

The Seven Management and Planning Tools

To illustrate the Seven Management and Planning Tools, we present hypothetical high-technology consumer electronics company, MicroTech. MicroTech's mission is

to design and manufacture miniature electronics products utilizing radio frequency technologies, digital signal processing technologies, and state-of-the-art surface mount manufacturing techniques.

Affinity Diagrams

The affinity diagram is a tool for organizing a large number of ideas, opinions, and facts relating to a broad problem or subject area. In developing a vision statement, for example, senior management might conduct a brainstorming session to develop a list of ideas to incorporate into the vision. This list might include

low product maintenance	low production costs
satisfied employees	innovative product features
courteous order entry	high return on investment
low price	constant technology innovation
quick delivery	high quality
growth in shareholder value	motivated employees
teamwork	unique products
responsive technical support	small, lightweight designs
personal employee growth	

Once a large number of ideas have been generated, they can be grouped according to their "affinity" or relationship to each other. An affinity diagram for the preceding list is shown in Figure 1.

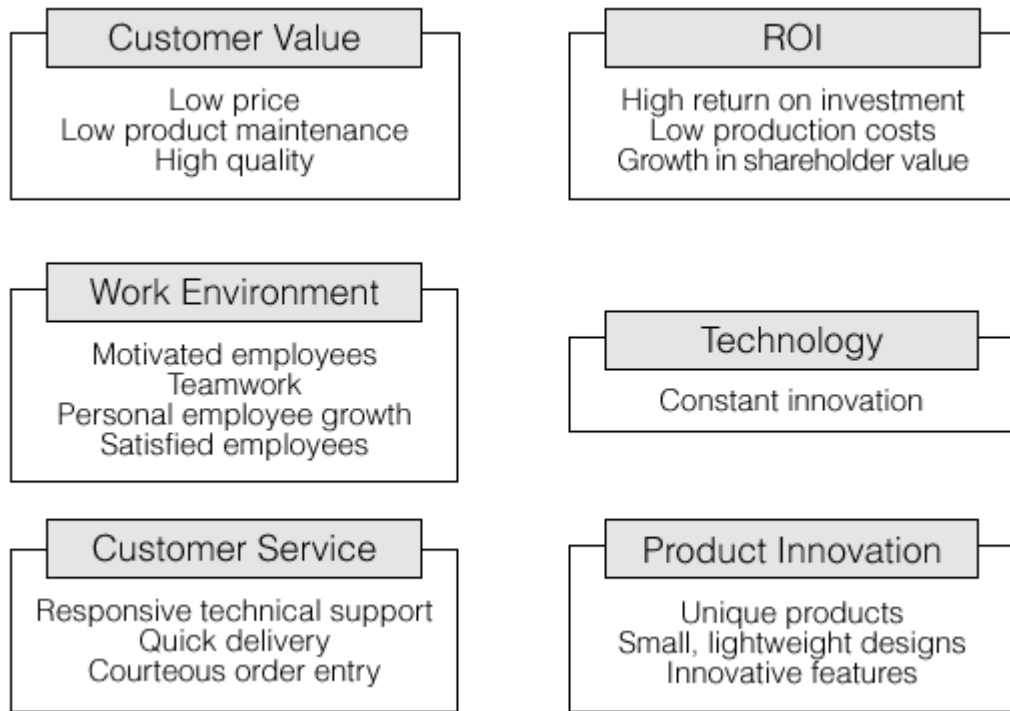


Figure 1 Affinity Diagram for MicroTech (5E Fig 5.8)

Interrelationship Digraph

An interrelationship digraph identifies and explores causal relationships among related concepts or ideas. It shows that every idea can be logically linked with more than one other idea at a time, and allows for “lateral thinking” rather than “linear thinking.” This technique is often used after the affinity diagram had clarified issues and problems.

Figure 2 shows an example of how the key strategic factors for MicroTech relate to one another. The elements having the most net outward-pointing arrows (number out minus number in) represent the primary drivers of the company’s vision: in this case, work environment and customer service. As a result, MicroTech might develop the following vision statement:

We will provide exceptional value to our customers in terms of cost-effective products and services of the highest quality, leading to superior value to our shareholders. We will provide a supportive work environment that promotes personal growth and the pursuit of excellence and allows each employee to achieve his or her full potential. We are committed to advancing the state-of-the-art in electronics miniaturization and related technologies and to developing market opportunities that are built upon our unique technical expertise.

