

# A New Approach to Strategy Formulation: Opening the Black Box

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In most business curricula, theory is merged with state-of-the-art practice into a set of principles and tenets that best elucidate a given topic. Similarly, the approach to teaching strategic planning reflects the merging of the most dominant theoretical approaches with contemporary application. Unfortunately, this merging of theory and practice leads us to the troubling conclusion that we know a great deal about the constituent elements of environmental *analysis* but relatively little about the elements and dynamics of strategy *formulation*. In short, most management professors feel comfortable and confident when teaching their students how to conduct a competitive analysis but less certain when teaching students how to develop specific strategies based on that analysis.

In Mintzberg's (1994) view, the planning model of strategy formulation attempts to routinize the process of strategic decisionmaking by providing detailed checklists and flowcharts of the process. This approach to strategic planning, characterized by analysis and sequential problem solving, has been criticized by a number of authors (see for example Daft & Buenger, 1990; Hamel & Prahalad, 1994; Javidan, 1985). Mintzberg himself stated that strategy formulation is a "black box" in the strategic planning model, and that

**ABSTRACT.** The strategic planning process is arguably one of the most important topics taught in a management class. Moreover, the subtopic of strategy formulation is both the most pivotal and the most difficult to teach. As many theorists argue, strategy formulation is the "black box" of strategic planning. One approach for both clarifying and teaching strategy formulation uses the thinking process tools of the theory of constraints. In this article, we briefly describe these thinking process tools and apply them to a popular introductory strategy case to illustrate how they can be used to teach strategy formulation. Implications of the thinking process for other strategic management issues are also discussed.

no one has been able to explain satisfactorily what goes on inside the box.

Our purpose in this article is to present a set of constructs that are theoretically sound and pragmatically focused, and reduce the inherent frustration in teaching strategy formulation. The constructs are based on Goldratt's Theory of Constraints (TOC). First, we discuss how and why TOC principles and their related planning tools solve these problems. Second, we apply these tools to a strategic planning case, thus demonstrating their pedagogical power. Finally, we conclude with a discussion of specific recommendations for applying TOC to the teaching of strategic planning.

## The Theory of Constraints and Strategic Planning

In an attempt to remedy the deficiencies in strategic planning models, we propose the use of the theory of constraints "thinking process," a set of very general process improvement and problem-solving techniques developed by Goldratt (1992). The tools are designed to answer three questions:

1. What factor(s) should be changed?
2. What should the change outcome be?
3. How can the change be brought about?

Goldratt (1992) claimed that the thinking process provides a structured method for accessing management's ability to solve business problems intuitively. This feature of the TOC thinking process directly addresses one of the failings of typical strategic planning approaches: their minimization and disregard of intuition in the strategic planning process.

In Table 1, we show parallels between the TOC thinking process and the strategic planning process. A company that is performing a situational analysis as part of its strategic planning process is answering the question, What factor(s) should be changed? And strategy implementation is clearly

answering the question, How can the change be brought about? However, the most critical question in strategic planning, the one that is answered in the black box, is What should the change outcome be? In answering this question, the real power of the TOC thinking process for strategic planning becomes clear. The relationship between the thinking process tools and existing strategic management tools is shown in Figure 1.

The discussion of the tools that follows is necessarily brief. However, we believe that the application of the tools described will provide an illustration of the power of the thinking process tools applied to strategic planning. Moreover, detailed descriptions of the thinking process can be found in a number of sources (see Dettmer, 1997; Scheinkopf, 1999).

### Application of the TOC Thinking Process Tools to a Strategy Case: Robin Hood

Next, we apply the thinking process tools to "the Robin Hood case." This is a two-page case used in introductory strategic management courses to illustrate a variety of issues in strategic management (see Thompson & Strickland, 1999, for the full case). The case is useful because it highlights human resources, marketing, operations, and leadership issues in a situation calling for immediate action. The setting for the case is approximately 1 year after Robin Hood's band of merry men started operations in Sherwood Forest with the mission of "robbing the rich and giving to the poor." Several problems with the current strategy have appeared: (a) The rich are traveling around Sherwood Forest, (b) game is becoming scarce, (c) the sheriff is growing stronger and better organized, (d) the cost of buying food and supplies is increasing, (e) discipline is becoming harder to implement, (f) the encampment is becoming easier to detect, (g) revenues are in decline, and (h) financial reserves are declining.

