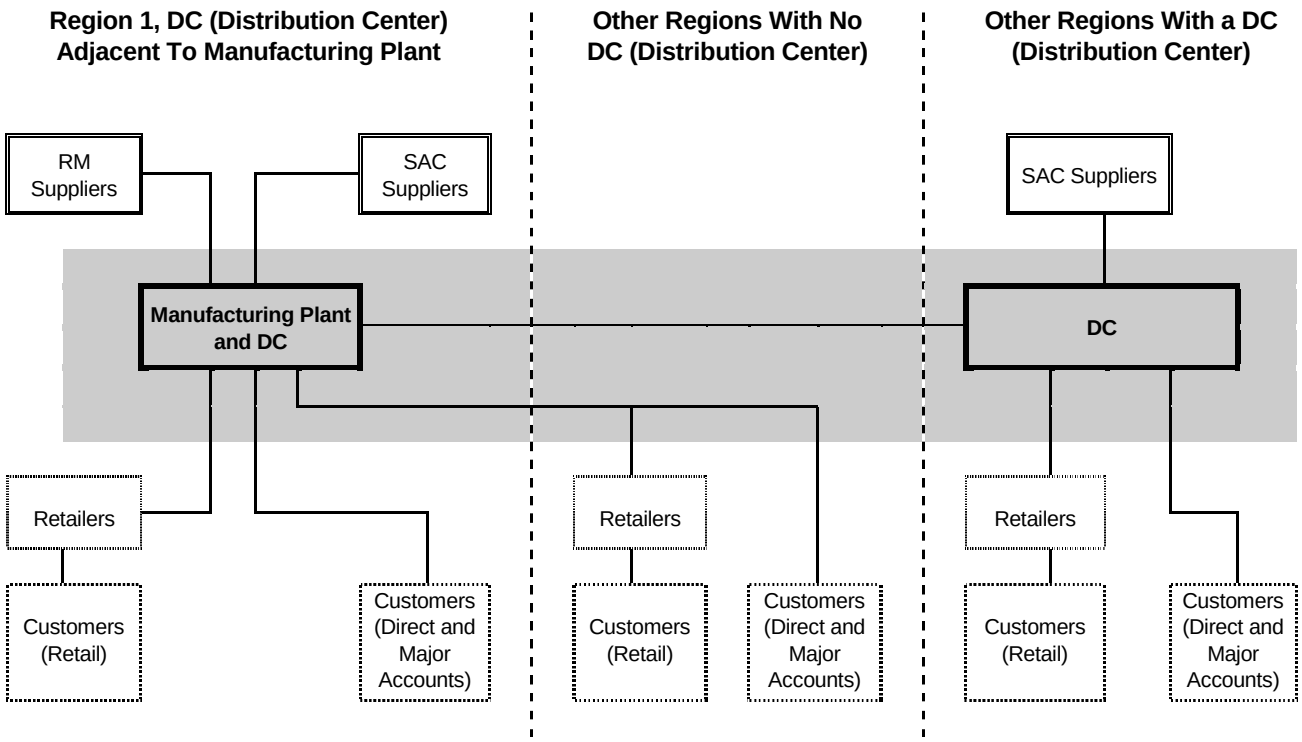
Exhibit 1 contains a schematic representation of the LINKS supply chain. LINKS firms manufacture and distribute products, as well as provide post-sale customer service via regional service centers. The indirect retailer and direct e-commerce and major accounts channels in LINKS provide a rich and challenging 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.

Exhibit 1: LINKS Supply Chain



Notes:

(1) In this Exhibit, "DC" refers to distribution center, "RM" refers to raw materials (used for production), and "SAC" refers to sub-assembly components (used for production and replacement parts).

(2) The shaded area in this exhibit is the direct responsibility of the LINKS manufacturers. LINKS firms are manufacturers who own their distribution centers and provide post-sale service to customers via service centers. The "manufacturing plant" handles product development, procurement, and production. Multiple customer segments (i.e., "end users" or "final customers") are reached via indirect (retail) and direct distribution channels. These customer segments include individuals (consumers) and business-to-business customers. Some customer segments presumably consider indirect (retail) and direct channels as viable purchase options. Other customer segments may be captive to a particular channel and are only able to seriously consider purchasing products distributed through their most-preferred channel.

You manufacture, distribute, and sell set-top boxes in three regional markets in LINKS. Your manufacturing plant is located in market region 1. Distribution centers in each market region inventory your products, fill orders from the channels in all market regions, and provide customer service via regional service centers. Your distribution center in region 1 is located adjacent to your manufacturing plant.

What Is a Set-Top Box?

The "product" in LINKS is a set-top box. A set-top box is a high-tech electronics product purchased by individual consumers for home use and 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."*

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.

LINKS Products

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 end users. **There is no direct competition across the hyperware and metaware set-top box categories.**

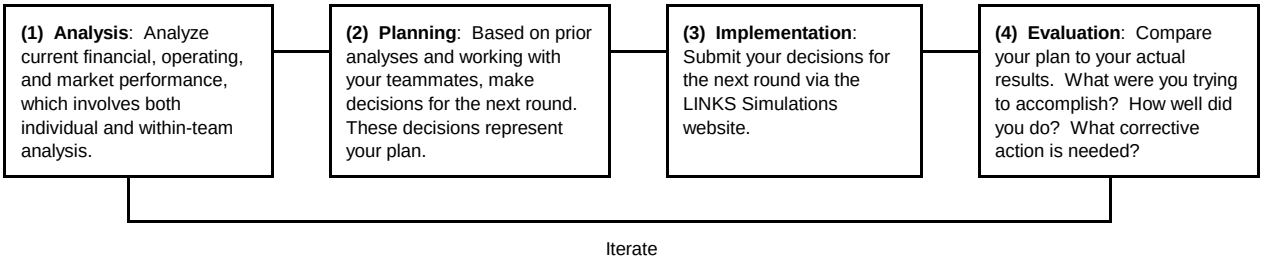
Each LINKS firm in your industry has two products: a hyperware product (product 1) and a metaware product (product 2).

What Will You Do Within LINKS?

"Learning is not a spectator sport." – Unknown

The LINKS analysis-planning-implementation-evaluation cycle, 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 need to learn from earlier analyses, decisions, and results.

Exhibit 2: Analysis-Planning-Implementation-Evaluation Cycle



Analysis

After each decision round (quarter), your LINKS team receives updated financial and operating reports. Reports provided include profit-and-loss statements for each product in each market region and channel, an overall balance sheet for the firm, and a cash-flow statement for the firm. Additional operational reporting provides details of inventory flows (raw materials, components and finished goods), and service-related performance elements throughout your supply chain.

These financial and operating reports permit you to monitor your accounting-based financial performance, track top-line elements of your supply chain in terms of material flows, and compare your current performance to recent past performance. The top-line impacts of all of your decisions are reported in these financial and operating reports.

LINKS teams have the option of ordering various research studies for a fee. These research studies are of two general kinds: competitive benchmarking against industry-wide competitors and specific customer/market analyses. Industry-wide benchmarking studies allow both process and performance dimensions to be compared across competitors within your set-top box industry. These research studies help you understand your relative position (compared to your competitors) in your markets, regions, and channels. In addition, these research studies provide the essential external customer-oriented measures of performance such as customer satisfaction, service quality perception, and product quality perception.

Planning

You must develop a specific plan for each quarter in LINKS. Your plan consists of the decision inputs that you'll ultimately record on the decision forms described in this manual.

Your decision inputs for the next simulation quarter are based on your analysis. While you may have personal areas of specialization and responsibility within your LINKS team, you will need to coordinate with your teammates. This coordination may occur during a face-to-face meeting with all team members present. Alternatively, teammates may be geographically dispersed, and it will be necessary to communicate via teleconferences or e-mail.

Implementation

Ultimately, you record your decisions on decision forms included within this participant's manual. Normally, one member of your team will enter those decisions into the LINKS Simulation Database for processing. There will be a pre-announced deadline for receipt of your team's input for each LINKS round.

At the specified input submission deadline, the simulation will run for the next round. Part of this "running" involves the generation of new financial, operations, and research reports. Your firm's reports will be accessible to you via the LINKS Simulation Database.

Evaluation

After receiving your results from the previous quarter, you will need to assess how well you did compared to your plans and goals. Criteria for such an evaluation presumably include top-line performance measures such as profitability, but the underlying drivers of profitability must be examined as well.

In a very long management simulation exercise (20+ decision rounds), bottom-line profitability or return-on-investment (ROI) can be the sole determinant of simulation team performance. However, in finite simulation exercises (6-12 decision rounds), a pure emphasis on profitability or ROI can be unsatisfactory from a learning perspective.

Financial, operating, and customer performance measures are combined in LINKS to create an overall multi-factor balanced scorecard performance measure. This performance evaluation system is described in Chapter 15.

Decisions and Decision Forms

Included within Chapters 3-12 and Chapter 14 are copies of the various decision input forms that you'll 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. Standing-order LINKS decisions means that you will be inputting only a few decisions each round, rather than having to reinput all decisions.

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, distribution, transportation, 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.

Exhibit 3: LINKS Decisions

Decision Areas	Specific Decisions
Manufacturing	Production volumes
Distribution	Distribution center presence in regional markets RFID-application process for retail-channel sales Emergency carrier for plant-DC finished-goods shipments
Transportation	Shipment volumes and modes for plant-to-DC finished goods
Generate Demand	Introduction/drop in market regions and channels Price for each product, channel, and region Marketing spending for each product, channel, and region
Forecasting	Short-term sales volume forecasts
Research Studies	Ordering specific research studies
Other Decisions	Firm name

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, and production scheduling) 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. If you only have a distribution center in region 1, then your products are shipped via your distribution center in market region 1 to all market regions served by your firm. If you choose to have distribution centers in other regions, then you'll ship your products to those other-region distribution centers and local shipments will follow from those regional distribution centers to local customers.

There are three regional markets in your set-top box industry. Three sales channels (retail, direct, and major accounts) exist to reach end users 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.

Currency Conventions in LINKS

The LINKS currency unit is the LCU, 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

Your firm has two products. Product 1 is a hyperware product and product 2 is a metaware product.

In the LINKS Multi-Channel Management Essentials Simulation, reconfiguration of your existing products is not permitted.

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

In addition to these six configuration elements, two sub-assembly components are part of set-top boxes. Sub-assembly components details are provided in Chapter 4. Exhibit 4 contains a schematic representation of the hyperware and metaware set-top box product configurations.

Exhibit 4: Set-Top Box Configurations For Products 1 and 2

	Product 1: **Hyperware**	Product 2: **Metaware**	Definitions
Configuration Elements	1. "H" 2. Alpha 3. Beta 4. Bandwidth 5. Warranty 6. Packaging	1. "M" 2. Alpha 3. Beta 4. Bandwidth 5. Warranty 6. Packaging	Category [hyperware ("H") or metaware ("M")] 0-9 Kg of Raw Material 0-9 Kg of Raw Material 1-7 Terahertz 0-4 Quarters Stnd ("1"), Prem ("2"), or ES Prem ("3")
Sub-Assembly Components	Epsilon Gamma	Epsilon Delta	Common Sub-Assembly Component Unique Sub-Assembly Component

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.

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. With a warranty, 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 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.

Chapters 4/5: Procurement/Manufacturing Decisions

"Nobody wants to have inventory, but everybody wants a product there when they want it." – Joe Chernay, Vice-President of Manufacturing and Technology, Bayer Corporation

Procurement and manufacturing costs and decisions in LINKS are described in this chapter. While no procurement decisions are required in the LINKS Multi-Channel Management Essentials 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 Multi-Channel Management Essentials 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

	Cost	Delivery	Failure
Gamma	$17	100%	5.1%
Delta	$19	100%	6.9%
Epsilon	$24	100%	4.8%

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 as customers use their set-top boxes. Within the warranty period for 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)

Hyperware	Fixed Costs (per order)	$67,500
	Labor Costs (per unit)	$30
	Production Costs (per unit)	$20
Metaware	Fixed Costs (per order)	$73,500
	Labor Costs (per unit)	$36
	Production Costs (per unit)	$16

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 and scheduled product shipments to other DCs 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 particular channel and region, the unfilled orders associated with that product in that particular channel and region are completely lost. They will not shift to another product, even your own dropped product still actively distributed in another channel in that region.
- 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.

The definition of unfilled orders varies by channel. For a direct channel (like channel #2), an unfilled order to an end-user customer is the same as an unfilled order to the manufacturer. However, for an indirect channel (like channel #1), inventory buffer stock routinely maintained by retailers complicates the interpretation of unfilled orders. If retailers order 1,000 units from a manufacturer but that manufacturer is only able to fill 600 units of that order, this represents 400 units of unfilled orders to the manufacturer. However, this doesn't necessarily mean that retailers have unfilled orders from end-user customers. If the 600 units of the retailers' manufacturer-order yield sufficient on-hand retailer inventory to permit all end-user customer orders to be filled, then there are no unfilled orders as far as retailers are concerned. (In this case, retailers' ending inventory level would be below the desired level, which presumably would lead to increased orders in the following quarter to meet expected end-user customer demand plus inventory restocking targets.) With the buffering nature of retailer inventory, there could be no industry-wide unfilled orders but individual manufacturers could still have unfilled orders in channel #1.

If dealers stockout, they will reorder in anticipation of future (continuing) rising demand above current sales levels, as well as having to account for their (i.e., dealers') desired inventory levels in the future. These are the total unfilled orders that manufacturers see arising from channel #1. Industry-wide unfilled orders, as reported in Research Study #12, reference actual final end-user customer stockouts now (not in the future). Note, too, that since industry-wide unfilled orders are customer-based, industry-wide unfilled order estimates presumably are based on customer surveys. Such survey-based estimates contain some statistical noise as well as reflecting the potential for biases in customer surveys, especially if there are lots of customers who encountered stockout situations. Thus, even a thoughtful/rational survey respondent might claim to have wanted to buy and encountered a stockout situation, to encourage manufacturers to have more plentiful inventory, especially when no contractual purchase commitment is required within the survey.

