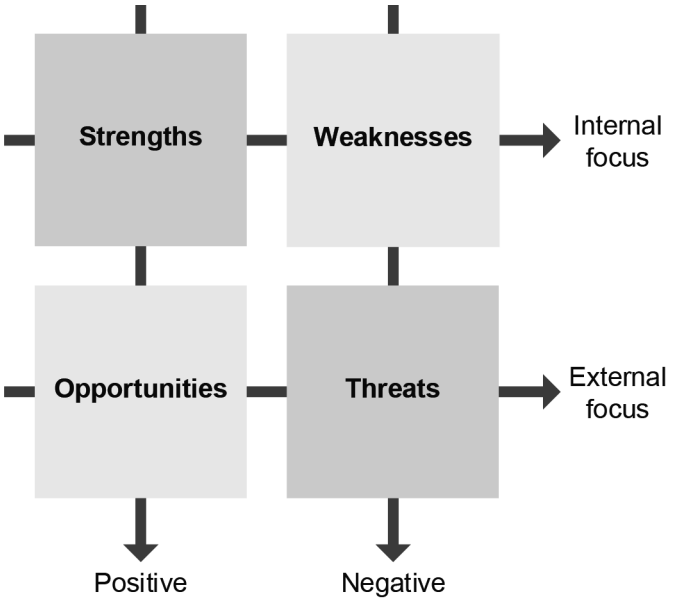
SWOT analysis

SWOT stands for **S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats. As seen in Exhibit 1-24, the SWOT analysis is usually in the form of a quadrant in which distinctions are made between internal versus external focus and positive versus negative points.

Exhibit 1-24: SWOT Analysis



How are each of these determined?

- **Internal strengths and weaknesses** are typically derived from comprehensive data collected about the organization. This may include information on skill sets by function, professional development and training activities, facilities, the company's reputation or standing in the community, etc. Ideally input from external customers and suppliers provides substantiated evidence, as to weaknesses in particular, that can then be appropriately addressed.

- **External opportunities and threats** are based on market trends and risk analyses. Environmental scanning may be required to assemble data on external forces. This involves collecting and analyzing external data on market forces; demographic changes; changing customer needs; competitor pricing and offerings; current and emerging technology; new taxes, laws, and regulations; and social, political, and economic conditions.

Opportunities can be acted upon to help move an organization toward achieving its goals. However, if those opportunities are ignored or improperly developed,

they can transform into threats (like IBM giving Bill Gates the green light to market his disk operating system [DOS] because they weren't in the "software business"). Other opportunities may arise from competitors' activities or products or new markets or from other data seen during environmental scanning.

Threats are defined as risks that can impact a company negatively if they are not handled appropriately. External risks include unforeseen events outside the control of an organization that can diminish productivity, profits, or market share, for example, the 2011 Japanese earthquake and tsunami, which resulted in losses for many multinational companies around the globe. Of course there can be internal threats that arise due to a company's actions, such as overzealous geographic expansion or excessive outsourcing.

This valuable information feeds into a written document called the market plan.

Market research

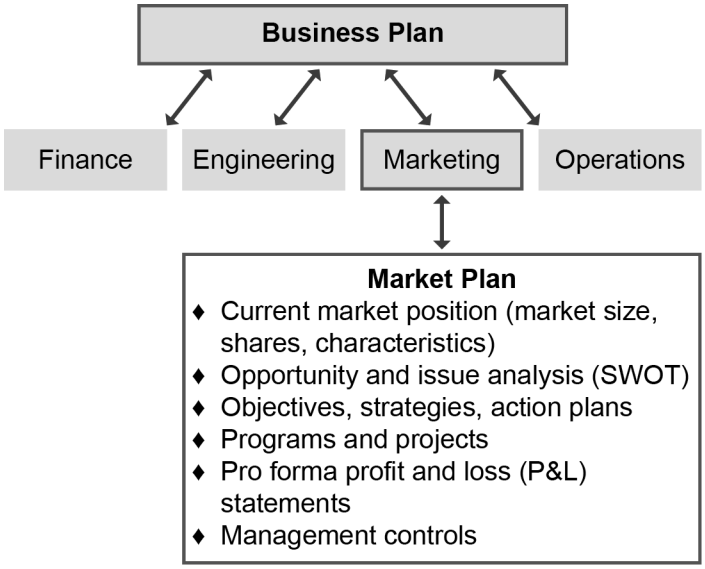
In order to design a supply chain that can meet its ultimate goal of delivering the right product at the right place and time and at the right price, it's important to understand the marketplace.

The strategic business plan drives several important functions like finance, engineering, marketing, and production. These functions also have input in shaping the overall business strategy. Here we're going to focus on the marketing function and how it provides foundational information about the marketplace. Knowing your market, customers, competitors, and product can heavily influence how you design your supply chain to meet long-term objectives.

The marketing function develops its own strategically oriented plan based on the strategic business plan. Once again, these plans must be in alignment and there should be consistency between them.

As seen in Exhibit 1-25, the marketing strategy is based on a number of key elements.

Exhibit 1-25: Marketing Strategy and Plan



Research

Marketing begins its quest to understand the marketplace by doing **marketing research.** According to the *APICS Dictionary*, 16th edition, such research involves "the systematic gathering, recording, and analyzing of data about problems relating to the marketing of goods and services." Also referred to as market research, it may be undertaken by impartial agencies, business firms, market research agents, or an internal marketing staff.