In addition to the problems, several opportunities, or at least alternatives, are being proposed by various members of the band. These include implement-

Arrow	Assumption	Injection
A-B	The growing band needs increasing amounts of revenue to buy food and supplies.	<i>Freeze the size of the band.</i>
	The financial reserves are not large enough for the band to sustain itself.	<i>Rob the Bank of England.</i>
B-D	There is no other way to increase revenues.	<i>Expand the geographical area of operation of the band.</i>
	A transit tax would collect money from all who travel through Sherwood.	
A-C	The band will not function effectively if the band is not satisfied. The band needs the support of the poor people.	
C-D'	Poor people are dissatisfied with the Sheriff's taxes, so they will be dissatisfied with the transit tax as well.	
	The tax would have to be applied to both rich and poor people.	
D-D'	The band cannot do both. The band cannot tax some travelers while not taxing others.	<i>The band applies different tax rates to the rich and the poor.</i>

	<i>Analysis</i>	<i>Formulation</i>	<i>Implementation</i>
Existing strategic management tools	SWOT analysis Five forces model	Black Box	Short-term objectives, policies, tactics, and rewards
Theory of Constraints tools	<i>What factor(s) should be changed?</i> Current reality tree (CRT)	<i>What should the change outcome be?</i> Evaporating cloud (EC) Future reality tree (FRT)	<i>How can the change be brought about?</i> Prerequisite tree (PRT) Transition tree (TrT)

ing a fixed transit tax, killing the sheriff, and joining with a group of barons to free King Richard from captivity in Austria. It is clearly time to analyze the situation and formulate and implement a strategy.

#### *Situational Analysis: The Current Reality Tree (CRT)*

The first step of the strategic planning process is the current reality tree, which

uses cause-and-effect logic in conjunction with the tree builder's intuition to identify the core problem in a system. The core problem is one that underlies (i.e., causes through a chain of cause and effect) a number of other problems in a system and is the answer to the question, What factor(s) should be changed? The first step in constructing the CRT is to make a list of problems or symptoms in the current situation: In SWOT terms, the list of problems might

be viewed as a list of weaknesses and threats. Problems are referred to as undesirable effects (UDEs) because they are generally effects or symptoms of a less obvious problem. Some of the UDEs, or symptoms, from the Robin Hood case are listed above.

Any two of the UDEs that appear to be causally related can be selected to start the process of building a CRT. In many cases, one entity by itself is insufficient to cause another—the cause must be combined with another statement about current reality to establish the causal relationship. In this case, two or more causes with an ellipse connecting their arrows would lead to an effect. Other times, several entities might cause an effect *independently*, in which case there would be more than one arrow leading to an effect without an ellipse. We continue building the CRT until we identify a core problem (see Figure 2).

The completed tree is shown in Figure 2. Note that though the CRT is built from the top (i.e., the undesirable effects) to the bottom, it is read from bottom to top (i.e., from causes to effects). The core problem identified in the Robin Hood CRT is entity 101, “The band does not have a long-term plan.” This makes intuitive sense: If the band had had a viable long-term plan from the beginning, they probably would not have found themselves in their current situation at the end of the first year of operations. The core problem also makes sense on another level. Because the UDEs are diverse, relating to marketing, human resources, and operations issues, we would expect any core problem that underlies all of them to be a relatively broad issue.

Core problems often persist not because no one realizes that they are problems but because, in many cases, one person or department does not have the power in the organization to fix them. For example, they may persist because of an unresolved conflict, a situation in which different parties have conflicting needs and wants and neither has the power to impose a solution on the other. The solution to the core problems does not come out of the current reality tree but from the next step—the evaporating cloud.