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

Firm	

Quarter	

Manufacturing Decisions	Product 1	Product 2	Product 3	Product 4
Production				

***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.*

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).

Chapter 6: Distribution Decisions

LINKS distribution decisions include whether to have distribution centers (DCs) in regions other than your home-base (i.e., region 1) and, if so, the form of those DCs (outsourced or owned). For each DC, you also face a decision related to how RFID-application occurs for products distributed through the retail channel (channel #1). In addition, if you have a regional distribution center, you must choose an emergency carrier for plant-DC shipments for regions with a distribution center.

Distribution Center Decisions

While you must always have an owned DC in region 1, you may or may not wish to have DCs in other regions. Even if you choose not to have a distribution center in a market region other than market region 1, you can still have sales in that market region if you choose to have products in active distribution in any channel in that market region. Such sales would be serviced directly from your distribution center in market region 1, where your firm must always have an owned distribution center.

With a distribution center in a market region, transportation of finished goods to customers from a regional DC is via surface transportation. Otherwise, air transportation is required to ship finished goods from the distribution center in market region 1 to customers in other regions without a local distribution center.

Three distribution center decision options exist in regions other than market region 1. In market region 1, you always own your distribution center. In region 1, your distribution center is located adjacent to your manufacturing plant. The distribution center decision options, along with their cost consequences, are as follows:

- Decision Option "0" (don't have a distribution center): No distribution center costs exist.
- Decision Option "1" (outsourced third-party distribution center): By using a third-party logistics strategy, your firm outsources your regional distribution center to a reputable partner in any market region. Outsourced distribution centers involve one-time costs of $100,000 to open an outsourced distribution center, $50,000 in one-time costs to close an outsourced distribution center, $50,000 in quarterly costs as long as your firm has an outsourced distribution center in any region, and inventory charges of 5% based on the inventory value at any outsourced distribution center. These one-time costs of $100,000 are incurred to open any outsourced distribution center or to convert any owned distribution center to outsourced status.
- Decision Option "2" (operate owned distribution center): In operating your own distribution centers, your firm incurs one-time costs of $250,000 to open an owned distribution center in any market region, $150,000 in one-time costs to close any owned distribution center, $25,000 in quarterly costs as long as your firm owns a regional distribution center, and inventory charges of 3% based on the inventory value at owned regional distribution centers. These one-time costs of $250,000 are incurred to open any owned distribution center or to convert any outsourced distribution center to owned status.

Inventory costs are recorded under "Inventory Charges" on your "Corporate P&L Statement" and other distribution costs are recorded under "Distribution FC" on the "Corporate P&L Statement."

Your firm either has no DC or your firm has one DC in a region. Your firm never has more than one DC in a region. The DC status code "2" denotes an owned DC in a region, not two DCs in that region.

DC-openings and DC-conversions (from outsourced to owned or from owned to outsourced) occur immediately (i.e., at the start of the next quarter). In DC-conversions, existing inventory is automatically transferred to the new DC.

The LINKS software automatically disposes of any residual inventory of finished goods when a DC is closed. The inventory is converted to cash at the current balance-sheet values and a corresponding disposal cost of 20% of the inventory's value accrues. This disposal cost is recorded under Consulting Fees on the firm's P&L statement. An appropriate disposal-sale message appears at the end of the firm's financial statements.

RFID-Application For Retail-Channel Sales

A recent development in the set-top box industry has increased your costs associated with selling through the indirect channel (i.e., channel #1). Retailers of set-top box products now require that your products be equipped with RFID (radio-frequency identification). Compared to bar codes, radio tags can carry more information about products, can be scanned more rapidly, and can be located easily even if they are hidden in cartons or behind other products. RFID is seen as the long-term successor to bar codes throughout the retail industry.

RFID is applied to your outbound set-top box products at your distribution centers. Only products being distributed to the retail channel (i.e., channel #1) require RFID-application.

At each distribution center, you have two choices with regard to how RFID is included on your set-top box products sold through the indirect (retail) channel.

- Decision Option 0 (outsourced RFID-application): Your current practice is to outsource RFID application to a reputable vendor in each market region in which you have a distribution center. Outsourcing adds $11 in variable costs to all of your set-top box products sold through the retail channel (i.e., channel #1).
- Decision Option 1 (insourced RFID-application): You can insource the provision of RFID for products sold through the retail channel. Insourcing incurs a one-time investment of $1,000,000 (for capital equipment purchases, process reorganization, and staff retraining) and reduces the variable costs to $1 for all set-top box products sold through the retail channel (i.e., channel #1). The one-time investment of $1,000,000 is recorded under "Consulting Fees" on your corporate profit-and-loss statement.

Note that there is no re-sale market for used RFID equipment. Therefore, you would not be able to recapture any part of the one-time $1,000,000 investment in RFID insourcing at any distribution center if you subsequently choose to close that distribution center.

Your RFID decision is specific to each distribution center. Thus, you may choose to insource at some DCs and outsource at other DCs, as you wish.

RFID insourcing is only possible if you already have (or simultaneously open) a DC in a region. With no DC in a region, your set-top box products must be sourced from DC1 and your RFID status at DC1 will be in effect for your retail-channel sales in other regions without a local DC.

Emergency Carriers For Plant-To-DC Shipments

You must choose an emergency carrier for each of your DCs (other than DC1). This emergency carrier for each DC (other than DC1) is used for plant-to-DC transportation shipments required on an emergency basis. Your emergency carrier choices are recorded on the Distribution Decisions form, since these decisions are specific to each DC.

Distribution Decisions Form

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

Distribution Decisions

Firm		Quarter	

Distribution Decisions	Region 1	Region 2	Region 3
DC? {**0**=none | **1**=outsourced | **2**=owned}			
RFID-Application? {**0**=outsourced|**1**=insourced}			
Emergency Carrier? {**I**|**J**|**K**|**L**|**M**|**N**}			

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 7: Transportation Decisions

This chapter details the transportation decisions for which you are responsible in LINKS: transportation mode choice (surface and air) and carrier selection for finished goods shipments from your plant to your distribution centers (DCs). Surface transportation is generally less expensive and less reliable than air transportation. Mode choice (surface and air) and carrier selection in LINKS revolve around explicit trade-offs between cost and performance.

Damage rates are comparable and relatively low across set-top box industry carriers. Carriers are contractually responsible for damages arising in goods under their care. If carriers accept a shipment from a manufacturer, then they are responsible for it throughout the shipment journey. Thus, damage is not a major consideration in your LINKS transportation decisions.

Transportation Responsibilities

Different kinds of transportation decisions are required in different parts of your supply chain.

- **Plant-To-DC Shipments**: Manufacturers are responsible for all transportation decisions related to within-firm shipments of finished goods from manufacturing plants to DCs. Transportation decisions include mode choice (surface and air) for carriers I, J, K, L, M, and N. Cost and operating details are provided in this chapter.
- **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, 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, these 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.

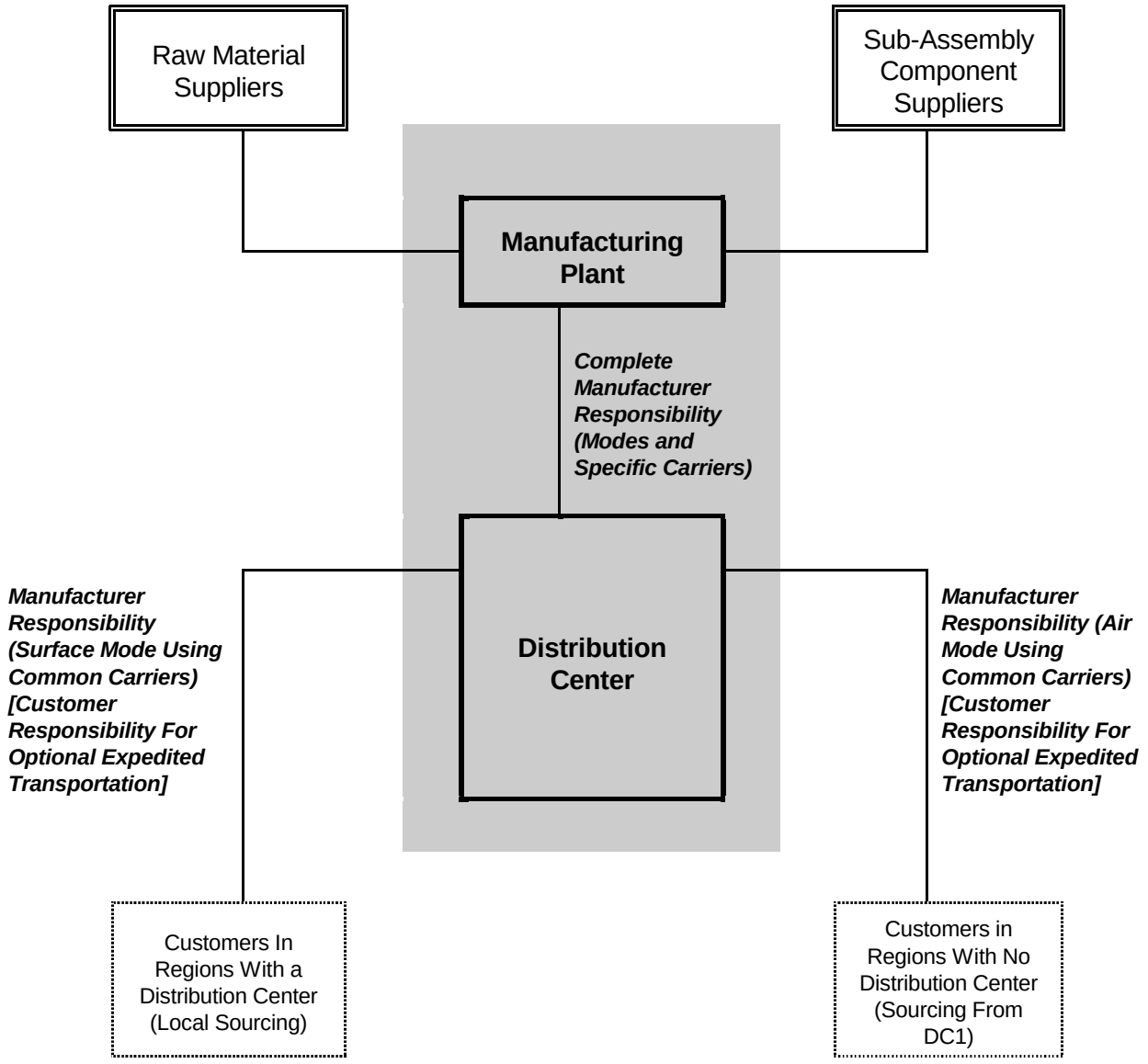
Exhibit 7 summarizes the roles of transportation throughout the set-top box industry supply chain. Some transportation decisions are the responsibility of suppliers, others are shared between suppliers and manufacturers, and still others are the manufacturer's responsibility.

Plant Shipments To Distribution Centers

Your regional distribution center in region 1 is located adjacent to your manufacturing plant, so there are no transportation costs associated with shipments of products to your distribution center in market region 1. For all other market regions, transportation decisions are required to ship your products to regional distribution centers. You make shipment volume decisions across two possible transportation modes (surface and air) and six possible carriers (I, J, K, L, M, and N).

Based on past experience, 100% of air-shipped finished goods arrive at regional DCs to meet

Exhibit 7: Transportation Responsibilities



Notes: Transportation responsibilities in the set-top box industry are indicated by the bolded and italicized text at each supply chain linkage point where transportation activity occurs. The set-top box manufacturer's supply chain management responsibility domain is shaded. Recall that set-top box manufacturers both manufacture and manage distribution centers in the set-top box industry.
current-quarter orders. This 100% delivery reliability is a major advantage of air transportation. Of course, air transportation does have a cost premium over surface transportation.

Based on past experience, an average of about 80% of surface transported volume arrives at regional DCs in time to meet current-quarter orders. The range of surface transported production

volumes received within the current quarter varies from about 50% to 100%. Surface- transported finished goods volume that does not arrive within the current quarter always arrives by the end of the current quarter and is, therefore, available for meeting orders in the following quarter.

Current transportation costs per unit between your manufacturing plant and your regional DCs are shown in Exhibit 8. Note that these transportation costs are identical for all set-top box products (i.e., for hyperware and metaware products).

The delivery rates in Exhibit 8 are averages; the range of delivery rates is plus or minus 10% around these means. "100%" delivery reliability for air transportation reflects the certainty of delivery within the current quarter for air transportation for plant-to-DC shipments.

FYI: Surface Transportation Delays

"In many parts of the world, the transportation infrastructure is relatively undeveloped or congested. Imagine, for example, sourcing product from a factory in Wuhan, China for retail sale within the US. After manufacture, the product may travel by truck, then by rail, by truck again, and then be loaded at a busy port; and it may repeat the sequence of steps (in reverse order) within the US. At each stage the schedule may be delayed by congestion, bureaucracy, weather, and road conditions."

Source: John J. Bartholdi and Steven T. Hackman, **Warehouse & Distribution Science** (Atlanta: Georiga Institute of Technology, 2010), p. 5.

Occasionally, carriers have limited available space and are unable to offer any shipping services in a particular quarter. This might arise due to prior contractual obligations, seasonal forces, or environmental developments (e.g., strikes, equipment limitations, etc.). Set-top box manufacturers that already have an on-going relationship with a carrier (i.e., firms that used a carrier last quarter) receive preferential treatment as existing customers and, therefore, are normally unaffected by spot-market unavailability conditions with such carriers. If your specified carriers are unavailable in any quarter, carrier N will be used. Carrier N has an unblemished past record of availability and is the well-recognized carrier-of-last-resort in the set-top box industry.