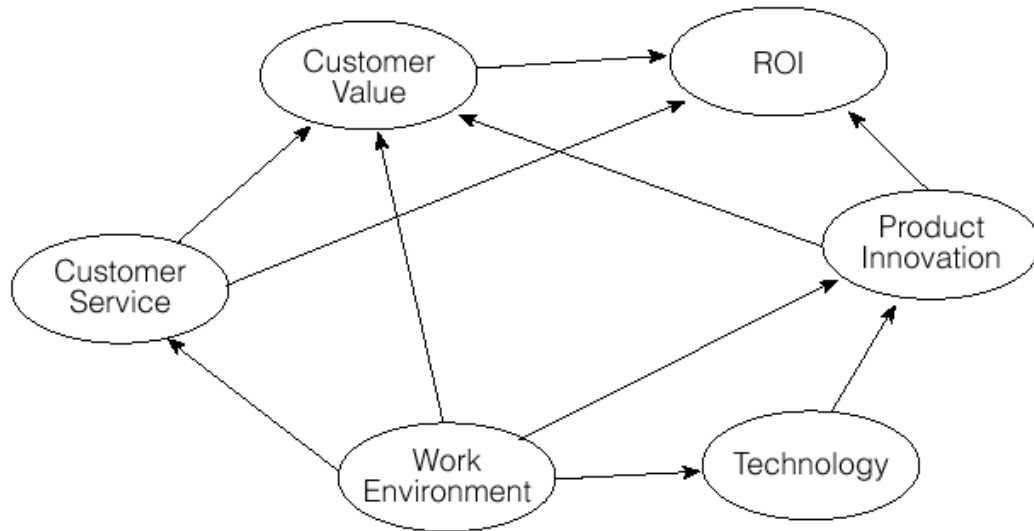


Figure 2 Interrelationship Digraph of MicroTech’s Strategic Factors (5E Fig 5.9)

Tree Diagrams

A tree diagram maps out the paths and tasks necessary to complete a specific project or reach a specified goal. Thus, the planner uses this technique to seek answers to such questions as “What sequence of tasks will address the issue?” or “What factors contribute to the existence of the key problem?”

A tree diagram brings the issues and problems revealed by the affinity diagram and the interrelationship digraph down to the operational planning stage. A clear statement specifies problem or process. From this general statement, a team can be established to recommend steps to solve the problem or implement the plan. The “product” produced by this group would be a tree diagram with activities and perhaps recommendations for timing the activities. Figure 3 shows an example of how a tree diagram can be used to map out key goals and strategies for MicroTech.