#### *Strategy Formulation: The Evaporating Cloud (EC)*

Next, we show how the thinking processes tool known as the evaporating cloud (EC) can be used to illuminate the black box of strategy formulation. This tool is based on the reasoning that in order to achieve a common objective, the needs of each party (i.e., requirements) must be satisfied, but their specific wants (i.e., prerequisites) might not be. The purpose of the evaporating cloud is to develop win-win solutions to such conflicts, thereby eliminating the core problem.

The first step in creating an EC is to find a common objective that both parties in the conflict can agree on. It is in some sense the opposite of the core problem. The next step is identifying the conflict that prevents the objective of the cloud from being achieved. Although a number of conflicts are present in Robin Hood’s situation, an obvious one is that between those who favor implementing a fixed transit tax and those opposed to the tax. Once the objective and conflict are identified, we ask the question, What requirements are the parties to the conflict trying to satisfy? In proposing a fixed transit tax, Robin Hood is obviously trying to ensure a steady source of revenues to sustain the band. The rest of the band, by opposing the tax, is attempting to maintain the goodwill of the poor people whom the band helps. Once the requirements are identified, the cloud can be constructed as shown in Figure 3.

The top side of the evaporating cloud is read from left to right: “For the band to have a viable future, we must increase revenues to sustain the band. In order to increase revenues to sustain the band, we must implement a fixed transit tax.” The bottom of the cloud is read the same way, also starting with the objective. The conflict arrow (between D and D’) is read: “We cannot both implement a fixed transit tax and not implement a tax.”

Assumptions underlie each of the arrows in the cloud. If we do a thorough job of identifying assumptions, we can identify some that are either not valid, or for which we can think of an action (referred to as an injection) that will invalidate the assumption. In either

case, the conflict will be eliminated (i.e., the cloud will evaporate). There are several simple techniques for surfacing assumptions that we will not go into here. In Table 1, we list assumptions for each arrow on the cloud, together with potential injections for the cloud presented in Figure 2.

#### *Strategy Formulation (Continued): The Future Reality Tree (FRT)*

The next step in the thinking process is to test the injections to ensure that they produce the effects we want without creating unacceptable new undesirable effects. We do this in the future reality tree (FRT), by placing the injection from the evaporating cloud at the bottom of a page, and desirable effects, the opposites of the undesirable effects in the current reality tree, at the top (see Figure 4). We then use the same cause-and-effect logic employed in the CRT to build from the original injection(s) developed in the evaporating cloud to reach the desirable effects. Generally, other small injections will have to be added as the FRT is constructed. If new undesirable effects appear as we build it, we must develop additional injections to trim these “negative branches.”