Carriers offer a 20% rebate on the current quarter's transportation charges if they are used exclusively in a quarter. Shipments from your manufacturing plant to all DCs may be divided between surface and air, but the 20% rebate only accrues if all plant-to-DC shipments (**including emergency shipments**, if any) are via a single carrier. The "Transportation Rebates" is recorded on your "Corporate P&L Statement."

You must also choose an emergency carrier for each of your DCs (other than DC1). This emergency carrier for each DC (other than DC1) is used for plant-to-DC transportation shipments required on an emergency basis. Your emergency carrier choices are recorded on the Distribution Decisions form, since these decisions are specific to each DC.

Exhibit 8: Plant-To-DC Transportation Shipments

	Region 1		Region 2		Region 3	
	Cost	Delivery	Cost	Delivery	Cost	Delivery
Carrier I, Surface			$6	70%	$10	70%
Carrier I, Air			$8	100%	$14	100%
Carrier J, Surface			$4	40%	$4	30%
Carrier J, Air			$10	100%	$14	100%
Carrier K, Surface			$6	70%	$6	60%
Carrier K, Air			$8	100%	$14	100%
Carrier L, Surface			$8	75%	$6	60%
Carrier L, Air			$10	100%	$14	100%
Carrier M, Surface			$6	65%	$8	75%
Carrier M, Air			$8	100%	$16	100%
Carrier N, Surface			$10	82%	$12	78%
Carrier N, Air			$12	100%	$18	100%

Note: Since your manufacturing plant is located adjacent to your DC in region 1, there are no transportation costs associated with shipments from your manufacturing plant to DC1, and delivery reliability is always 100%.

Distribution Center Shipments To Customers

Your firm is responsible for covering all costs associated with shipping your products from your DCs to your customers, to retailers in the retail channel and to end-users in the direct channel.

- If your firm has a distribution center in a market region, then that distribution center is used to service all orders for set-top boxes. Your firm's policy is to ship by surface transportation when you have a within-region distribution center. Occasionally, customers may request expedited shipment, but the custom in the set-top box industry is for customers to pay any incremental shipping charges above surface transportation rates.
- If your firm does not have a distribution center in a market region, then the distribution center in market region 1 (i.e., the distribution center associated with your manufacturing plant) must service such an order. Your firm's transportation policy is to ship via air in such situations, to ensure prompt delivery to customers within the current quarter.

The transportation costs associated with various customer shipments are shown in Exhibit 9. Note that the costs associated with shipping to customers in direct channels (channel 2 [“Direct”] and channel 3 [“Major Accounts”]) are higher than the retail channel (channel 1), since direct-channel customers normally are ordering in much smaller quantities than the bulk shipments to retailers. The cost of shipping replacement parts to end-users is 50% of the cost associated with

shipping finished products to customers.

Exhibit 9: Customer Shipment Transportation Costs (Per Unit)

	Within-Region Surface Transportation Costs			Sourcing From Plant/DC1 With No Within-Region DC		
	Channel 1	Channel 2	Channel 3	Channel 1	Channel 2	Channel 3
Market Region 1	$4	$8	$6			
Market Region 2	$6	$12	$8	$18	$28	$22
Market Region 3	$8	$16	$12	$26	$36	$30

Outbound Shipments

If the Exhibit 8 and Exhibit 9 data are combined, the total transportation costs for outbound shipments may be determined for any choice of plant-to-DC carrier. The total transportation costs for "outbound shipments" refers to finished goods transportation costs from the manufacturing plant to the customer, either through the "local" DC if one exists or directly from the plant/DC1 to regions where no "local" DC exists. Exhibit 10 contains the relevant calculations for a sample carrier, carrier I. Alternative calculations would follow for other plant-to-DC carriers.

- In all cases, total transportation costs for "air to DC" shipping for plant-to-DC shipping exceed "surface to DC" shipping.
- In all cases, total transportation costs are less when a "local" DC exists than when air sourcing is required from the plant/DC1 because no "local" DC exists. Of course, this variable cost advantage for having a "local" DC does not take into account the fixed costs of operating DCs and the incremental management effort required to manage a more complicated supply chain.
- In all cases, channel 1 total transportation costs are less than channel 2 total transportation costs, reflecting the relative costliness of shipping to individual (direct) customers purchasing single units of set-top boxes.

Emergency Transportation Shipments

LINKS calculates inventory requirements at DCs in the first instance assuming that all potential demand can be met. This can lead to "tentative" emergency shipments created from DC1 to other regions. Remaining excess demand over available inventory results in unfilled orders. Then, for example, if total worldwide unfilled orders represent 28.35% of total potential demand,

all shipments including "tentative" emergency shipments are reduced by 28.35% to reflect the unfilled orders situation.

Exhibit 10: Sample Calculations of Plant-DC-Customer Total Transportation Costs For Channels 1 and 2

	Channel 1			Channel 2		
	"Local" DC		Air Sourced From Plant/DC1	"Local" DC		Air Sourced From Plant/DC1
	Surface To DC	Air To DC		Surface To DC	Air To DC	
Region 1	**4**			**8**		
Region 2	6+6=**12**	8+6=**14**	**18**	6+12=**18**	8+12=**20**	**28**
Region 3	10+8=**18**	14+8=**22**	**26**	10+16=**26**	14+16=**30**	**36**

Notes: These total transportation costs reflect the sum of the cost of shipping finished goods from the plant/DC1 to the regional DC plus the cost of shipping finished goods to the final customer from the regional DC. With sourcing from plant/DC1 (when there is no "local" DC), the former cost is, of course, zero. These sample total transportation cost calculations reference carrier I for plant-to-DC shipments.

Intuitively, this situation is interpreted as follows. With unfilled orders occurring within a quarter, the regular (planned) surface and air transportation system is overwhelmed by unfilled orders. Surface and air transportation must be planned ahead of time, presumably on a more-or-less regular basis throughout the quarter (e.g., regular weekly shipments). With unfilled orders occurring during the quarter, (unplanned) emergency shipments have to occur immediately to meet on-going unfilled orders. This can result in regular surface and air transportation shipments being converted to emergency shipments, with a corresponding reduction in the original amounts of the regular surface and air transportation shipments.

Emergency transportation shipments to a regional DC cost 50% more than the current air transportation costs of your designated regional emergency carrier.

Transportation Decisions Form

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

Transportation Decisions

Firm		Quarter	

Plant Shipments To DC2	Carrier I	Carrier J	Carrier K	Carrier L	Carrier M	Carrier N
Product 1, Surface						
Product 1, Air						
Product 2, Surface						
Product 2, Air						
Product 3, Surface						
Product 3, Air						
Product 4, Surface						
Product 4, Air						

Plant Shipments To DC3	Carrier I	Carrier J	Carrier K	Carrier L	Carrier M	Carrier N
Product 1, Surface						
Product 1, Air						
Product 2, Surface						
Product 2, Air						
Product 3, Surface						
Product 3, Air						
Product 4, Surface						
Product 4, Air						

***Notes**: Residual inventory (inventory not explicitly shipped to another DC) is automatically "shipped" from your plant to your adjacent DC in region 1, with no associated shipment costs.*

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 transportation 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).

Chapter 8: Service Decisions

Rather than actively managing service, service is outsourced in the LINKS Multi-Channel Management Essentials Simulation. Service outsourcing is provided by reputable call-center service providers in each region and is region-specific.

- Your firm's policy is to use the "Standard" level of outsourcing, with the following per-call costs and associated guaranteed service quality performance levels ("SQ Guarantee"): $10, $12, and $13 per call in regions 1, 2, and 3, respectively with a 20% service quality guarantee.
- These "SQ Guarantees" are long-run averages. Service-center outsourcers guarantee that perceived service quality won't vary by more than 3% from these averages in any month. Costs for call-center service outsourcing are reported as "Service Outsourcing" on your financial and operating reports.

Chapter 9: Generate Demand Decisions

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

Channel Decisions

> *"Channel selection ultimately boils down to three factors: (1) identifying channels that are well suited to customers' buying behaviors and needs; (2) ensuring that there is a good fit between those channels and a set of products and services; and, (3) determining which of those channels offers the most favorable economics."* – Lawrence G. Friedman and Timothy R. Furey, ***The Channel Advantage*** (Butterworth Heinemann, 1999), p. 76

There are three sales channels within LINKS market regions: retail, direct (e-commerce), and major accounts.

- **Channel 1 is a retail channel.** The retail channel serves individual consumers who purchase set-top boxes for home use and businesses with set-top box needs. Retailers stock set-top boxes, along with an array of other similar and complementary electronic products. Retailers provide point-of-purchase support for in-person shoppers.
- **Channel 2 is a direct channel.** In the direct channel, firms sell set-top boxes directly to final customers via an e-commerce channel. Since your firm sells to final consumer and business-to-business end-users in the direct channel, the price in the direct channel is the final price paid by customers.
- **Channel 3 is a major accounts channel.** Major account channels represent bulk sales of multiple units (at least ten units per sales transaction) to corporations, organizations, and government agencies. Prices in the major account channel are normally lower than those in the retail and the direct channels, due to the bulk sales character of major accounts.

FYI: Dell's Direct-Channel Strategy

- Sell what you have: Use day-to-day pricing and incentives to shift demand.
- Minimize stock: Carry less than four days of inventory (many companies routinely carry 30 days or more).
- Ensure extremely crisp product lifecycle transitions.
- Leverage real-time customer feedback and market insights.
- Control pricing on a real-time basis.

Source: William Copacino and Jonathan Byrnes, "How To Become a Supply Chain Master," ***Supply Chain Management Review*** (September/October 2001).

Alternative distribution channels tap into common and distinct customers, so the channels partially compete with each other. Some customers will only purchase a set-top box product if it's available in their preferred distribution channel. Other customers will purchase set-top box products from any of the available channels (with channel preferences possible, to be sure), to the extent that multiple channel options are available. These latter customers will, of course, shift some of their purchases away from existing channels and toward new channels, as new channels become available.

One other source of sales for new channels is channel-captive customers. Channel-captive customers have not purchased in the past due to the absence of products being sold via their strongly preferred channel, the channel to which they are captive. Markets can grow (i.e., total category sales volume can increase) as firms open new channels, since captive customers in non-available channels do not purchase any products unless those products are available in the preferred channel.

Differential order processing costs accrue for sales in these three channels. In all regions, these order processing costs are $4/unit, $24/unit, and $12/unit in channels 1 ("Retail"), 2 ("Direct"), and 3 ("Major Accounts"), respectively.

Price Decisions

"Price is what you pay. Value is what you get." – Warren Buffett

You set prices for each of your products that are actively distributed in each market region and channel. The retail channel price is the bulk-rate price for all units purchased for resale by retailers. The custom in the set-top box industry is to quote a single price regardless of order volume.

You do not control final selling prices in the retail channel. Rather, your manufacturer price is marked up by some percentage amount by retailers in the various market regions. You will need to consult current research studies to determine average retailer prices for your products in the various market regions. In the direct channels, you do control your final selling prices since you're selling direct to final customers.

You must take potential cross-channel competition into account in your price setting. If you sell a product in multiple channels in a market region, some customers will inevitably seek out the lower-priced channel to purchase preferred brands.

FYI: Price Cuts and Profits

Here are some estimates of the impact on operating profit of a 1% reduction in price, **assuming no change in volume or costs**:

- Food and drug stores: -23.7%
- Airlines: -12.9%
- Computers, office equipment: -11.0%
- Tobacco: -4.9%
- Semiconductors: -3.0%

Across all industries, the average decrease in operating profit from a 1% price decrease was 8.0%, assuming no change in volume or costs.

Source: McKinsey & Co., cited in Janice Revell, "The Price Is Not Always Right," ***Fortune*** (May 14, 2001), p. 110.

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, categories, and channels. The specific price sensitivities in the markets, categories, and channels 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. More importantly, it's 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.[1]

- 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 channel 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.[2] For example, a $75 change in price on a product with revenues of $4,500,000 in a particular channel and 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.

Price wars are often initiated by thoughtless price manipulations by naive managers who assume that competitors won't notice, won't respond, or respond ineptly. To provide a fact-based approach for making pricing decisions, please refer to the "Pricing Worksheet" on the following page. Complete this "Pricing Worksheet" anytime you're planning to reduce prices. Review the worksheet details with your teammates. After this review, go ahead with the price decrease if you really think that it's appropriate. Review this "Pricing Worksheet" again after you receive next quarter's financial results to verify whether your assumptions and predictions were reasonable.

[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 channel and region. No price change costs accrue for price changes for a product as it is being introduced into a channel and region (i.e., it was inactive in that channel and region in the last quarter).

Pricing Worksheet

This pricing worksheet is designed to provide an analysis framework anytime you are contemplating decreasing prices within LINKS.

Complete the "Before" columns and review the "Before" columns with your team members. Complete the "After" column with actual data from the next quarter, after the results are available. Review the before-after comparison with your team members.

Firm		Product		Region		Channel		Quarter	

		Before Action Analysis, Review, and Forecast		After Action Review
		Last Quarter, Actual	Next Quarter, Predicted	Next Quarter, Actual
	Industry Sales Volume [units]			
*	Volume Market Share [%s]			
=	Sales Volume [units]			
*	Manufacturer Price [$]			
=	Revenue [$]			
-	Variable Costs [$]			
=	Gross Margin [$]			
-	Fixed Costs [$]			
=	Operating Income [$]			

Marketing Spending Decisions

"Advertising is what you do when you can't go see somebody." – Fairfax Cone

A marketing spending budget is required for each set-top box product in each market region and channel. This budget is managed by the relevant region and channel 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 and channels.

Marketing spending is thought to increase customer demand for set-top box products in all market regions and channels. Past industry practice has been to budget at least $50,000 per quarter in marketing spending in all market regions and channels 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.

FYI: Marketing/Sales Ratios

Marketing expenditures typically range between 10% and 20% of sales revenues. The ratios are highest for businesses with high gross profit margins. Sales force/sales ratios average three times advertising/sales ratios. Business-to-business (B-to-B) typically spend five to six times as much on sales force budgets as advertising, while spending only about half as much on total marketing as a percentage of sales as do business-to-consumer (B-to-C) businesses. Both B-to-B and B-to-C spend more on marketing/sales when selling new products, products purchased in low dollar amounts, and more frequently purchased products.