There are several types of marketing research:

- Market analysis: the study of the size, location, nature, and characteristics of markets (for example, product potential). More information on market segmentation is included in a later section.
- Sales analysis (or research): the systematic study and comparison of sales (or consumption) data and **market share** ("the actual portion of current market demand that a company or product achieves," *APICS Dictionary*, 16th edition).
- Consumer research: the discovery and analysis of consumer attitudes, reactions, and preferences (including motivation research).

Market research can be conducted via a variety of information-gathering tools, such as customer surveys, interviews, focus groups, direct mail questionnaires, websites providing opportunities for visitor feedback, and market reports sold by research firms. Of course the internal marketing department staff can also do research about potential markets, products, etc. The SWOT analysis is commonly used for this purpose.

Market plan components

The **market plan** (shown in Exhibit 1-25 on the previous page) is defined in the *APICS Dictionary*, 16th edition, as including

> the current market position, opportunity and issue analysis [SWOT results], marketing objectives and strategies, action plans, programs, projects, budgets, and pro forma profit and loss statement and management controls.

Current market position information may include data and findings about demand patterns, products and pricing, customer satisfaction, and service level agreements with partners, distributors, and retailers. (Note that a profit and loss statement is another name for an income statement. Pro forma means that the statement is based on forecasted information rather than historical information.)

When designing a supply chain, one must carefully consider the market plan. For example, if the market plan shows that Europe will be the primary source of demand for product X, it may make sense to assemble that product in the Netherlands instead of China, despite comparatively higher labor costs. By assembling a product in Europe, import duties may be much lower than for importing a finished product. (For example, Tesla assembles battery-powered cars in Tilburg.) The shipping volume of the parts may also be much smaller than the shipping volume of the finished products, so postponed assembly can save money in transportation costs.

In addition, one must keep in mind that marketplace factors may evolve over time, and, if they do, that may require modifications to the design of the supply chain and its organization.

Network modeling and operations research

Network modeling and operations research are tools that can be used to find the most efficient and effective or optimal strategic plan and network design for a supply chain. In fact, network modeling is frequently called network design. We will restrict this discussion to the subset of network design in which expert analysts create a mathematical model of the supply chain for supply chain managers.

A good model will represent the supply chain in all of its necessary complexity but be no more complex than it needs to be (avoiding being needlessly complex and thus error-prone). It is a representation of a supply chain, not a supply chain itself, and so is complex enough when it can reliably help decision makers choose between available options.

Mathematical models have inputs, processes, and outputs. A model's input parameters can be adjusted to account for where facilities might be located, the number of these facilities, their function, their costs and related transportation costs, and so on. The model will have processes (mathematical relationships and formulas) that automatically translate the inputs into outputs. The outputs will indicate total network costs as well as any other key performance indicators related to strategy that the model developers include. These models are often developed in a spreadsheet such as Microsoft Excel, but more sophisticated modeling tools also exist. Modeling expertise is needed to develop, check, and validate such models. Model errors are easy to create, and there is a risk that the wrong decision will be made based on invalid outputs.

The *APICS Dictionary*, 16th edition, defines **operations research (OR),** (called operational research in the U.K.), as

> 1) The development and application of quantitative techniques to the solution of problems. More specifically, theory and methodology in mathematics, statistics, and computing are adapted and applied to the identification, formulation, solution, validation, implementation, and control of decision-making problems. 2) An academic field of study concerned with the development and application of quantitative analysis to the solution of problems faced by management in public and private organizations.

Operations research is typically concerned with finding the minimum (e.g., minimum cost or risk) or the maximum (e.g., maximum profit, yield, or performance). Since the problems to solve are very complex, it is strongly tied to computer science.

The mathematical models developed with network modeling use operations research to solve for optimal network design. Network modeling and operations research are highly applicable to supply chain management because there are so many complexities to consider in an international supply chain. The benefit of harnessing these sciences is that decision makers have some assurance that the choices they are making in regard to expensive capital investments are likely to be wise in the long run.

Operations research uses a number of tools to find the best number and location of suppliers, manufacturing and assembly facilities, warehouses and distribution centers, and retail locations. The best solution depends on supply chain strategy. Some networks will minimize total supply chain cost while others will provide best value in terms of the most flexible, the highest quality, or the fastest flow of products through the network. Current best practices promote finding a solution that maximizes flexibility while minimizing cost so that the supply chain can both be resilient to frequent changes in the environment and provide the maximum potential for organizational profit.

Operations research relies on mathematical modeling, statistical analysis, simulation and optimization, economic methods, queuing theory, expert systems, decision analysis, and other tools. While it is beyond the scope of this text to describe these tools, let's look briefly at one common method: the Monte Carlo simulation. A Monte Carlo simulation randomizes each variable within its available range and runs thousands of simulations, and then it generates statistics to summarize the average results as well as other statistics such as the minimum and maximum. In this case, the optimum solution would be in the outliers of such a model: the scenario that produces exceptional results.

Balanced scorecard (BSC)

Metrics provide a way to keep score, so it was only natural that someone would create a business-related scorecard. If your objective is to improve order fill rate from 93 percent to 98 percent, then you've created a contest with its own rules and an ultimate goal. Sure enough, in 1992 Robert S. Kaplan and David Norton introduced the balanced scorecard (BSC). Initially designed to give managers a comprehensive view of business performance, it has since been adapted to the design and measurement of supply chain performance.

You will be learning more details about the balanced scorecard and how it's used in a later section.