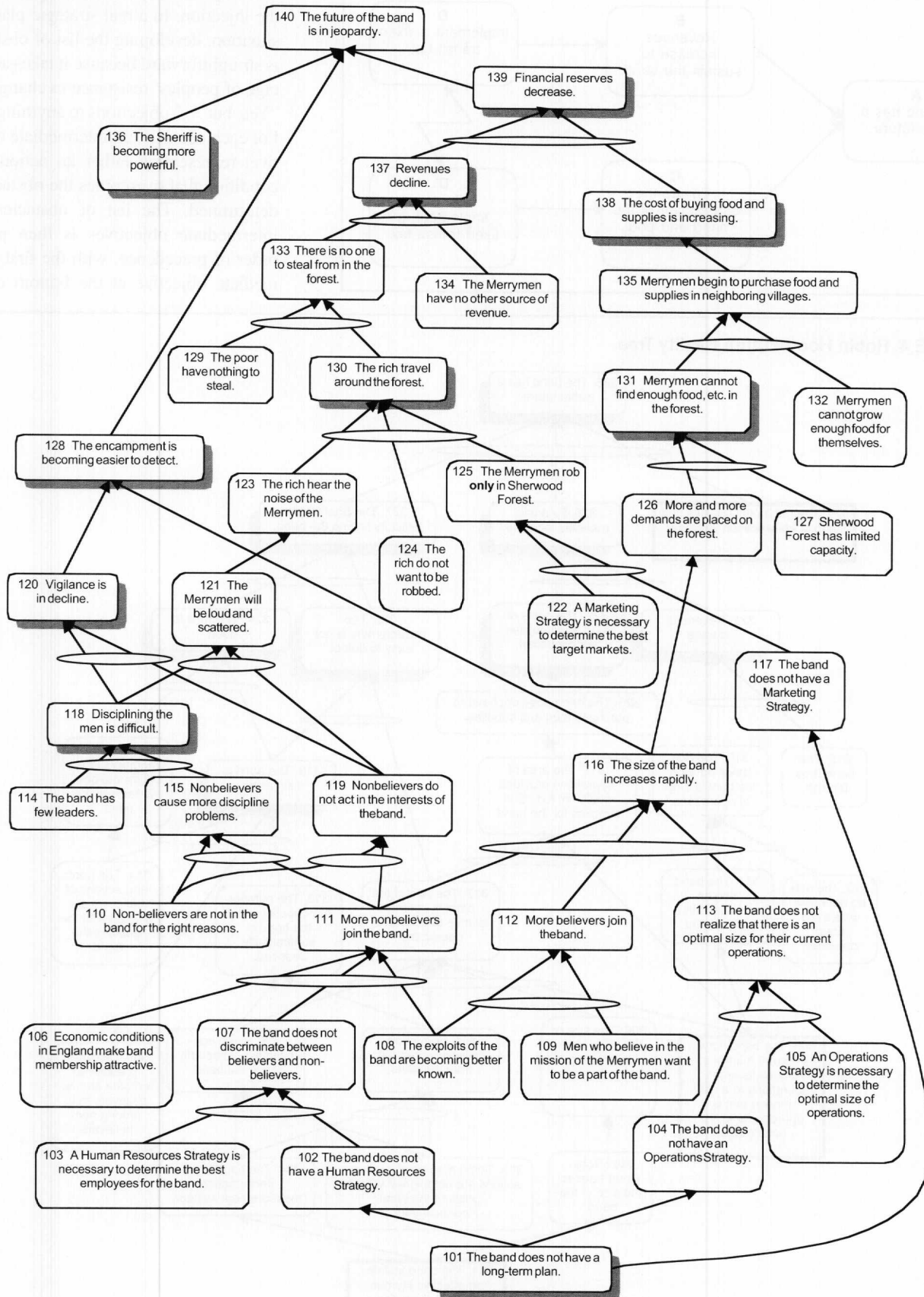
Upon completion of the future reality tree, we have a list of injections shown to produce desirable effects and have demonstrated that no new undesirable effects are being produced. Thus, the evaporating cloud and the future reality tree together address the question of what the desired outcome is; that is, how to formulate a new strategy for the firm. To ensure that the ideas, or injections, are implemented effectively, we build a prerequisite tree that answers the question of how to bring about the change.

#### *Strategy Implementation: The Prerequisite Tree (PRT)*

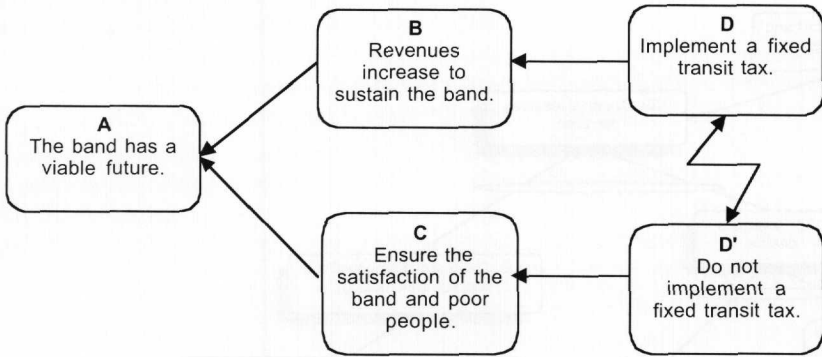
The purpose of the PRT (see Figure 5) is to identify all obstacles preventing achievement of a desired course of action, objective, or injection. When used in conjunction with the future reality tree, the desired objective is implementing the injections reflected on the FRT.