Source: Paul Farris and Gary L. Lilien, "Marketing/Sales Ratios," in Dominique M. Hanssens (Editor), ***Empirical Generalizations About Marketing Impact: What We Have Learned From Academic Research*** (Cambridge, MA: Marketing Science Institute, 2009), p. 94.

Since the channels overlap to an extent, marketing spending in one channel of a market region will have some spillover in influencing customers in the other channel. Advertising, for example, targeted at individual consumers will have some spillover to businesses that normally purchase in the direct channel. Marketing efforts are not normally targeted to reach only those customers in a particular channel.

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

Introduction/Drop Decisions

You may introduce products into regions or channels not currently active or drop products from regions or channels as you see fit. Introduction incurs a one-time cost of $750,000 in channel #1 in any region and $250,000 in any other channel in any region.[3] Dropping a product from active

[3] The higher per-channel introduction costs in channel #1 reflect slotting fees and allowances in the retail channel. Slotting fees and allowances are the up-front, one-time, lump-sum payments from set-top box manufacturers to retailers to obtain new product distribution in the retail channel. For a discussion and analysis of retail-channel slotting fees, see Paula Fitzgerald Bond, Karen Russo France, and Richard

distribution in a region or channel incurs no special costs. Introduction costs are recorded under "Introductions" on your financial statements.

If you wish to "activate" a product in a channel/region, you must issue a specific introduction decision. Change the "Active Product?" status to "Yes" to introduce a product into a specific channel and/or region. To drop a product from active status in a channel or region, change its "Active Product?" status to "No." **You only have to introduce a product into a channel/region once. Once a product is active in a channel/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 channel and/or 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 and channel.

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

Your firm has a policy of limiting simultaneous new product-region-channel launches to a maximum of three in any quarter. For example, if you choose to launch a product in all three channels of a region, that action represents a total of three new launches and no other launches would be possible in that quarter in that region, or in any other combinations of channels and regions. A reconfiguration isn't a launch if that product is already actively distributed in a channel or a region. However, if you reconfigure a product and launch (introduce) it into two channels in one region and one channel in another region, that represents three new launches and no other launches would be possible in that quarter.

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.

Generate Demand Decisions (1)

Firm	

Quarter	

Product 1, Channel 1	Region 1	Region 2	Region 3
Active Product? {**Yes**|**No**}			
Price			
Marketing Spending			

Product 1, Channel 2	Region 1	Region 2	Region 3
Active Product? {**Yes**|**No**}			
Price			
Marketing Spending			

Product 1, Channel 3	Region 1	Region 2	Region 3
Active Product? {**Yes**|**No**}			
Price			
Marketing Spending			

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).

Generate Demand Decisions (2)

Firm	

Quarter	

Product 2, Channel 1	Region 1	Region 2	Region 3
Active Product? {**Yes**|**No**}			
Price			
Marketing Spending			

Product 2, Channel 2	Region 1	Region 2	Region 3
Active Product? {**Yes**|**No**}			
Price			
Marketing Spending			

Product 2, Channel 3	Region 1	Region 2	Region 3
Active Product? {**Yes**|**No**}			
Price			
Marketing Spending			

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

This chapter provides details about the forecasting decisions for which you are responsible within LINKS: short-term sales volume forecasts for all products/channels/regions for the next quarter.

Forecasting prowess reflects understanding of the generate demand drivers of any business. In LINKS, quarterly sales volume forecasts are required for each channel's sales of 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, $360,000/quarter, and $300,000/quarter per product in channels 1, 2, and 3, respectively, in all market regions.

Sales volume forecasting decisions are independent of your procurement and production decisions. Sales volume forecasting decisions are your best estimates of customer demand. Of course, your actual procurement and production decisions will be based on additional factors, such as fixed order costs and target inventory levels.

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

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

Forecasting Decisions

Firm		Quarter	

Short-Term (i.e., Next Quarter) Sales Volume Forecasts, Product 1	Region 1	Region 2	Region 3
Product 1, Channel 1			
Product 1, Channel 2			
Product 1, Channel 3			

Short-Term (i.e., Next Quarter) Sales Volume Forecasts, Product 2	Region 1	Region 2	Region 3
Product 2, Channel 1			
Product 2, Channel 2			
Product 2, Channel 3			

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

There are no information technology decisions in the LINKS Multi-Channel Management Essentials Simulation.

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.

Firm Name

"A rose by any other name would smell as sweet." – William Shakespeare

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.

Other Corporate Decisions

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.

Other Corporate Decisions Form

"Do or do not. There is no 'try'." – "Yoda" (The Empire Strikes Back)

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

Other Corporate Decisions

Firm	

Quarter	

Firm Name {max of 40 characters}	

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 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 12-15 decompose net income into its underlying components.

In Exhibit 12, the principal drivers of net income are revenues and costs. Taxes and non-operating income play lesser roles. Exhibit 13 provides a breakdown of the drivers of volume, one of the two key drivers of revenues. Exhibit 14 provides further details about the drivers of availability perceptions. Exhibit 15 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.

Corporate P&L Statement

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 for specific channels.

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

- Administrative overhead ("Administrative O/H") is $240,000/quarter, $360,000/quarter, and $300,000/quarter per product in channels 1, 2, and 3, respectively, in all market regions.

