



WOODSTRAT: A SUPPORT SYSTEM FOR STRATEGIC MANAGEMENT

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THE CORPORATION AND THE COMPETITIVE ENVIRONMENT

Today, Finland has more forests than it has had for the last several hundred years. This is due to the ecological concept of *sustainable development*, in which a considerable part of the forest's natural growth remains unexploited. Although Finnish pine and spruce forests are only about 1 percent of the total resources in the world, Finland has been able to build a leading position among the forest industry nations.

Metsä-Serla is a Finnish forest products group with 1993 net sales of FIM 8,239 million (U.S. \$881 million). It is the fourth-largest forest products company in Finland; its operating profit was FIM 964 million (U.S. \$220 million) and the consolidated financial result was over FIM 550 million (U.S. \$126 million) better than in 1992. This shows an impressive recovery from a severe recession in the Finnish forest industry. The year 1993 will be remembered "as one in which, in real terms, prices for several forest products on world markets fell to their lowest level in 20 years" (Timo Poranen, president and CEO of Metsä-Serla). In its eight divisions, which operate rather independently, Metsä-Serla processes wood raw material into paper and paperboard, corrugated board, and tissue as well as sawn goods, pulp, and chemicals. It has production and marketing operations in Europe and sells its products worldwide; exports from Finland and sales through foreign subsidiaries together contribute 84 percent of net sales. Metsä-Serla's basic strategy is to expand and strengthen its market positions in carefully selected core businesses (Metsä-Serla, *Annual Report 1993*). In 1993, the number of employees was approximately 8,700, of whom almost 30 percent worked outside Finland.

Metsä-Serla has undertaken a rapid and thorough adaptation to the emerging characteristics of its European markets. It was one of the first companies in Finland to adopt modern environmental values and has actively de-

veloped proenvironmental technology and products. "We see it as a trend that we should be directly involved in, right from the start," says Timo Poranen. "We are concentrating on manufacturing the type of products that best bring out the excellent properties of primary fiber; an additional factor is that products should be well suited to recycling and processes should consume as little energy as possible." Strategic thinking has a long history in the corporation and new ideas have, on many occasions, been very successfully implemented.

In the corporation, strategic planning used to be rather a formal exercise. This is the case in most forest industry corporations, where the pressures of rapidly changing markets and strong competition quickly make most strategic plans obsolete. Ossi Kokkonen, a senior vice president, did not feel very happy with the way things were done. He heads a division with nine small business units (SBUs) representing sawn goods, pulp, and building materials. These SBUs operate with multiple products in different markets and market segments. Softwood and hardwood pulps are mainly sold to Metsä-Serla's other mills, and fluff pulp (a speciality that is used as raw material for hygiene products) is marketed mainly to European and North American manufacturers. Important segments for the sawn goods are joinery, planing mill, furniture, packaging, and construction industry. Sawn goods are marketed through the division's own sales offices in Denmark, the United Kingdom, France, and Switzerland; in the other markets, sales are taken care of by local agents. Building materials—windows, doors, log houses, and saunas—are distributed to European markets, but also remote markets such as the Japanese have been attractive for log houses. Ossi Kokkonen's view on traditional strategic planning is that the process offers very little substance to its participants. He elaborates as follows:

My vision is that the process should be a dynamic one, sensitive to changes in the competitive context and aimed at creating strategic advantages. I want more effective strategic management processes, as I expect my people to be well prepared to face drastic changes and new challenges in the markets. I am not too sure that my managers are practicing customer-oriented thinking, which is one of the cornerstones in my management philosophy [forest industry companies have tra-

ditionally been production oriented]. I have my doubts about how knowledgeable my SBU teams are about assessing their expected market shares, developing their competitiveness, and attaining expected sales margins of their segments or markets. I am looking for ways to make the strategic planning knowledge based, dynamic, interactive, and more insightful—at least in my own division. This is why I formed the Woodstrat consortium together with the Institute for Advanced Management Systems Research [IAMSRS] and Kymmene [another major Finnish forest industry corporation].

The consortium has developed a new technology for building and implementing support systems for strategic management in the forest industry; this support system is called *Woodstrat* and is a knowledge-based system, built as a hybrid of an object-oriented expert system and a hyperknowledge¹ user interface. Kokkonen explains that “in the beginning, I had the feeling that the Woodstrat concept was far too theoretical and abstract. We proposed to link market and competitive visions to profitability, and I thought it was—if not impossible—at least far too advanced for practical purposes. But the relationships turned out to be almost self-evident for my SBU managers, and now I feel a little bit ashamed to confess it.”