**FIGURE 2. Robin Hood Current Reality Tree**

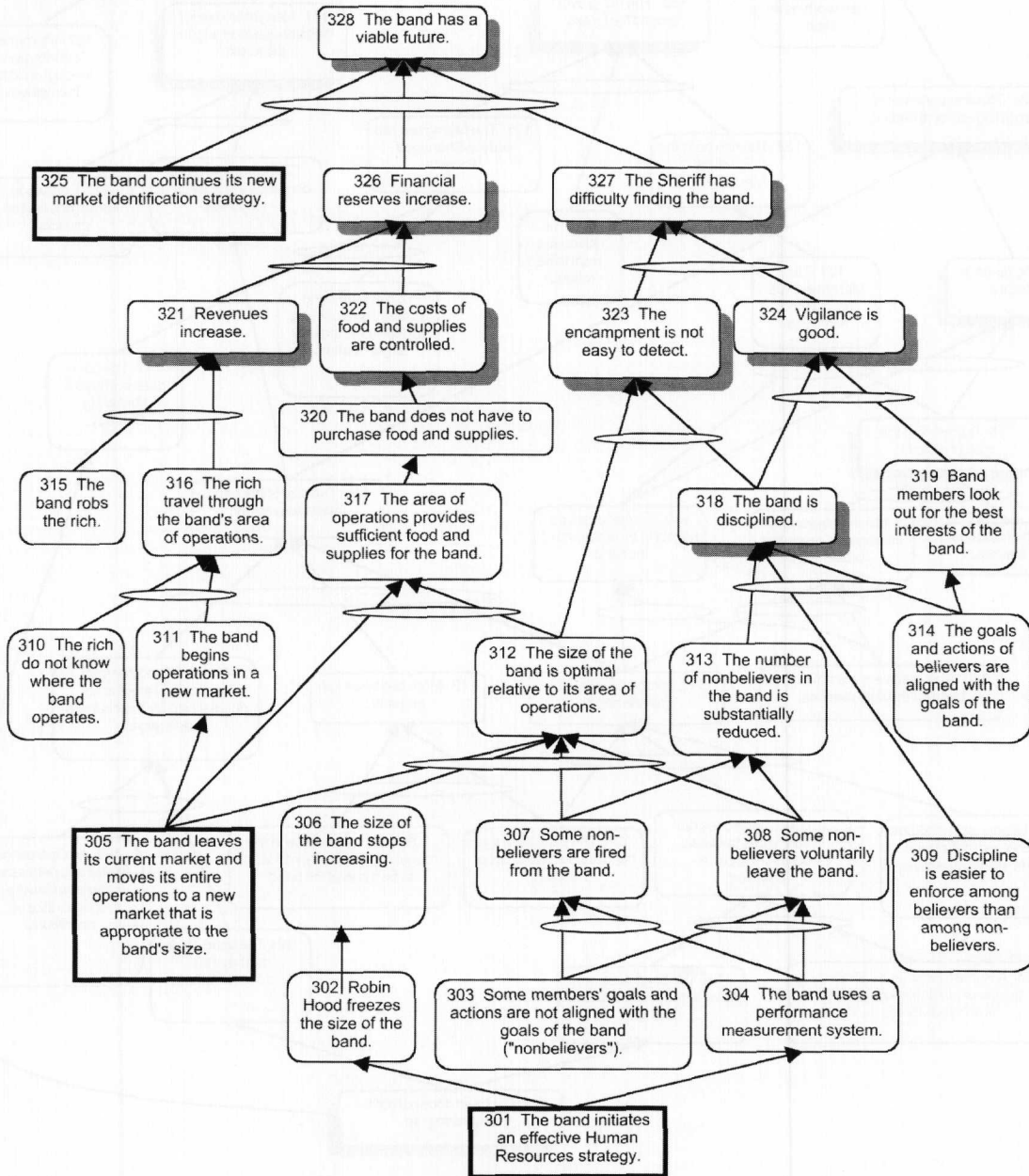


**FIGURE 3. Robin Hood Evaporating Cloud**



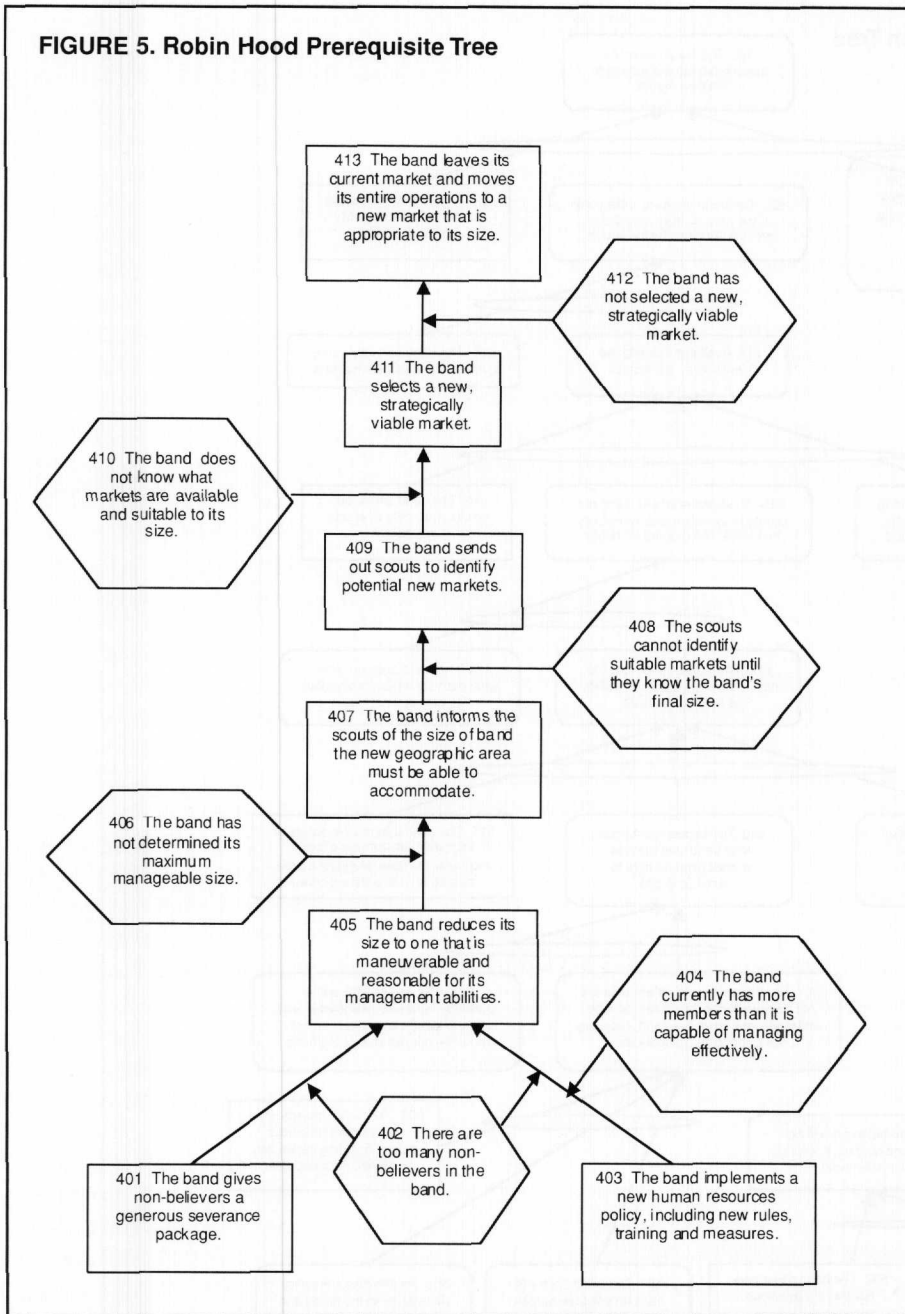
The PRT is constructed by first developing a list of all obstacles that stand in the way of immediately implementing the injection. In a real strategic planning situation, developing the list of obstacles is straightforward because it takes advantage of peoples' resistance to change and "Yes, but..." objections to anything new. For each obstacle, an intermediate objective, representing either an action or a condition that overcomes the obstacle, is determined. The list of obstacles and intermediate objectives is then put in order of precedence, with the first intermediate objective at the bottom of the