Exhibit 12: Net Income Drivers in LINKS

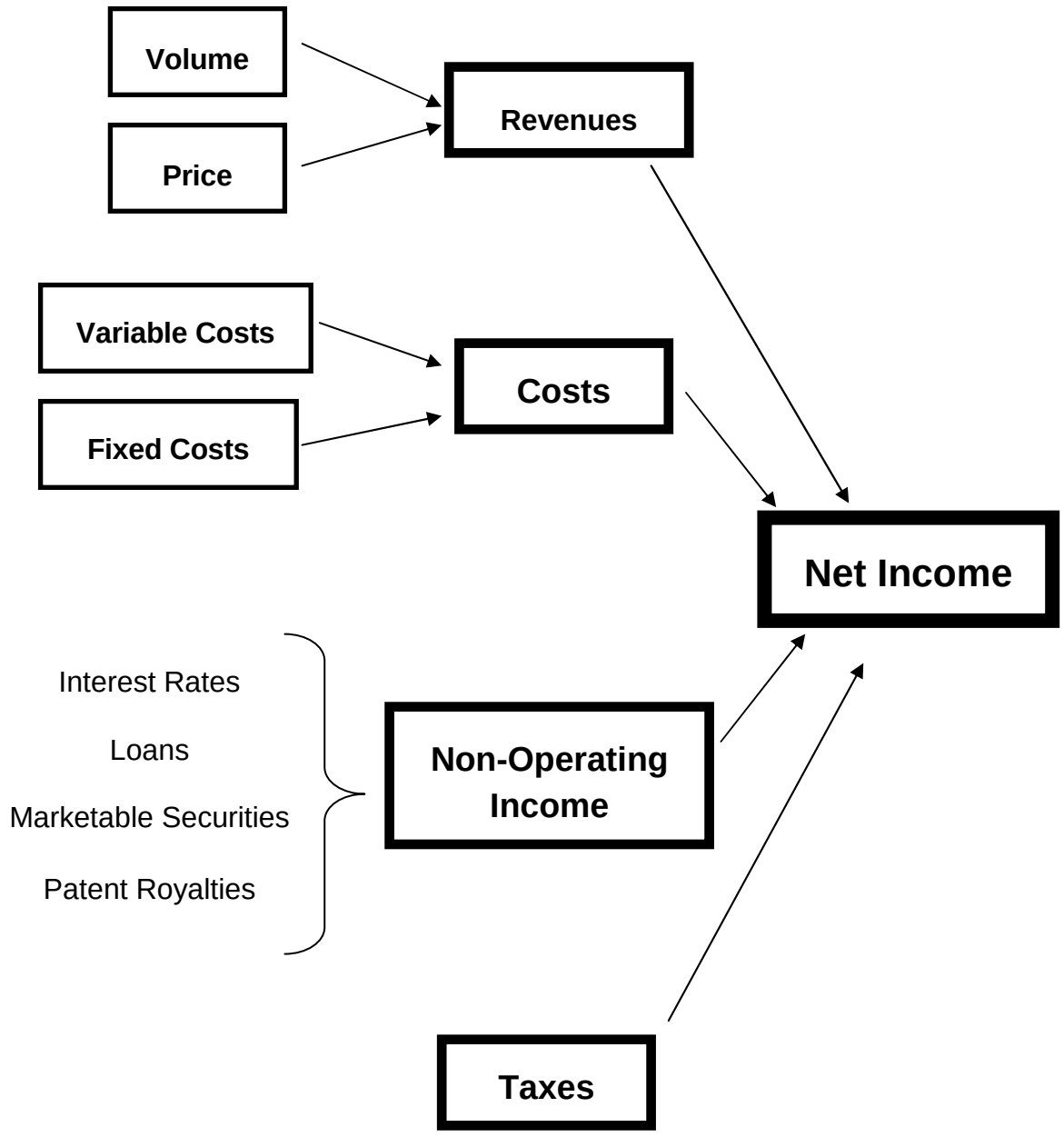


Exhibit 13: Volume Drivers in LINKS

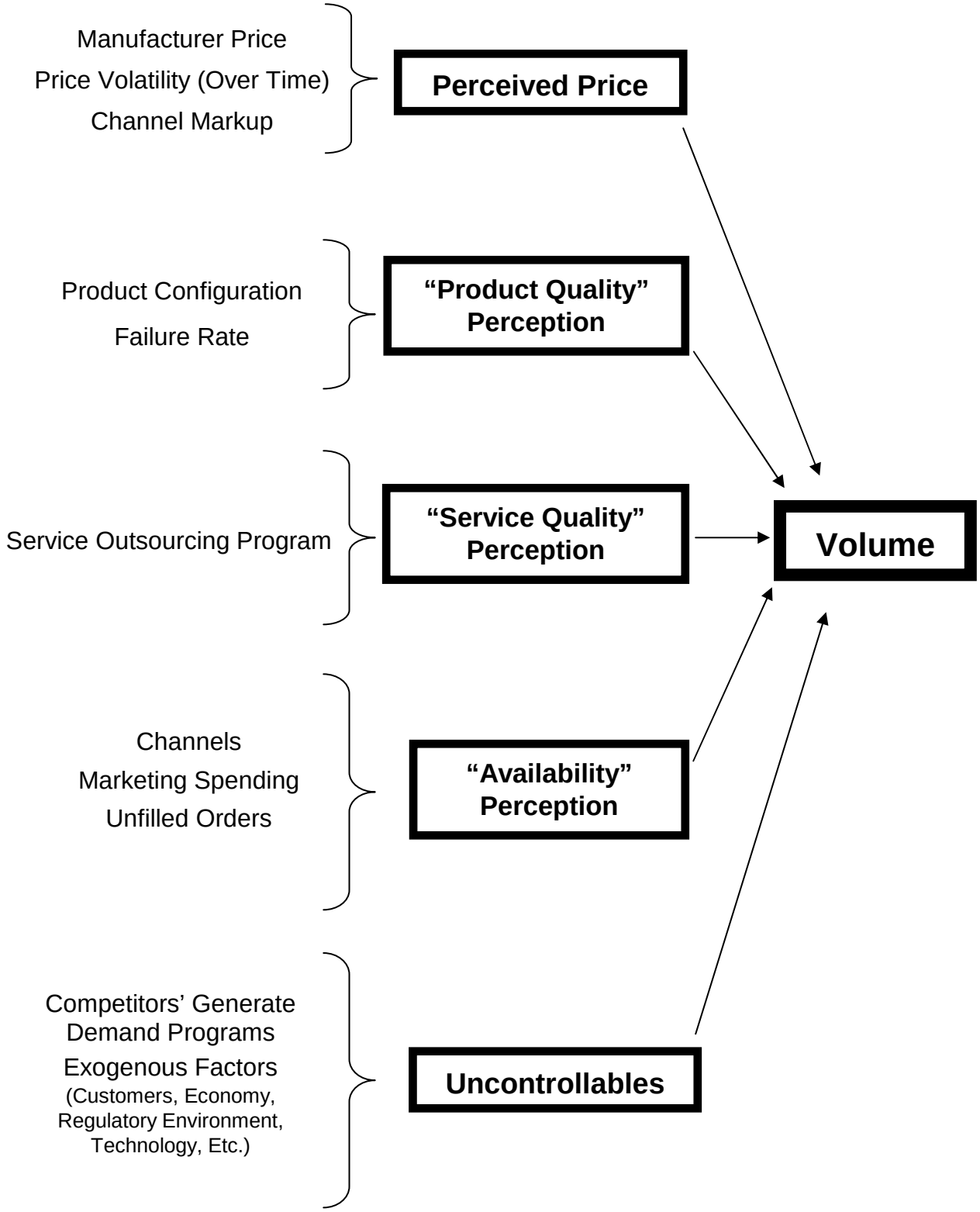


Exhibit 14: Availability Perception Drivers

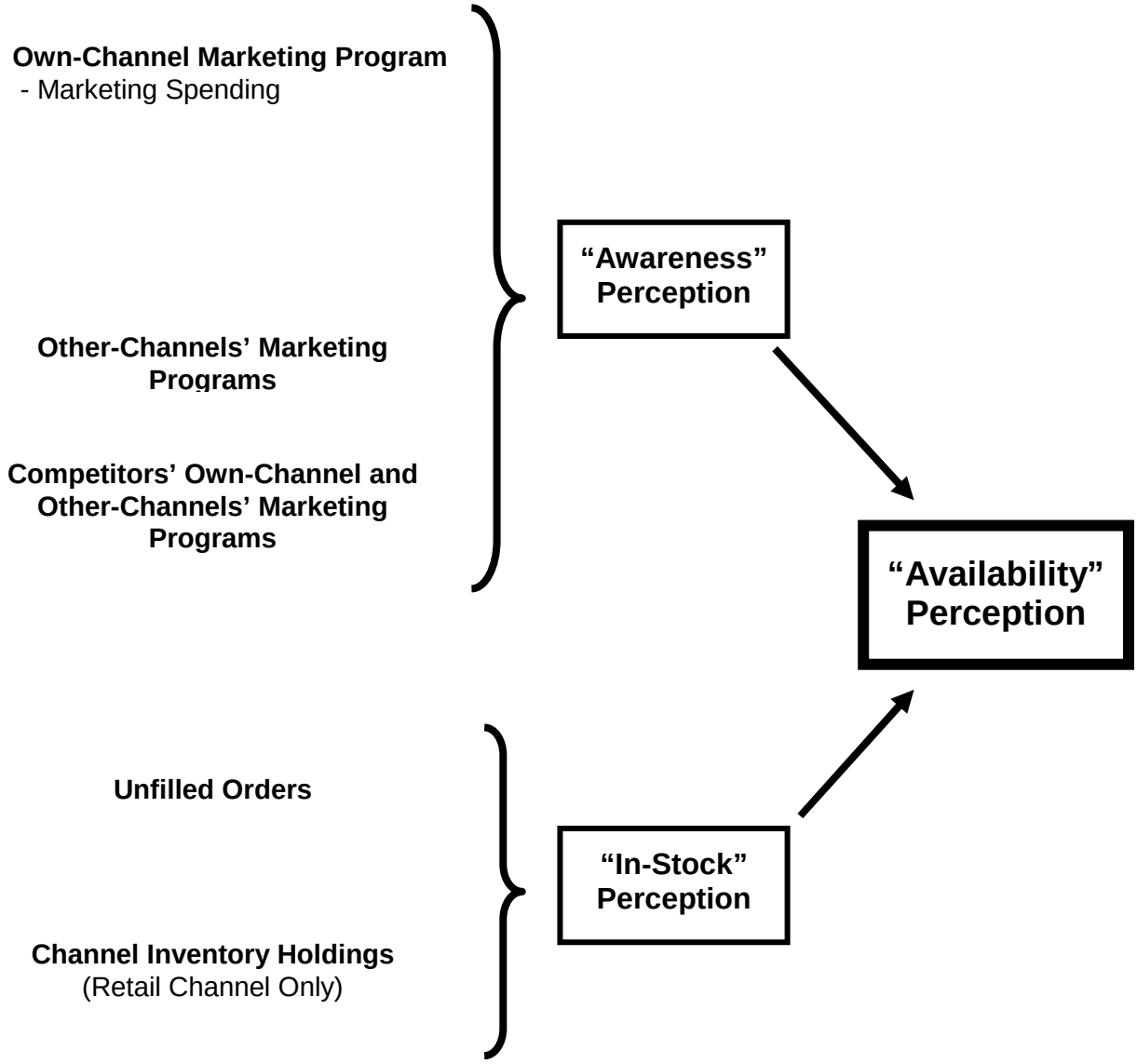
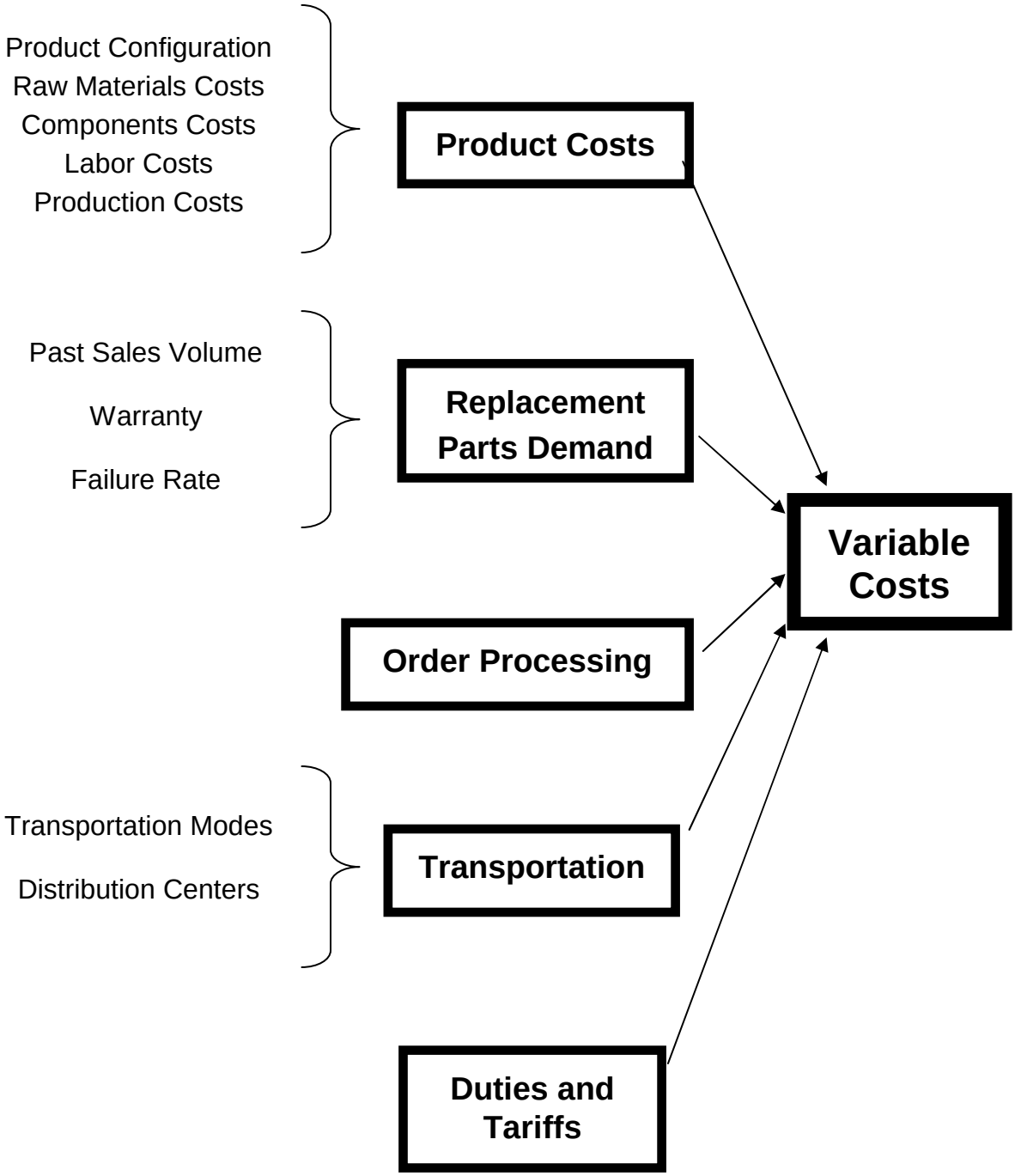


Exhibit 15: Variable Cost Drivers in LINKS



- "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.
- "Distribution FC" reflects the fixed costs associated with operating distribution centers.
- "Duties & Tariffs" are a percentage of the average selling price for finished goods (across all channels) 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 plus research studies. 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 or channels.
- 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 and 5% per quarter for outsourced distribution centers 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" records the channel-specific order processing cost. In all regions, these order processing costs are $4/unit, $24/unit, and $12/unit in channels 1 ("Retail"), 2 ("Direct"), and 3 ("Major Accounts"), respectively.
- "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.
- "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.
- "Unfilled Handling" costs are the unfilled orders handling 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.

Historical Corporate P&L Statement

The "Historical Corporate P&L Statement" reports the previous and current quarter's corporate-level profit-and-loss data. In addition, all elements in the "Historical Corporate P&L Statement" are expressed in percentage-of-revenue terms.

Product P&L Statement

Each product has a current profit-and-loss statement each quarter. The product "P&L Statement" includes the relevant data for all channels.

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 is revenues derived from sales, but you incur lots of costs 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.

FAQ

"Are costs expensed at the beginning of the quarter or the end of the quarter? The answer influences our spending decisions, since we obviously don't want to spend money before we have it." Assume that all revenues and costs happen uniformly throughout the quarter. That is, with a 90-day quarter, about 1/90 of the quarter's revenues and costs are attributable to each day's operations. Thus, you do have revenue coming in regularly throughout the quarter to pay for your various within-quarter operating costs. There's no need to worry about within-quarter cash flow issues with regard to covering your operating costs and within-quarter spending. Also, note that you do have access to loans, as necessary, to cover shortages in cash.

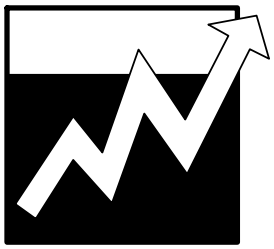
Finished Goods Inventory Report

The details of your finished goods inventories are reported on the "Finished Goods Inventory Report." Recall that your manufacturing plant and the distribution center in market region 1 hold common finished goods inventory.

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, channel, 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%.

Service Center Operations Report

The "Service Center Operations Report" details staffing levels at your regional service centers (including resignations) as well as documenting service demand and related statistics.

Transportation Cost Report

The "Transportation Cost Report" provides a break-down of the transportation cost elements which cumulate to yield total transportation costs for your firm.

Other Decision Variables Report

The "Product P&L Statement" provides an easy-to-read listing of the current values of the product development, distribution, service, generate demand, and forecasting decision variables. However, manufacturing and information technology decision variables are either sprinkled around in the financial and operating reports or not directly reported. To provide an easy-to-access listing of the current values of these decision variables, an "Other Decision Variables Report" is provided as part of your financial and operating reports.

Set-Top Box Industry Bulletin

The "Set-Top Box Industry Bulletin" provides current-quarter industry-related information. Information reported in the "Bulletin" includes things that an actual manager in the set-top box industry 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 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.

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********************************************************************************
FIRM 3:  InterSet BV                                          INDUSTRY ABC
PERFORMANCE EVALUATION REPORT, QUARTER 23                        PAGE   1
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	Firm 3	Industry Worst	Industry Average	Industry Best
FINANCIAL				
Net Income to Revenues	3.6%	0.4%	3.4%	6.1%
Change in Net Income to Revenues	0.8%	-3.1%	-0.5%	0.8%
Return on Assets	12.2%	1.1%	11.4%	18.2%
Net Asset Turns	4.0	2.9	4.4	5.9
OPERATIONAL				
Inventory Turnover	7.3	0.9	8.8	41.8
Fill Rate	100.0%	86.5%	95.7%	100.0%
Transportation Expenses Per Unit Sold	29.5	30.7	27.0	20.4
Forecasting Accuracy	72.5%	62.9%	71.0%	76.2%
(Marketing + Service) to Revenues	13.1%	15.2%	11.9%	9.5%
CUSTOMER				
Change in Market Share	-0.1%	-1.1%	0.0%	1.8%
Customer Satisfaction	27.1%	19.5%	25.1%	31.7%

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.

FIRM 5: Global Set-Top Boxes INDUSTRY DEF
CORPORATE P&L STATEMENT, QUARTER 16 PAGE 2

	All Products	Product 5-1	Product 5-2
Sales Volume	184,864	113,387	71,477
Unfilled Orders	0	0	0
Price	420	381	481
Revenues	77,645,955	43,250,495	34,395,460
- Product Costs	40,601,911	20,409,660	20,192,251
- Order Processing	2,044,964	1,312,784	732,180
- Replacement Parts	1,349,093	596,677	752,416
- RFID Costs	909,601	445,489	464,112
- Transportation Costs	5,972,138		
+ Transportation Rebates	0		
- Duties & Tariffs	4,221,421	2,721,296	1,500,125
Gross Margin	22,546,827	17,764,589	10,754,376
Gross Margin %	29.0%	41.1%	31.3%
Fixed & Other Costs:			
Administrative O/H	4,440,000	2,700,000	1,740,000
Consulting Fees	0		
Corporate O/H	1,500,000		
Distribution FC	25,000		
Forecast Inaccuracy	349,660	241,044	108,616
Information Technology	24,000		
Introductions	0		
Inventory Charges	590,443		
Marketing	5,500,000	3,240,000	2,160,000
Marketing Creative	0	0	0
Plant Capacity FC	1,200,000		
Price Changes	0	0	0
Production FC	141,000		
Research Studies	0		
Service Outsourcing	2,534,625	1,602,310	932,315
Unfilled Handling	0		
Total Fixed & Other	16,304,728	7,783,354	4,940,931
Operating Income	6,242,099	9,981,235	5,813,445
Non-Operating Income	-1,258,986		
Taxes	-2,491,556		
Net Income	2,491,557		

FIRM 1: ABC Corporation INDUSTRY GHI
HISTORICAL CORPORATE P&L STATEMENT, QUARTER 8 PAGE 4

	Previous (Quarter 7)		Current (Quarter 8)	
Sales Volume	183,211		184,864	
Unfilled Orders	0		0	
Price	422		420	
Revenues	77,430,000	100.0%	77,645,955	100.0%
- Product Costs	40,155,439	51.9%	40,601,911	52.3%
- Order Processing	2,082,872	2.7%	2,044,964	2.6%
- Replacement Parts	1,368,127	1.8%	1,349,093	1.7%
- RFID Costs	858,055	1.1%	909,601	1.2%
- Transportation Costs	5,826,140	7.5%	5,972,138	7.7%
+ Transportation Rebates	0	0.0%	0	0.0%
- Duties & Tariffs	4,111,036	5.3%	4,221,421	5.4%
Gross Margin	23,028,331	29.7%	22,546,827	29.0%
Fixed & Other Costs:				
Administrative O/H	4,440,000	5.7%	4,440,000	5.7%
Consulting Fees	0	0.0%	0	0.0%
Corporate O/H	1,500,000	1.9%	1,500,000	1.9%
Distribution FC	25,000	0.0%	25,000	0.0%
Forecast Inaccuracy	594,720	0.8%	349,660	0.5%
Information Technology	24,000	0.0%	24,000	0.0%
Introductions	0	0.0%	0	0.0%
Inventory Charges	518,179	0.7%	590,443	0.8%
Marketing	5,500,000	7.1%	5,500,000	7.1%
Marketing Creative	0	0.0%	0	0.0%
Plant Capacity FC	1,200,000	1.5%	1,200,000	1.5%
Price Changes	0	0.0%	0	0.0%
Production FC	141,000	0.2%	141,000	0.2%
Research Studies	0	0.0%	0	0.0%
Service Outsourcing	2,532,465	3.3%	2,534,625	3.3%
Unfilled Handling	0	0.0%	0	0.0%
Total Fixed & Other	16,475,364	21.3%	16,304,728	21.0%
Operating Income	6,552,967	8.5%	6,242,099	8.0%
Non-Operating Income	-1,226,218	-1.6%	-1,258,986	-1.6%
Taxes	-2,663,374	-3.4%	-2,491,556	-3.2%
Net Income	2,663,375	3.4%	2,491,557	3.2%