The first version of the *Woodstrat* support system was done with a Lisp-based expert system shell which turned out to be too restrictive and was quickly followed with a full-scale system in PC ToolBook (by Asymetrix). The most recent version is built with Visual Basic (version 3.0 by Microsoft Corporation), in which all the expert systems and hyperknowledge features of the Lisp and ToolBook versions have been constructed as objects, with their elements designed to jointly perform the hyperknowledge functions. The system is run on portable PCs that allow users to spend time with the system out of the office. The end result is that the Woodstrat system is actually run by SBU managers; it is extensively used as a support system in strategic management; and users are actively improving the system while they use it.

THE WOODSTRAT SYSTEM

Strategic management is commonly understood to cover both the strategic planning process and implementation of its results. Metsä-Serla quickly found out that we needed a more formal description of the concept. *Strategic management* is the process through which a SBU, for a chosen planning period, (1) defines its operational context; (2) outlines and decides upon its strategic goals and

long-term objectives; (3) explores and decides upon its strengths, weaknesses, opportunities, and threats; (4) formulates its sustainable competitive advantages; and (5) develops a program of action that exploits its competitive advantages and ensures profitability, financial balance, adaptability to sudden changes, and sound development of its capital structure. This requires an advanced support system, and the technology developed in Woodstrat became fairly advanced but also very supportive for users.

Technology is, however, not enough. There were some practical issues that needed to be tackled and solved satisfactorily: (1) where to get reliable external data, (2) how to find enough information about strengths and weaknesses of key competitors, (3) how to determine the effects of perceived competitive advantages on competitive positions in key market segments, and (4) how to combine and transform the results of strategic decisions into estimates of profitability, financial positions, and capital structure for the strategic planning period. Metsä-Serla has resolved these issues using Woodstrat, which became a natural and logical basis for the strategic planning process.

Ossi Kokkonen explained the evolution of the system at Metsä-Serla:

In the beginning of the project, we were far too eager to create a system for all aspects of the strategic arena. But as we went along with the development process, we were able to separate important strategic issues from those of minor interest; this made the system more easy to grasp. My managers do not accept a system which they do not fully understand. Implementing traditional profitability measures is, of course, easy and understandable, but implementing nontraditional measurements, such as customer satisfaction, is hard to do and even harder to link to profitability in any intuitively understandable way.

We succeeded, and in my division from now on we can do more effective and efficient planning. Of course, my SBU managers are now forced to learn more about their business, as they have to take into account many more factors than before. They must consider different scenarios and visions and, of course, Woodstrat gives me the possibility to demand a greater knowledge about our markets, competitors, and customers. I have started to think of Woodstrat as a multi-dimensional navigation chart (I am a sailor) for my division. It means I can plot a course for the years ahead and locate my division in terms of positions (market, competitive, and production); profitability; and sustainable competitive advantages [see Figure 1].

In Woodstrat, these conceptual constructs are linked with functions and logistical connectives to form a *hyperknowledge* system—a context in which they interact to form a synthesis that represents possible variations of sustainable competitive advantages. The support system was

¹Hyperknowledge is represented by a system of concepts, in which the use of a concept triggers another concept in a theoretically correct and meaningful way (see Chang et al. [1993] and Walden and Carlsson [1994]).

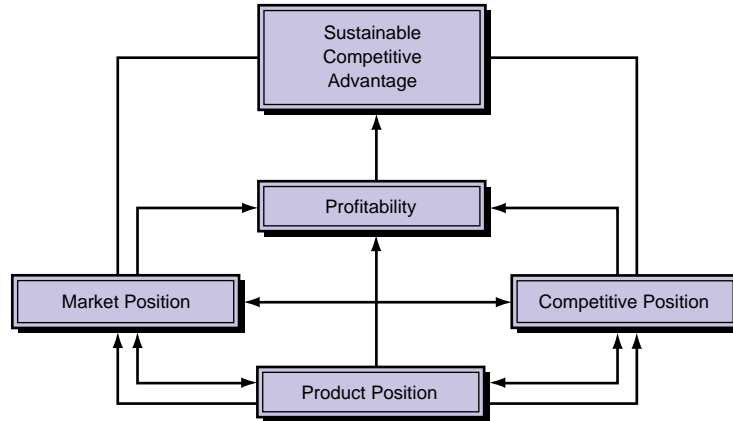


FIGURE 1 Strategic management: a conceptual framework.

implemented in all nine SBUs, with some variations to account for differences in markets and competition.