**FIGURE 4. Robin Hood Future Reality Tree**





**FIGURE 5. Robin Hood Prerequisite Tree**



PRT, followed by the second, and so on. Next to each intermediate objective is the obstacle that it overcomes. Thus the PRT flows chronologically from the present at the bottom to the future at the top, which represents the point at which the objective is reached. However, the PRT is read from top to bottom, with a format similar to that of the EC.

In some cases, the sequenced list of intermediate objectives represented by the PRT provides enough detail for implementation by the various functional areas. However, if the obstacles are significant and the intermediate objectives represent complex actions, a more

detailed plan may be needed. For this we turn to the transition tree.

*Strategy Implementation (Continued):  
The Transition Tree (TrT)*

The transition tree represents a logically sequenced “to do” list of very specific actions and the rationale behind each action. It becomes useful when the intermediate objectives of the prerequisite tree are complex actions or conditions, or when it is necessary to give clear instructions, including the logic behind the instructions.

The Robin Hood transition tree is

shown in Figure 6. The reasoning used in the transition tree is the same as that in the CRT and the FRT. The transition tree is also similar to the FRT in that both are concerned with future actions and consequences. However, the TrT differs from the FRT in that it is much more detailed and usually follows a repeating structure. The increased level of detail is required because the TrT is a detailed implementation tool, in contrast with the FRT, which is used to test the broad consequences of a proposed course of action.