FIRM 2: Eastern Quality Providers Inc. INDUSTRY JKL
PRODUCT 2-1 P&L STATEMENT, QUARTER 9 PAGE 5

	All Regions (TOTAL)	Region 1 (Europe)	Region 2 (Latin AM)	Region 3 (Pacific)
Active? Ch#1,2,3		Yes Yes Yes	Yes Yes Yes	Yes Yes Yes
Sales Volume, Ch#1	40,499	17,359	8,144	14,996
Sales Volume, Ch#2	23,011	8,645	5,185	9,181
Sales Volume, Ch#3	49,877	20,347	10,268	19,262
Unfilled Orders	0	0	0	0
Price, Ch#1,2,3	295 450 420	295 450 420	295 450 420	295 450 420
Revenues	43,250,495	17,556,895	9,048,290	16,645,310
- Product Costs	20,409,660	8,343,180	4,247,460	7,819,020
- Order Processing	1,312,784	521,080	280,232	511,472
- Replacement Parts	596,677	247,367	133,512	215,798
- RFID Costs	445,489	190,949	89,584	164,956
- Duties & Tariffs	2,721,296	0	723,861	1,997,435
Gross Margin	17,764,589	8,254,319	3,573,641	5,936,629
Gross Margin %	41.1%	47.0%	39.5%	35.7%
Fixed Costs:				
Administrative O/H	2,700,000	900,000	900,000	900,000
Forecast Inaccuracy	241,044	41,459	75,368	124,217
Marketing, Ch#1	1,080,000	360,000	360,000	360,000
Marketing, Ch#2	1,080,000	360,000	360,000	360,000
Marketing, Ch#3	1,080,000	360,000	360,000	360,000
Marketing Creative	0	0	0	0
Price Changes	0	0	0	0
Service Outsourcing	1,602,310	565,230	366,228	670,852
Total Fixed Costs	7,783,354	2,586,689	2,421,596	2,775,069
Operating Income	9,981,235	5,667,630	1,152,045	3,161,560
Distribution Center?		2 Owned	0 None	0 None
RFID Outsource/Insource?		0 Outsourced	0 Outsourced	0 Outsourced
Emergency Carrier			N	N
Sales Volume Forecast, Ch#1		16,514	9,780	16,639
Sales Volume Forecast, Ch#2		8,529	5,282	8,085
Sales Volume Forecast, Ch#3		18,655	9,569	15,734
Service: Service Outsourcing		2 Standard	2 Standard	2 Standard

Product 2-1 Configuration: H55221

For Your Information

The standard LINKS quarterly reports include separate product P&L statements for each of your products. In this sample display, only reports for product 1 are included.

```
*****************************************************************************
FIRM 6:  United International SetTop Boxes                      INDUSTRY PQR
BALANCE SHEET, QUARTER 17                                            PAGE  6
*****************************************************************************

ASSETS
------
Cash                                                                914,152
Marketable Securities                                                     0
Finished Goods Inventory:
  Plant & DC1:  Product 1-1 (   3,418 units @  143.73/unit)         491,266
                Product 1-2 (   4,577 units @  179.00/unit)         819,283
Plant Investment                                                175,000,000
Total Assets                                                    177,224,701

LIABILITIES AND EQUITIES
------------------------
Corporate Capitalization                                        150,000,000
Dividends, Current Quarter                                         -645,007
Dividends, Cumulative Prior To This Quarter                        -713,154
Loans                                                            24,055,658
Retained Earnings, Current Quarter                                2,150,024
Retained Earnings, Cumulative Prior To This Quarter               2,377,180
Total Liabilities and Equities                                  177,224,701
```

```
 ********************************************************************************
 FIRM 8:  International Global                                    INDUSTRY STU
 CASH FLOW ANALYSIS REPORT, QUARTER 12                                 PAGE  7
 ********************************************************************************

   Starting "Cash" Balance (Final "Cash" Balance, Quarter 11)          938,004
 + Marketable Securities (Converted To "Cash" In Quarter 11)                 0
 - "Loans" (Liquidated During Quarter 11)                          -24,826,468
 + "Finished Goods Inventory" Changes:
     Product 1-1 (From    123,606 To    491,266)                     -367,660
     Product 1-2 (From    428,884 To    819,283)                     -390,399
+ "Net Income"                                                       2,150,024
 = Preliminary End-of-Quarter "Cash" Balance                       -22,496,499
 - "Dividends" (Paid at End of Quarter 12)                            -645,007
 = Actual "Cash" Balance (End of Quarter 12)                       -23,141,506
 - Operating "Cash" Excess (To "Marketable Securities")                      0
 + Operating "Cash" Deficit (From "Loans")                         24,055,658
 = Final "Cash" Balance (End of Quarter 12)                           914,152


 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 7:  SRTM Pty.                                          INDUSTRY VWY
FINISHED GOODS INVENTORY REPORT, QUARTER 38                      PAGE  8
**************************************************************************
```

	Product 7-1	Product 7-2
PLANT/DC1 FG INVENTORY		
Beginning Inventory	838	2,396
+ Regular Production	32,000	24,000
= Available Inventory	32,838	26,396
- Sales, Region 1	-15,537	-11,493
- Sales, Other Regions	-13,883	-10,326
= Ending Inventory	3,418	4,577

```
**************************************************************************
FIRM 3:  International Set-Top Box, Ltd.                    INDUSTRY ABC
SERVICE CENTER OPERATIONS REPORT, QUARTER 13                     PAGE   9
**************************************************************************
```

	All Regions	Region 1	Region 2	Region 3
ACTIVITY REPORT				
PRODUCT 3-1				
Calls	131,617	54,355	27,093	50,169
CSR Cost/Call	11.56	10.00	12.00	13.00
PRODUCT 3-2				
Calls	80,375	42,208	18,737	19,430
CSR Cost/Call	11.19	10.00	12.00	13.00

```
**************************************************************************
FIRM 3:  Range Rovers, Ltd.                                   INDUSTRY THE
TRANSPORTATION COST REPORT, QUARTER 12                           PAGE  10
**************************************************************************
```

SUB-ASSEMBLY COMPONENTS		Surface Cost	Surface Volume	Air Cost	Air Volume	Emergency Cost	Emergency Volume	Total Cost
Plant/DC1:	Gamma	4.00	0	4.00	0	4.00	125,597	502,388
	Delta	4.00	0	4.00	0	4.00	84,438	337,752
	Epsilon	6.00	0	6.00	0	6.00	203,915	1,223,490

CUSTOMER SHIPMENTS			
Region 1, Channel 1	(32,697 units @ $ 4.00/unit)		130,788
Region 1, Channel 2	(20,842 units @ $ 8.00/unit)		166,736
Region 1, Channel 3	(30,773 units @ $ 6.00/unit)		184,638
Region 2, Channel 1	(19,661 units @ $18.00/unit)		353,898
Region 2, Channel 2	(10,913 units @ $28.00/unit)		305,564
Region 2, Channel 3	(7,781 units @ $22.00/unit)		171,182
Region 3, Channel 1	(37,230 units @ $26.00/unit)		967,980
Region 3, Channel 2	(10,729 units @ $36.00/unit)		386,244
Region 3, Channel 3	(15,168 units @ $30.00/unit)		455,040
REPLACEMENT PARTS SHIPMENTS TO CUSTOMERS			
Region 1, Channel 1	(6,957 units @ $ 2.00/unit)		13,914
Region 1, Channel 2	(4,972 units @ $ 4.00/unit)		19,888
Region 1, Channel 3	(6,395 units @ $ 3.00/unit)		19,185
Region 2, Channel 1	(5,098 units @ $ 9.00/unit)		45,882
Region 2, Channel 2	(2,620 units @ $14.00/unit)		36,680
Region 2, Channel 3	(1,176 units @ $11.00/unit)		12,936
Region 3, Channel 1	(8,305 units @ $13.00/unit)		107,965
Region 3, Channel 2	(1,310 units @ $18.00/unit)		23,580
Region 3, Channel 3	(2,117 units @ $15.00/unit)		31,755
TOTAL TRANSPORTATION COSTS			5,497,485

```
********************************************************************************
FIRM 3:  eTop.com                                                  INDUSTRY DEF
OTHER DECISION VARIABLES REPORT, QUARTER  9                            PAGE 11
********************************************************************************


=============
MANUFACTURING                    3-1      3-2
=============                  -------  -------
Production                      15,213   54,100

=========================                          Carrier
TRANSPORTATION, PLANT/DC1     ----------------------------------------------
SHIPMENTS TO OTHER DCs              I        J        K        L        M        N
=========================     ======= ======= ======= ======= ======= =======
To DC2: Product 3-1, Surface        0        0        0        0        0    8,133
To DC2: Product 3-1, Air            0        0        0        0        0    8,133
To DC2: Product 3-2, Surface        0        0        0        0        0   18,000
To DC2: Product 3-2, Air            0        0        0        0        0    8,000
```

```
**************************************************************************
FIRM 3:  eTop.com                                          INDUSTRY JKL
FORECASTING ACCURACY REPORT, QUARTER 19                        PAGE 12
**************************************************************************
```

	Region	Forecast	Actual	Accuracy
Product 1-1, Channel 1	1	15,959	20,067	79.5%
Product 1-1, Channel 2	1	8,544	7,294	82.9%
Product 1-1, Channel 3	1	19,196	19,275	99.6%
Product 1-1, Channel 1	2	11,022	8,202	65.6%
Product 1-1, Channel 2	2	6,513	4,454	53.8%
Product 1-1, Channel 3	2	11,584	10,491	89.6%
Product 1-1, Channel 1	3	16,222	11,052	53.2%
Product 1-1, Channel 2	3	8,023	10,149	79.1%
Product 1-1, Channel 3	3	16,213	17,697	91.6%
Product 1-2, Channel 1	1	12,755	11,449	88.6%
Product 1-2, Channel 2	1	8,343	9,124	91.4%
Product 1-2, Channel 3	1	12,622	14,776	85.4%
Product 1-2, Channel 1	2	13,384	12,197	90.3%
Product 1-2, Channel 2	2	6,151	5,342	84.9%
Product 1-2, Channel 1	3	17,198	23,907	71.9%

SUMMARY: For 15 forecasts, average forecasting accuracy is 80.5%

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.

SALES HISTORY	Quarter 14	Quarter 15	Quarter 16	Quarter 17	Quarter 18	Quarter 19
REGION 1						
Product 1-1H, Ch#1	20,272	13,934	18,893	14,497	22,908	20,067
Product 1-1H, Ch#2	6,941	8,902	8,797	8,362	12,353	7,294
Product 1-1H, Ch#3	19,715	18,280	22,119	18,456	20,053	19,275
Product 1-2M, Ch#1	14,059	13,740	17,493	16,275	14,545	11,449
Product 1-2M, Ch#2	8,434	8,325	8,413	8,378	7,446	9,124
Product 1-2M, Ch#3	14,237	14,828	13,769	15,278	11,731	14,776
REGION 2						
Product 1-1H, Ch#1	12,277	8,056	9,440	10,256	9,116	8,202
Product 1-1H, Ch#2	6,624	6,086	6,215	7,368	6,605	4,454
Product 1-1H, Ch#3	10,199	10,717	10,955	11,225	9,292	10,491
Product 1-2M, Ch#1	14,376	14,919	12,231	15,048	10,085	12,197
Product 1-2M, Ch#2	6,820	6,956	6,771	5,089	7,487	5,342
REGION 3						
Product 1-1H, Ch#1	20,089	7,573	19,095	14,418	23,178	11,052
Product 1-1H, Ch#2	7,800	6,856	9,169	9,250	7,594	10,149
Product 1-1H, Ch#3	22,806	20,283	18,566	18,367	14,223	17,697
Product 1-2M, Ch#1	18,358	20,471	16,141	21,396	24,363	23,907

```
********************************************************************************
FIRM 3:  Asian Industries                                          INDUSTRY MNO
SET-TOP BOX INDUSTRY BULLETIN, QUARTER 19                               PAGE 13
********************************************************************************


Welcome to the quarter 19 issue of the Set-Top Box Industry Bulletin.
Notable set-top box industry developments are highlighted in the Bulletin.


INDUSTRY NEWS HEADLINES

  Total set-top box industry MNO profits were  9,653,475 this quarter.

  Firm 3 leads industry MNO in market share (25.8%).
  Firm 2 has the second-highest market share in industry MNO (22.2%).

  Industry MNO inventory investments decreased from 17,736,479 to 14,396,223
  this quarter.

  Total industry MNO research study spending was 2,187,000 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

"Research is the process of going up alleys to see if they are blind." - Marston Bates

This chapter describes the available research studies in the LINKS Multi-Channel Management Essentials 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 one of these research studies 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 16. Exhibit 17 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.

Research Studies Strategy

"Time spent in reconnaissance is seldom wasted." – Sun Tzu, 4BC

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.

Exhibit 16: Overview of LINKS Research Studies

#	Research Study	Cost	Limit
1	Benchmarking - Earnings	$500	
6	Benchmarking - Distribution	$5,000	
7	Benchmarking - Transportation	$5,000	
9	Benchmarking - Generate Demand	$5,000	
10	Benchmarking - Info Tech & Research Studies	$1,000	
11	Benchmarking - Operating Statistics	$2,500	
12	Market Statistics	$2,500	
14	Regional Summary Analysis	$5,000 per region	
20	Customer Satisfaction	$10,000	
24	Price Sensitivity Analysis	$20,000 per product per region per channel	4
32	Market Attractiveness Analysis	$3,000	

Exhibit 17: Research Studies Catalog

Competitive Benchmarking	1	Benchmarking - Earnings
	6	Benchmarking - Distribution
	7	Benchmarking - Transportation
	9	Benchmarking - Generate Demand
	10	Benchmarking - Info Tech & Research Studies
	11	Benchmarking - Operating Statistics

Competitive and Market Monitoring	12	Market Statistics
	14	Regional Summary Analysis
	20	Customer Satisfaction
	32	Market Attractiveness Analysis

Generate Demand Program Evaluation	9	Benchmarking - Generate Demand
	14	Regional Summary Analysis
	24	Price Sensitivity Analysis

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 continual updating of databases, charts, or graphs to reformat the raw LINKS research studies results into more meaningful and useful forms.
- 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.

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.

Sample Output

```
========================================================================
RESEARCH STUDY # 1 (Benchmarking - Earnings                            )
========================================================================


                              Current   Cumulative      Current
                            Net Income   Net Income    Dividends
                           -----------  -----------  -----------
Firm 1                       2,974,292    5,788,265      892,287
Firm 2                       3,472,461    6,234,171    1,041,738
...