The status and expected developments of an SBU are defined by its strategic *market position*, in which expected net sales (defined by forecasts of sales volumes and prices) is determined. The market position is influenced by the competitive position and the production position, which both determine the profitability. The market position is built with knowledge-based (KB) links among several different conceptual constructs. Countries are described with economic indicators, and markets/segments are characterized by market share, competitive ability, profitability, and volume and price development (see Figure 2). Woodstrat helps the SBU management teams work out the potential of all the markets/segments in which they operate in terms of forecasted demand and their share of it as well as expected price development and changes in currency exchange rates. This process also shows the management team where they are missing data about the market, where they need more knowledge about their customers and the competition and so on. Woodstrat initiated bench-marking studies in key mar-

kets. In order to enhance market knowledge, the system will also be distributed to all sales offices in Europe, which will be an effective way to update and develop the knowledge base on the markets.

The strategic market position is partially determined by the *competitive position*, which covers the same countries, markets, segments, and product groups (see Figure 3). Hyperknowledge links give access to the same background information as in the market position module. Woodstrat is supported by a rather extensive database with country and market forecasts.

In order to determine their competitive position, SBU managers are expected to assess their price competitiveness, their competitive advantages (with support from KB-links to models of critical success factors for the segments), the threat from entries of new products in the segments, viable market strategies, and the influence of their corresponding market position on the competitive position. Assessment of the competitive position is consolidated from all individual assessments. Factors defining the competitive position may change among the SBUs, and the hyperknowledge environment allows for changes

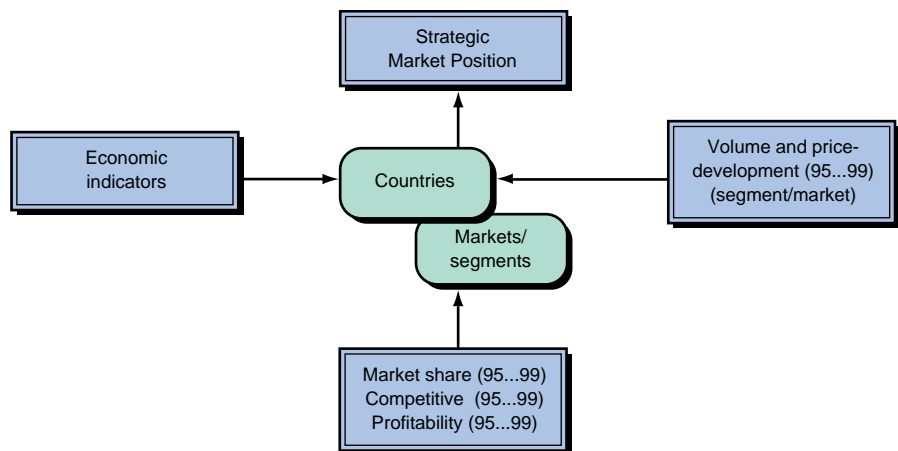


FIGURE 2 Market position

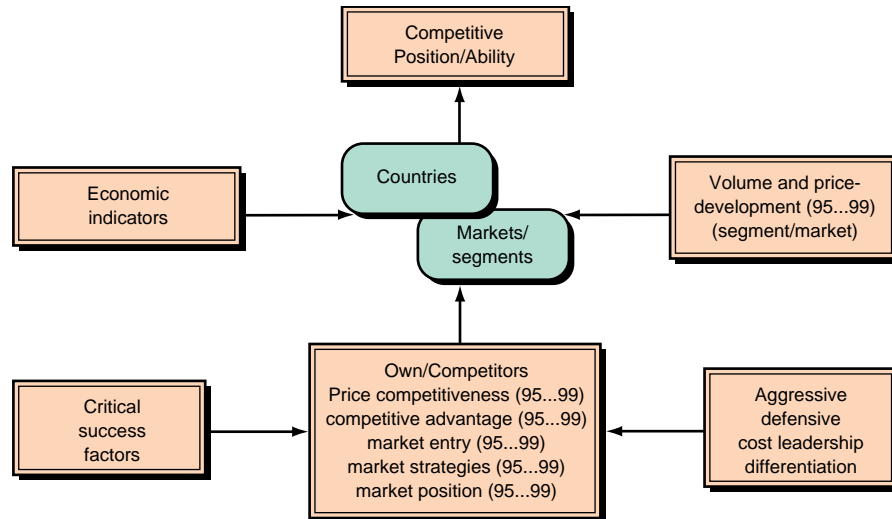


FIGURE 3 Competitive positions: own vs. key competitors

and adaptive actions concerning the background information given the managers.