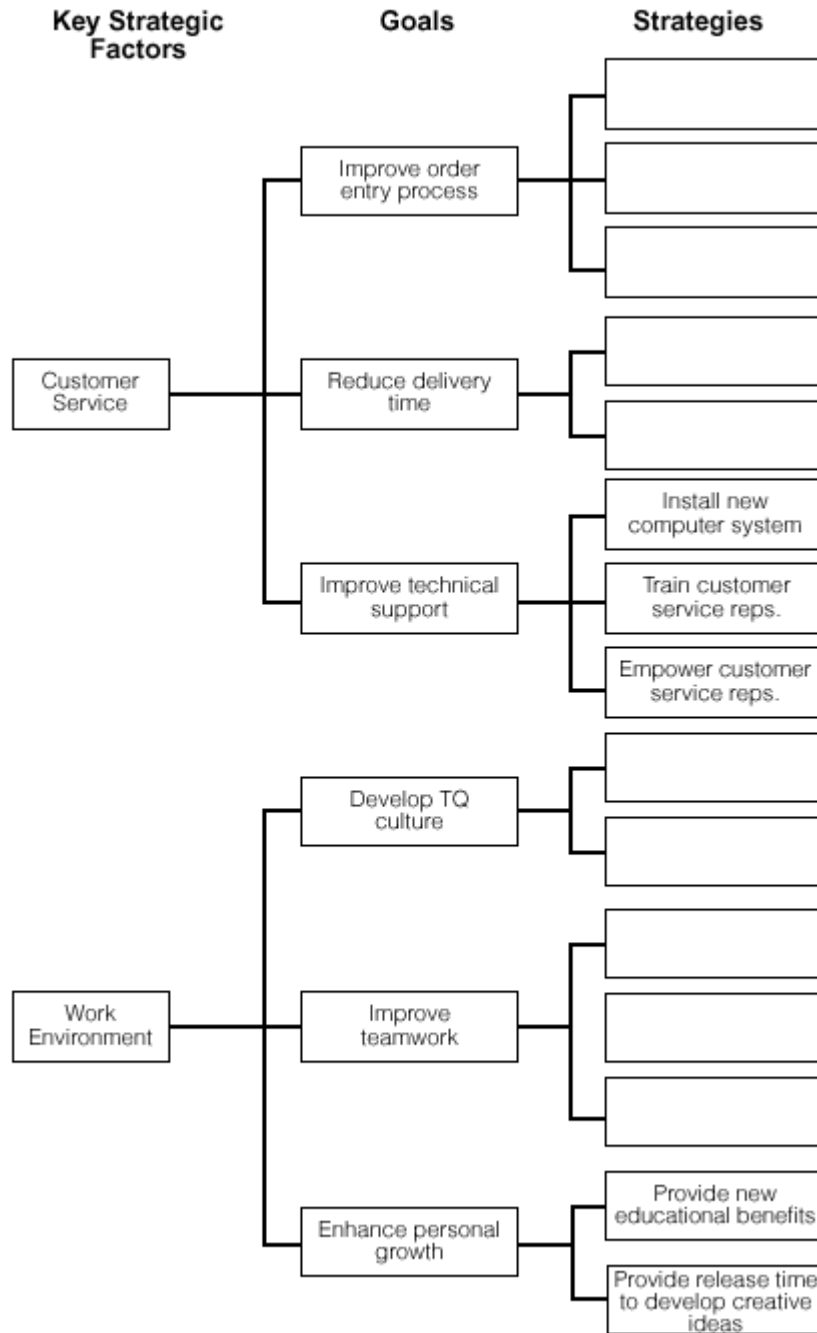


Figure 3 Tree Diagram of MicroTech Goals and Strategies (5E Fig. 5.10)

Matrix Diagrams

Matrix diagrams are “spreadsheets” that graphically display relationships between ideas, activities, or other dimensions in such a way as to provide logical connecting points

between each item. A matrix diagram is one of the most versatile tools in quality planning. One example is shown in Figure 5.11. Here, we have listed the three principal goals articulated in MicroTech’s vision statement along the rows, and the key strategies along the columns. Typically, symbols such as ●, ○, and △ are used to denote strong, medium, and weak relationships. Matrix diagrams provide a picture of how well two sets of objects or issues are related, and can identify missing pieces in the thought process. For instance, a row without many relationships might indicate that the actions proposed will not meet the company’s goals. In Figure 4, we see that focused attention to these three strategies should meet MicroTech’s goals. Other matrices might relate short-term plans to medium-term objectives, or individual actions to short-term plans. These visual depictions can help managers set priorities on plans and actions.

Goals \ Actions	Improve Work Environment	Improve Manufacturing Technology	Develop New Products
Cost Effectiveness	●	○	
High Quality	●	●	
Shareholder Value		△	●

● = Strong relationship
 ○ = Medium relationship
 △ = Weak relationship

Figure 5.4 Matrix Diagram for MicroTech’s Goals and Strategies (5E Fig. 5.11)

Matrix Data Analysis

Matrix data analysis takes data and arranges them to display quantitative relationships among variables to make them more easily understood and analyzed. In its original form used in Japan, matrix data analysis is a rigorous, statistically based “factor analysis” technique. Many feel that this method, while worthwhile for many applications, is too

quantitative to be used on a daily basis and have developed alternative tools that are easier to understand and implement. Some of these alternatives are similar to decision analysis matrixes that you may have studied in a quantitative methods course.

A small example of matrix data analysis is shown in Figure 5. In this example, MicroTech market researchers determined that the four most important consumer requirements are price, reliability, delivery, and technical support. Through market research, an importance weighting was developed for each. They also determined numerical ratings for the company and their best competitor. Such an analysis provides information as to which actions the company should deploy to better meet key customer requirements. For example, in Figure 5, reliability is the highest in importance, and MicroTech has a narrow lead over its best competitor; thus, they should continue to strive for improving product reliability. Also, technical support is of relatively high importance, but MicroTech is perceived to be inferior to its best competitor in this category. Thus, improving the quality of support services should be a major objective.