Financial Market Statistics [stock price, shares outstanding (millions),
earnings per share, dividends per share, market capitalization ($millions)]
                ------  ------  ------  ------
                Firm 1  Firm 2  Firm 3  Firm 4
                ------  ------  ------  ------
StockPrice      120.00  131.80  117.63  123.96
Shares            2.0M    2.0M    2.0M    2.0M
EPS               1.49    1.74    1.44    1.57
DPS                .45     .52     .43     .47
MarketCap         240M    264M    235M    248M
```

Research Study #6: Benchmarking - Distribution

Purpose: This research study provides distribution benchmarks for your industry.

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.

Sample Output

```
========================================================================
RESEARCH STUDY # 6 (Benchmarking - Distribution                        )
========================================================================

                             Region 1     Region 2     Region 3
                            -----------  -----------  -----------

Firm 1 DCs?                        Yes          Yes          Yes
Firm 2 DCs?                        Yes          Yes           No
...
```

Research Study #7: Benchmarking - Transportation

Purpose: This research study provides transportation benchmarks for your industry. This research study reports firm-specific transportation cost breakdowns (as %s) for raw materials, sub-assembly components, plant-to-DC shipments, DC-to-customer shipments, and replacement parts shipments to customers. In addition, this research study provides plant-to-DC shipping benchmarks for your industry by providing each firm's current plant-to-DC carriers. Estimated market shares are reported for each carrier in each region.

Sample Output

```
======================================================================
RESEARCH STUDY # 7 (Benchmarking - Transportation                     )
======================================================================

                                    Sub-   Plant-To-   DC-To-   Replace
                          Raw     Assembly  Customer  Customer   Parts
                      Materials Component Shipments Shipments Shipments
                      --------- --------- --------- --------- ---------
Firm 1 Transportation $s      .0%     33.5%     13.8%     50.2%      2.5%
Firm 2 Transportation $s      .0%     33.5%     13.5%     50.7%      2.3%
...

Firm 1 Plant-To-DC Carriers:    J
Firm 2 Plant-To-DC Carriers:    I   J   N
...

            Shipments:  Market Shares For Carriers I-N
           ---------------------------------------------
              I      J      K      L      M      N
           ------ ------ ------ ------ ------ ------
Region 2     0.0%   0.0%  22.7%  14.4%  50.5%  12.4%  100.0%
Region 3    20.9%  39.0%  10.3%   9.6%  20.2%   0.0%  100.0%
```

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 #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, market region, and channel 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.

Sample Output

```
======================================================================
RESEARCH STUDY # 9 (Benchmarking - Generate Demand                    )
======================================================================

                         Quarter 55   Quarter 56   Quarter 57   Quarter 58
                        -----------  -----------  -----------  -----------


-----------
HYPERWARE
REGION 1
min/ave/max
-----------
CHANNEL 1:
  Price [$]          435 520 657  431 554 689  437 542 662  429 542 662
  Mktg [$K]          100 161 300    0 183 300    0 157 300    0 181 326
CHANNEL 2:
  Price [$]          440 495 540  440 496 550  440 499 550  440 496 550
  Mktg [$K]            0  85 150   75 134 282    0 139 299    0 147 326

-----------
METAWARE
REGION 1
min/ave/max
-----------
CHANNEL 1:
  Price [$]          465 515 603  477 573 692  489 594 687  579 676 839
  Mktg [$K]          100 130 200   94 138 200  100 149 200  100 157 218
CHANNEL 2:
  ...
...
```

Research Study #10: Benchmarking - Info Tech & Research Studies

Purpose: This research study provides information technology and research studies ordering benchmarks for your industry.

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: $1,000.

Additional Information: The research study ordering frequencies are based on the last two quarters, to the extent that such historical data are available in the archives for your industry. Only research studies with non-zero ordering frequencies are reported.

Sample Output

RESEARCH STUDY #10 (Benchmarking - Info Tech & Research Studies)

	Firm 1	Firm 2	Firm 3	Firm 4	Firm 5	Firm 6	Firm 7	Firm 8
Product Cost Report	Yes	No	No	No	No	Yes	Yes	Yes
Replacement Parts Demand Report	No	Yes	No	No	Yes	No	No	No
Retail Pipeline Report	Yes	No	Yes	No	No	No	No	No
Service Center Statistics Report	Yes	Yes	No	No	Yes	Yes	Yes	No

Research Study Ordering Frequency Across All Firms in Industry A

1 Benchmarking - Earnings	4.8%
8 Benchmarking - Service (CSR Usage)	9.5%
9 Benchmarking - Generate Demand	14.3%
10 Benchmarking - Info Tech & Research Studies	14.3%
11 Benchmarking - Operating Statistics	14.3%
12 Market Statistics	9.5%

....

Research Study #11: Benchmarking - Operating Statistics

"There is no finish line." – Nike Corporation motto

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). Average CSR monthly salary in all regions is reported. 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.

Sample Output

RESEARCH STUDY #11 (Benchmarking - Operating Statistics)

	Firm 8	Minimum	Average	Maximum
P&L OPERATING STATISTICS				
Revenues	100.0%	100.0%	100.0%	100.0%
Product Costs	50.7%	44.3%	49.1%	50.7%
Replacement Parts	.6%	.5%	.6%	.7%
Transportation Costs	10.2%	8.0%	9.7%	10.5%
Duties & Tariffs	7.9%	7.0%	8.0%	8.9%
Gross Margin	30.5%	30.5%	32.6%	38.2%
Administrative O/H	5.7%	4.7%	5.6%	6.0%
Marketing	4.5%	3.8%	4.7%	6.0%
Research Studies	.0%	.0%	.0%	.1%
Service	4.7%	3.6%	4.5%	4.9%
Total Fixed Costs	25.7%	22.0%	24.9%	27.2%
Operating Income	4.8%	4.8%	7.8%	13.7%
Net Income	2.9%	2.9%	4.4%	7.3%
CSR SALARY				
Region 1	2,000	1,850	1,956	2,125
Region 2	1,975	1,910	2,005	2,150
Region 3	2,025	1,950	2,075	2,200
CSR CALLS STATISTICS				
Region 1	21,059	19,107	19,964	21,059
Region 2	18,485	17,339	18,171	18,930
Region 3	29,680	25,487	27,747	30,611
CSR $/CALL STATISTICS				
Region 1	10.73	10.73	11.57	12.99
Region 2	11.79	11.79	12.90	14.42
Region 3	7.88	7.36	8.10	8.55

Research Study #12: Market Statistics

"Those who cannot remember the past are condemned to repeat it." - George Santayana

Purpose: This research study provides a variety of market statistics for the last four quarters:

- Industry demand (final customer purchases) and unfilled orders are reported for hyperware and metaware set-top box categories.
- Overall market shares for each firm are provided for each of the last four quarters. These market shares are based on end-user customer purchase volumes and not on manufacturer orders.
- End-of-quarter retail-channel (channel 1) inventory holdings for active products are reported in two ways: units and quarters of inventory (expressed relative to the current quarter's retail-channel sales volume).
- Estimates of retail-channel (channel 1) margins for active products are reported. Note that "margin" is retail-channel sales volume times the retail-channel markup.

Information Source: This research study is compiled by your research vendor using a variety of sources.

Cost: $2,500.

Sample Output

RESEARCH STUDY #12 (Market Statistics)

	Quarter 11	Quarter 12	Quarter 13	Quarter 14
INDUSTRY DEMAND				
Region 1:				
Hyperware Demand	60,231	59,075	59,244	59,165
Hyperware Unfilled	0	0	0	0
Metaware Demand	29,940	31,385	31,145	30,422
Metaware Unfilled	0	0	0	0
Region 2:				
Hyperware Demand	21,988	23,306	23,136	22,930
...				
...				
OVERALL MARKET SHARES				
Firm 1	18.0	26.6	25.3	20.7
Firm 2	19.5	17.4	18.8	17.9
Firm 3	19.9	19.1	17.6	20.0
Firm 4	21.7	19.8	19.7	19.6
Firm 5	20.9	17.1	18.6	21.8
RETAIL CHANNEL INVENTORY [Units]				
Region 1:				
Product 1-1H	2,128	2,260	2,257	2,653
Product 1-2M	1,242	1,291	1,352	1,284
Product 2-1H	2,178	2,377	2,345	2,266
...				
Region 2:				
...				
...				
RETAIL CHANNEL INVENTORY [Quarters of Inventory at Current Sales Volume]				
Region 1:				
Product 1-1H	0.38	0.33	0.40	0.39
Product 2-1H	0.51	0.37	0.45	0.40
...				
Region 2:				
...				
...				
RETAIL CHANNEL MARGIN				
Region 1:				
Product 1-1H	1,459,436	1,608,804	1,743,830	1,244,650
Product 1-2M	1,462,715	1,278,837	1,342,770	1,296,460
Product 2-1H	1,903,352	1,382,814	1,472,254	1,902,297
...				
Region 2:				
...				
...				

Research Study #14: Regional Summary Analysis

"If you torture the data long enough, it will confess." – Anonymous

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 the service quality associated with a product. 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, channel presence, distribution accessibility, ease of access, convenience to purchase, and general presence/prominence in the market place.

Sample Output

RESEARCH STUDY #14 (Regional Summary Analysis)

REGION 1
HYPERWARE

	Volume	Market Share	Price	PQ	SQ	Av
Channel 1						
1-1	15,906	9.9-	707+	41	21-	54+
4-1	531	0.3	465	2	19	1
5-1	9,391	5.9	439	9	29+	38
6-1	7,291	4.6	417-	8	41+	23-
7-1*	32,519	20.3+	699+	58+	28	54+
8-1	16,096	10.1	650	34-	18-	43
Channel 2						
1-1	13,238	8.3-	670+	40-	18-	10-
2-1	6,881	4.3+	380-	8	9-	12-
5-1	12,162	7.6+	392	9	32+	23

. . .

REGION 1
METAWARE

	Volume	Market Share	Price	PQ	SQ	Av
Channel 1						
1-2	3,323	3.3-	918+	44-	20-	55+
3-2	12,860	12.7-	708-	72-	29	55
5-2r	4,717	4.6	745	35+	28+	44+
6-2u	11,206	11.0+	799-	74+	38+	49
7-2	8,895	8.8+	843-	96	32	43
8-2	4,382	4.3	699+	33+	22+	39
Channel 2						
1-2	5,851	5.8	755+	46	20-	35+
2-2	2,012	2.0	775	23+	9	8
3-2	14,992	14.8	680-	76	28	35
4-2	2,107	2.1	650	19+	19	8

. . .

Notes:
(1) "Volume" is sales volume in units.
(2) Other variables listed above are market share, end-customer price ("Price"), perceived product quality ("PQ"), perceived service quality ("SQ"), and perceived availability ("Av").
(3) Changes of more than 2%, $20, 2%, 2%, and 2%, respectively, in these variables from the previous quarter are flagged with "+" (increase) and "-" (decrease) signals after the numerical values.
(4) "r" after a firm#-product# denotes a reconfigured product this quarter.
(5) "u" after a firm#-product# denotes a product with unfilled orders.
(6) "*" after a firm#-product# denotes a reconfigured product that has unfilled orders.

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.

Additional Information: Your set-top box manufacturing firm sells to retailers in channel #1, not directly to final end-user customers. Retailers in channel #1 maintain inventory of your set-top box products as well as selling your products to their customers. Thus, final end-user customers sales volume and market share in channel #1 (for example, as reported in Research Study #14) aren't equal to your firm's sales volume and market share to the retailers in channel #1 due to inventory holdings of retailers in channel #1.

These market shares are region-wide market shares and not channel-based market shares. That is, these market shares are the relative sales volume across all channels in a region. You may wish to calculate your own channel-specific market shares, if you are interested in your market share only within a specific channel.

Channel #1 ("Retail") results reflect final end-user customer activity. Thus, the prices reported are the prices paid by final end-user customers. These prices include the retailers' markups on the manufacturers' prices.

Research Study #20: Customer Satisfaction

Purpose: This research study provides customer satisfaction estimates of all products in all channels 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.

Sample Output

```
========================================================================
RESEARCH STUDY #20 (Customer Satisfaction                              )
========================================================================