After deciding their own competitive positions, SBU managers select their main competitors and assess both their critical success factors and the expected development of competitive status for the planning period. The competitive positions (their own, competitors) are evaluated for each country, market/segment, and product group. They are then consolidated to give the overall competitive position for the SBU. The overall position is used to modify the overall market position (with KB-links) and to modify the forecasts of net sales and operational costs (with another set of KB-links).

Here, Woodstrat produced an unexpected bonus: the management teams were able—in many cases, for the first time—to assess their critical success factors and determine their competence in them. It turned out that, for the first time, they also could compare themselves with key competitors in a systematic way. In many cases, they realized that they did not know enough about the competition, and sales offices were activated to find out more. Links to the market position and the possibility to determine how volume and price developments are influenced by the competition were considered to be very useful.

Sustainable competitive advantages are also defined by the *production position*. This is the SBU manager's assessment of the potential development of the unit's overall productivity as a function of several factors: (1) quality of raw material, (2) availability of energy, (3) skill level of personnel, and (4) quality level of production technology. The overall productivity level, when consolidated from these factors, will improve both market and competitive positions (through a system of KB-links). The productivity will also define parts of the operating costs (through another set of KB-links), which are very sensitive to changes in the productivity levels (see Figure 4).

Decisions on major process investments and assessment of their impact on production technology and productivity are part of the production position. In this way, investment decisions are evaluated properly. With the help of KB-links, their impact on the sustainable competitive advantages is assessed, and their effects on both operating costs and financing are worked out in detail.

Productivity is enhanced with cost-effective production technology and by the use of full production capacity to produce competitively priced products that completely cover the SBUs' share of the market demand. Thus, productivity is influenced by the customers' demand patterns, the competition, and the price/cost relationships between products and production factors. Productivity is supported or enhanced with investments in production technology, which influence product quality and costs. Needless to say, the cause—effect relationships involved are complex, and Woodstrat—probably for the first time—offered a means for figuring out the interdependencies of productivity as well as market and competitive positions for an individual SBU.

The market, competitive, and production positions are linked to the *profitability and financing positions*, which shows the forecasts of income, positive and negative cash flows, capital structure, and profitability for the planning period. As the linking is done with KB-links, it has been possible in Woodstrat to ensure that the impacts of the various factors are theoretically correct, intuitively understandable, and supportable with empirical data.

The process described in Figure 5 is a simple and practical way to work out the financial implications of strategic visions, which is a necessary but rather difficult task. Much of the work done in careful strategic planning is simplified away when it should be evaluated in terms of financial consequences. The integrated evaluation introduced in Woodstrat gained immediate accep-

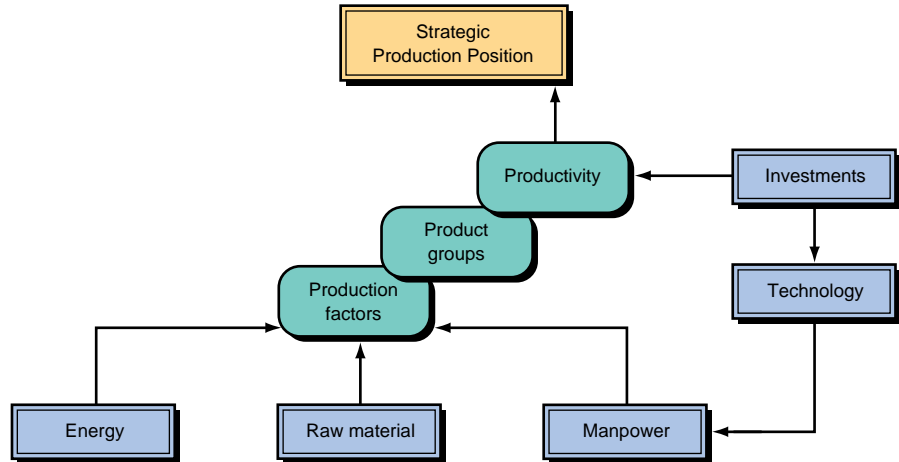


FIGURE 4 Production position.

tance among the SBU managers as it eliminated a tedious, time-consuming and uninspiring phase of the planning process.