Requirement	Importance Weight	Best Competitor Evaluation	MicroTech Evaluation	Difference*
Price	.2	6	8	+2
Reliability	.4	7	8	+1
Delivery	.1	8	5	-3
Technical support	.3	7	5	-2

*MicroTech Evaluation – Best Competitor Evaluation

Figure 5 Matrix Data Analysis of Customer Requirements for MicroTech (5E Fig 5.12)

Process Decision Program Charts

A process decision program chart (PDPC) is a method for mapping out every conceivable event and contingency that can occur when moving from a problem statement to possible solutions. A PDPC takes each branch of a tree diagram, anticipates possible problems, and provides countermeasures that will (1) prevent the deviation from occurring, or (2) be

in place if the deviation does occur. Figure 6 shows one example for implementing a strategy to educate and train all employees to use a new computer system.

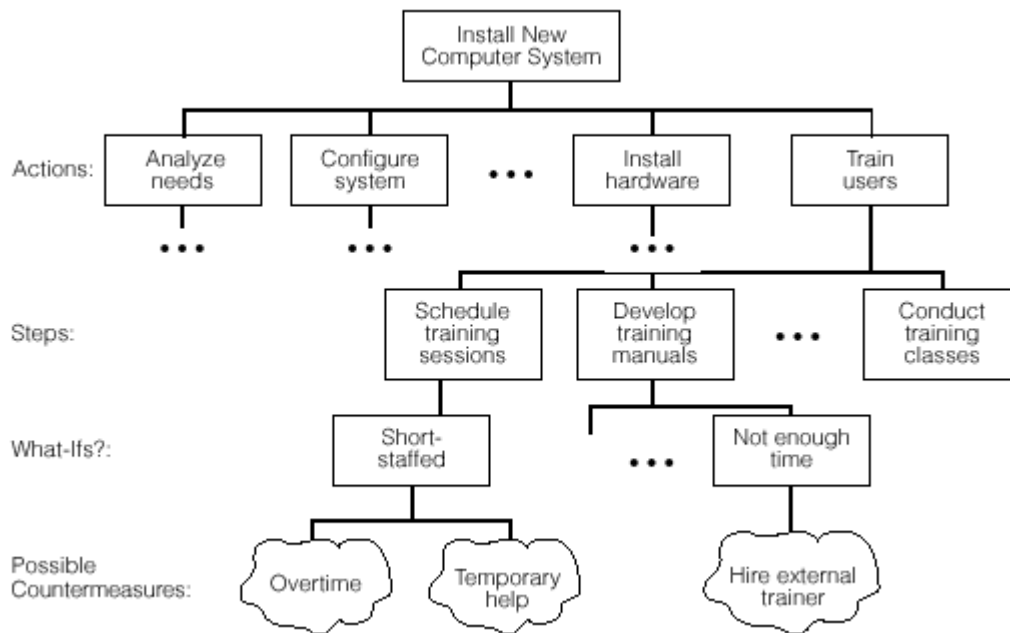


Figure 6 A Process Decision Program Chart (5E Fig. 5.13)

Arrow Diagrams

For years, construction planners have used arrow diagrams to sequence and schedule project tasks. Arrow diagramming has also been taught extensively in quantitative methods, operations management, and other business and engineering courses in the United States for a number of years. Unfortunately, its use has generally been confined to technical experts. Adding arrow diagramming to the “quality toolbox” has made it more widely available to general managers and other non-technical personnel. Figure 7 shows an example. Time estimates can easily be added to each activity in order to schedule and control the project.

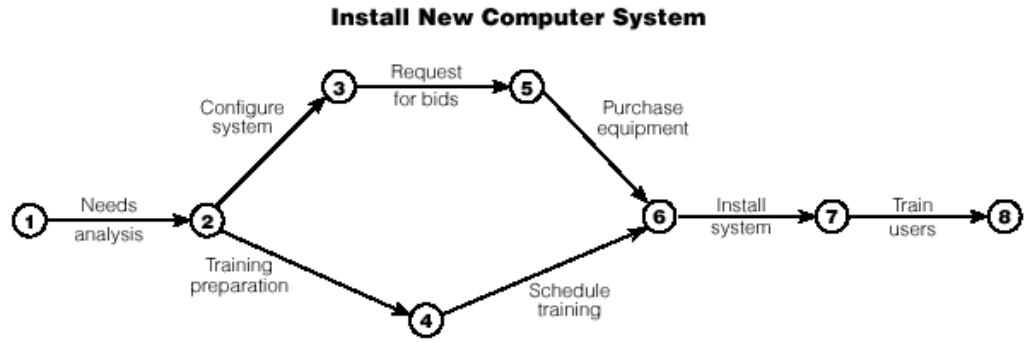


Figure 7 An Arrow Diagram for Project Planning (5E Fig. 5.14)