                          Quarter 33   Quarter 34   Quarter 35   Quarter 36
                         -----------  -----------  -----------  -----------

--------
REGION 1
--------
CHANNEL 1:
  Product 1-1H                23.0         18.8         27.2         25.8
  Product 3-1H                16.0         22.8         26.8         23.4
  Product 4-2M                25.2         27.2         29.3         20.0
  Product 5-1H                31.5         29.5         29.9         21.9
CHANNEL 2:
  Product 1-2M                28.5         38.8         26.9         22.4
  Product 2-1H                22.9         28.7         23.5         23.8
...
```

Cost: $10,000.

Research Study #24: Price Sensitivity Analysis

Purpose: This research study provides a price sensitivity analysis for a specific product in a specific region (or all regions) and a specific channel (or all channels). 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 and channel 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 channel-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.

In this research study, "Your Price" is the manufacturer price. Your manufacturer price is the price that you input for this research study. In a retail channel (like channel #1), the LINKS

software automatically estimates the “Market Price” (including the retail markup) that is presented to the final end-user customer in each price sensitivity analysis. In direct channels (like channels #2 and #3), the manufacturer price is, of course, the final end-user customer price.

Cost: $20,000 per price sensitivity analysis (per product per region per channel). If you execute this research study for all products, regions, and channels in a 2-product, 3-region, and 2-channel LINKS environment, the total cost would be $240,000.

Sample Output:

```
======================================================================
RESEARCH STUDY #24 (Price Sensitivity Analysis                        )
======================================================================

PRODUCT 6-1H PREDICTED GROSS MARGINS IN REGION 1, CHANNEL 1 [HYPERWARE]
Configuration:  H35322
Reference Price:   290
```

Market Price	$ 351	$ 373	$ 395	$ 417	$ 438	$ 459	$ 481	$ 503	$ 525
Your Price	$ 232	$ 247	$ 261	$ 276	$ 290	$ 304	$ 319	$ 333	$ 348
Your Cost	$ 171	$ 171	$ 171	$ 171	$ 171	$ 171	$ 171	$ 171	$ 171
Your Margin	$ 60	$ 75	$ 89	$ 104	$ 118	$ 132	$ 147	$ 161	$ 176
Sales Volume	30,577	25,879	21,985	19,002	16,459	14,269	12,513	11,086	10,533
Market Share	9.9%	8.4%	7.1%	6.2%	5.3%	4.6%	4.1%	3.6%	3.4%
Margin Chang	-49.2%	-36.4%	-24.6%	-11.9%	0.0%	11.9%	24.6%	36.4%	49.2%
MS Change	85.8%	57.2%	33.6%	15.4%	0.0%	-13.3%	-24.0%	-32.6%	-36.0%
Net Change	-5.5%	-0.1%	0.7%	1.8%	0.0%	-3.0%	-5.3%	-8.1%	-4.5%
Gross Margin (in $000s)	$1,834	$1,940	$1,956	$1,976	$1,942	$1,883	$1,839	$1,784	$1,853

```
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
```

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 and channels. This research study may only be conducted for products that are already actively distributed in a region and channel. This research study may not be used for products prior to their introduction into a region and/or channel.

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 current inventory holdings of retailers and 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 #32: Market Attractiveness Analysis

Purpose: This research study provides a market attractiveness analysis for the hyperware and metaware categories for all channels in all market regions.

Information Source: This research study is based on various data compiled by your research supplier. These data are historical in nature, thus providing potential insights into market attractiveness only for channels and regions with at least some active products.

Study Details: The raw data compiled in this research study are based either on other research studies' data or calculations by your research supplier.

Cost: $3,000.

Sample Output

```
========================================================================
RESEARCH STUDY #32 (Market Attractiveness Analysis                     )
========================================================================

                          Market Factors            Competitive Factors
                      --------------------------  --------------------------
                       Market   Growth   Market    Compet   Market    Cust
                         Size     Rate    Volati    Intens    Price   Satisf
                      -------- -------- --------  -------- -------- --------
---------
HYPERWARE
---------
Region 1, Channel 1    16,989     3.1%      859         5      496     7.4%
          Channel 2    17,513     6.7%    1,119         5      495     1.3%
          Channel 3    39,541     4.4%    1,336        12      433    11.3%
Region 2, Channel 1    28,573    -1.1%      744         5      502     4.9%
...

Notes:
(1) "Market Size" is segment volume.
(2) "Growth Rate" is average growth rate over the last three quarters.
(3) "Market Volati" is market volatility, proxied by the standard deviation
    in segment volume over the last three quarters.
(4) "Compet Intens" is competitive intensity, proxied by the number of
    products with 3% or more market share.
(5) "Market Price" is average price of all products in the segment.
(6) "Cust Satisf" is average customer satisfaction of all products.
```

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 Form

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

Research Studies Decisions

Firm		Quarter	

1	Benchmarking - Earnings	
6	Benchmarking - Distribution	
7	Benchmarking - Transportation	
9	Benchmarking - Generate Demand	
10	Benchmarking - Info Tech & Research Studies	
11	Benchmarking - Operating Statistics	
12	Market Statistics	
14	Regional Summary Analysis	Region(s)?
20	Customer Satisfaction	

24	Price Sensitivity Analysis	Product?	Region?	Channel?	Configuration?	Price?
		Product?	Region?	Channel?	Configuration?	Price?
		Product?	Region?	Channel?	Configuration?	Price?
		Product?	Region?	Channel?	Configuration?	Price?

32	Market Attractiveness Analysis	

***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 and/or channel numbers are required, enter a single region number and/or a single channel number. Use region "0" and channel "0" as designations to run a research study for all regions and/or all channels, respectively. See the research study descriptions for details about the associated multi-region and multi-channel 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

"In a good wind, even turkeys can fly." – Chinese saying

This chapter provides a detailed description of the quantitative performance evaluation mechanism used within LINKS. Since there are many facets of evaluation to consider in a business, a multi-dimensional scorecard is used. As you will note, both current performance and change in performance (hopefully, improvement!) are considered in this multi-dimensional quantitative performance evaluation scorecard.

Perspective

Many things matter in evaluating the performance of a business. Obvious financial performance measures include absolute profitability, relative profitability (e.g., the ratio of profits to revenues or the ratio of profits to investments), change in profitability, or stock prices for public companies. Stock prices are, of course, related to expectations of future profitability and such expectations are based on current and recent profitability patterns.

It's hard to argue with profitability-like measures as the correct things to examine to assess the long-run performance of a business. However, in a shorter-run perspective, other things matter too. These "other things" are leading indicators of future profitability and root causes of profitability.

Multiple measures of performance evaluation obviously lead to conflicts. Short-run and long-run trade-offs are obvious. For example, by reducing inventories and product support spending (marketing and service spending), current costs will decrease and profits will tend to increase. However, in the long-run, these might be exactly the wrong things to do to maximize long-run profitability. Subtler trade-offs arise in potentially conflicting performance measures that move in opposite directions. For example, inventory reductions save costs on the inventory and manufacturing fronts but may lead to shortages to meet the levels of customer demand in the distribution centers. Balancing all of these conflicting trade-offs is the challenge for management.

FYI: When Good Customers Are Bad: Cost-To-Serve Analytics

Companies don't just sell product; they sell "delivered product." In virtually every industry, they coddle customers with supply chain services such as next-day delivery, customized handling, and specialized labeling. But few companies track the real costs of the myriad services they offer – and most have no idea how much they're losing.

Because conventional accounting methods and average-cost assumptions obscure the true effect of these services on the bottom line, sales executives often view them as minor concessions needed to close the deal. As a result, the high-volume customers who receive the lion's share of these services may be far less profitable than companies think. Even worse, in their zeal to push sales volume, firms may be implicitly driving their sales forces to extend unprofitable services to the entire customer base.

Source: Remko Van Hoek and David Evans, "When Good Customers Are Bad," ***Harvard Business Review*** (September 2005), p. 19.

The various performance measures within LINKS are designed to monitor all key elements of

performance assessment:

- efficiency (input usage)
- effectiveness (output quality)
- productivity (conversion of inputs into output)
- firm-wide profitability
- external performance (e.g., change in market share and customer satisfaction perceptions).

The LINKS Scorecard

The LINKS scorecard is perhaps described more aptly as a boardroom-level scorecard. It focuses on top-line boardroom kinds of financial, operational, and customer performance measures and sub-measures. The LINKS scorecard includes the measures and weights described in Exhibits 18-20. 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 some of the sub-measures, "better" means a lower sub-measure value (e.g., the "Ratio of Controllable Procurement and Manufacturing Costs To Revenues" is a lower-is-better sub-measure). 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*(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 18-20 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 this 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 and industry bests on every KPI. You can assess where your firm stands compared to competitors with this scorecard.

Exhibit 18: Scorecard Financial Measures

Sub-Measures	Weight	Sub-Measure Details
Ratio of Net Income to Revenues	3	Current profitability is the best overall signal of business performance, hence its high weight. Firms are "tied" if their scores are within 0.2% of each other.
Change in Ratio of Net Income to Revenues	1	Improvement in profitability is important but less important than current profitability. Firms are "tied" if their scores are within 0.2% of each other.
Return on Assets	2	Return means "Net Income" (from the "Corporate P&L Statement") and investment equals "Total Assets" (from the "Balance Sheet"). This ratio is expressed in annualized terms. Firms are "tied" if their scores are within 0.5% of each other.
Net Asset Turns	1	Ratio of revenues to net assets. Net assets are assets minus loans. This measure reflects the desirability of higher revenues relative to the assets deployed to yield these revenues. This ratio is expressed in annualized terms. Firms are "tied" if their scores are within 0.2 of each other.

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.

Exhibit 19: Scorecard Operational Measures

Sub-Measures	Weight	Sub-Measure Details
Inventory Turnover	2	Ratio of product costs to average inventory value (average of the current and the previous quarters). If average inventory value is zero, then Inventory Turnover is defined to be 100. Firms are "tied" if their scores are within 0.2 of each other.
Fill Rate	1	The percentage of orders that are filled. "Unfilled orders" occur when available inventory is less than orders in a quarter. Firms are "tied" if their scores are within 0.5% of each other.
Transportation Expenses Per Unit Sold	-1	Equal to total transportation costs divided by total units sold (orders). Firms are "tied" if their scores are within 0.5 of each other.
Forecasting Accuracy	2	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 "tied" if their scores are within 0.5% of each other.
Ratio of (Marketing + Service Spending) to Revenues	-1	Service spending includes service salaries, service overhead, service hiring/firing, and 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 "tied" if their scores are within 0.2% of each other.

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.

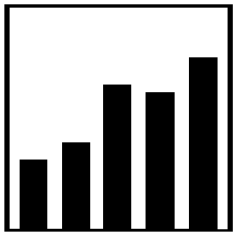
Exhibit 20: Scorecard Customer Measures

Sub-Measures	Weight	Sub-Measure Details
Change in Market Share	1	Change in market share is an overall measure of customer reaction to the firm's offerings. ("Market share" equals customer purchases in all channels and regions.) Firms are "tied" if their scores are within 0.1% of each other.
Customer Satisfaction	2	Customer satisfaction measures the performance of the product from the perspective of purchasers. Thus, it's 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, channels, and regions is used here. Firms are "tied" if their scores are within 0.5% of each other.

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.

Goal Setting

"To be sure of hitting the target, shoot first and then call whatever you hit the target." – Ashleigh Brilliant



As the LINKS exercise evolves, you will be called upon to form and commit to specific performance goals associated with the measures in the LINKS scorecard. Such goal setting is a normal part of managing all businesses. Goal setting forces you to have managerially relevant objectives, which frame all of your operating decisions. Without objectives (goals), nothing really matters. Or, as Lewis Carroll so eloquently penned it so long ago in ***Alice in Wonderland***: *'"Would you tell me, please, which way I ought to go from here?' 'That depends a good deal on where you want to get to' said the Cat. 'I don't much care where' said Alice. 'Then it doesn't matter which way you go' said the Cat."*

Goal setting and establishing business objectives aren't just about concrete/quantifiable things. The commitment aspect of goal setting is as important as the numeracy of the goals, as the following quote from Peter Drucker emphasizes: *"Objectives are not fate; they are directions. They are not commands; they are commitments. They do not determine the future; they are the means to mobilize the resources and energies of the business for the making of the future."*

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

Strengths	Weaknesses
What are your firm's strengths relative to your competitors? What are your most important strengths? Why?	*What are your firm's weaknesses relative to your competitors? What is impeding you from achieving your desired results? Prioritize your weaknesses.*
Opportunities	**Threats**
How can you convert these strengths, weaknesses, and threats into opportunities for your firm? What considerations are most important for your success?	*What organizational, competitive, and environmental threats do you face now and in the near future?*

KPI Worksheet

Firm		Quarter	

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.

What KPI?	
How/Why Is This KPI Relevant To Customers and Customer Requirements?	
Why Is This KPI Noteworthy Now?	
What Is Your Standing on This KPI Now?	
What Are Leading/Key Competitors' Standings on This KPI Now?	
What Is Your KPI Future Objective?	
What Can You Do To Influence This KPI? (What Drives This KPI?)	
What's Your Specific Action Plan To Achieve Your KPI Future Objective?	

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) lack of focus (capacity, reconfiguration, time, and human resource constraints combine to favor concentrated effort in fewer than "all" market regions);
(3) limited research and/or limited efforts to interpret the research studies that are available;
(4) limited attention to competitive developments (i.e., lack of in-depth competitor analysis to discover the underlying drivers of market behavior);
(5) financial mismanagement related to cost structure management (variable and fixed costs management, covering corporate-wide overheads, etc.), production and inventory levels, and capacity management;
(6) 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); and,
(7) team mismanagement (not spending enough time thinking about and discussing team management issues and related human resource deployment strategies and tactics).

End-Gaming Strategies and Tactics

"It's time to break camp." – Dwight Dowdell, Accenture

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.

General Advice

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.

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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