In addition, Woodstrat proved to offer more thorough and systematic information on the consequences of various market and competitive assessments, and the analysis carried out was more thorough, more detailed, and faster than before. The managers were confident that they could gain advantages relative to their competitors because they had a better understanding of their customers and their markets but also because they could guess the competitors' next strategic moves on the market with support from their own knowledge base. Ossi Kokkonen sums up his feelings on the system this way:

Woodstrat has given me a fair basis for evaluating my SBU-managers' level of knowledge, and it has created a very natural, on-going need to improve it. Now, I really have the feeling that we have done the basic work as it should be done. We have cut off all matters of minor importance for strategic management, and we have realized that we should concentrate on the customers who are really important to us.

Even with this much more detailed and systematic planning process, I am not going to need more plan-

ning staff in my division; I will need more portable PCs for my managers who are doing the planning. Woodstrat has been able to make many key decision processes faster because all the important external and internal information is available on the spot. If any information in the system proves to be wrong, the message to my managers is to correct it on the spot. Now I believe that we have a system to make strategic management an effective, dynamic process in my division. With Woodstrat, I am able to quickly and thoroughly communicate strategic shifts and changes with all my SBUs, and I have an effective instrument for continuous and systematic evaluation of how successful my strategic decisions have been.

The future is also very straightforward, from Kokkonen's point of view: Woodstrat will be an ongoing development process. The knowledge base should be even more profound and the system should be enlarged to cover the sales offices abroad. We will next look into possibilities to link all the SBUs and the sales offices in a corporate-wide, European LAN in which to consolidate the knowledge, assessments, updates, decisions, plans, and conclusions that we make with Woodstrat. I am going to establish a training program in order to make the use of Woodstrat routine.

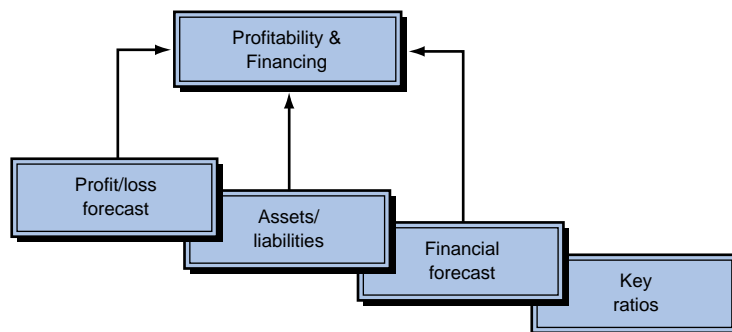


FIGURE 5 Profitability and financing position.

CONCLUSIONS

The Woodstrat system was built and implemented in all nine SBUs during 1992 and 1993; the development work was done in close cooperation with the SBU management teams as a series of prototypes. The system was tested by managers during the entire development process on a continuous basis. The system contains the knowledge and experience of the SBU managers because they had the opportunity to participate in the development process. The managers feel that Woodstrat is their own system. "The reason why the managers have accepted the system is because they were allowed to play an active part in its development process, and I am convinced that this is the only successful way to build support systems for upper-level managers," Kokkonen said—with a smile.

With Woodstrat, management team members work through their business more carefully in several ways: (1) they are guided to determine their own market positions in all their markets/segments in a number of countries; (2) they assess their own competitive positions in the same markets/segments by determining how good they are going to be on critical success factors, both independently and in relation to the competition; (3) they evaluate their production technology and productivity, and compare themselves with their competitors; (4) they work out the necessary investment plans and their corresponding financial plans; and (5) they work out a profitability position, a forecast of the capital structure, the long-term cash flows, and key ratios.

The support system received quick and easy acceptance. Between 1992 and 1994, managers were tested on several points: (1) their cognitive maps of strategic management as compared with the strategic planning documents prior to Woodstrat; (2) the minimum knowledge base for effective strategic management; (3) the effectiveness of strategic planning with Woodstrat; (4) the effectiveness of group processes supported with Woodstrat; and (5) their insights on the critical elements that form the sustainable competitive advantages. Results so far show definite improvements in the quality of some key elements of the strategic management process.

CASE STUDY QUESTIONS

1. What are the key elements to assess when building strategic plans?
2. Explain how computer support could be used to enhance the process of building strategic plans.
3. Examine Figure 3 and explain how you would visualize the role of hyperknowledge links in accessing information.
4. Explore the potential of some innovations in information technology to be used for building support systems in strategic management.
5. Explore the use of hypermedia as a basis for group support systems.

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