**Implications of the TOC Thinking Process for Teaching Strategic Planning**

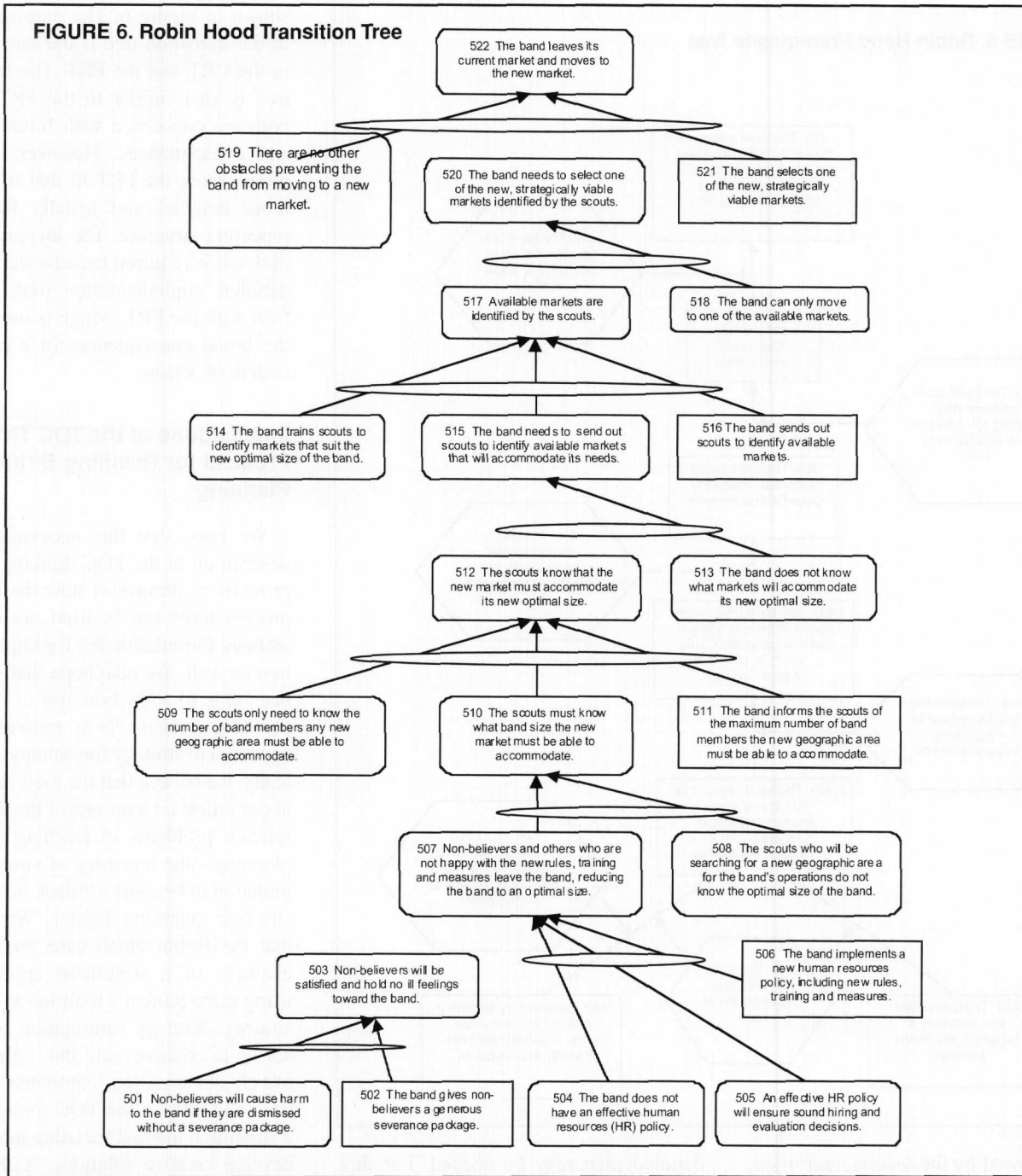
We hope that this necessarily brief description of the TOC thinking process provides a glimpse of how the thinking process tools can be used not only for strategy formulation but for implementation as well. We also hope that we have been able to show how use of the TOC thinking process is a radically new approach to strategy formulation. Specifically, we believe that the tools presented in our article address one of the most significant problems in teaching strategic planning—the tendency of strategy formulation to become a “black box” in the strategic planning model. We believe that the Robin Hood case provides an example of a structured approach to using management’s intuition to develop strategy. Strategy formulation is necessarily a creative act, but rather than merely stressing the importance of intuition and insight, the TOC tools provide a structured method for using intuition to develop creative solutions. Rather than simply teaching our students to search for “the best” strategies that leverage strengths and opportunities, TOC thinking processes provide them with a way to develop creative strategies specific to a company’s situation.

We had an opportunity to use the thinking process tools to teach an undergraduate strategic management class. Initial feedback from the students was very positive, as some of the following student comments attest:

“I have actually been thinking differently and using the tools for situations at work.”



FIGURE 6. Robin Hood Transition Tree



“My co-workers and I have already used the evaporating cloud at work.”

“I have already begun using the theory of constraints processes both at home and at work.”

A logical next step in this research might be the application of the thinking process to a well-known, “real world” case, followed by a single- or multiple-case study of the application of the thinking process to strategic planning in a real firm. When these case studies enter the literature, our ability to teach

strategy formulation will be enhanced significantly.

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