More Effective Strategic Management with Hyperknowledge: Case Woodstrat

Pirkko Walden and Christer Carlsson

Institute for Advanced Management Systems Research (IAMSR)
Åbo Akademi University
DataCity A 3208, 20520 Åbo, Finland

Woodstrat is a support system developed for strategic management. The development process was carried out interactively with managers in two major Finnish forest industry corporations. The system is modular and is built around the actual business logic guiding and controlling strategic management in these two corporations. The main modules cover the market position, the competitive position, the productivity position and the profitability and financing positions. The innovation in Woodstrat is that these modules are linked together in a hyperknowledge fashion, that is, the core concepts of strategic management are brought to interact. The intermodular links are based on expert knowledge which also is worked into the modules to guide the manager through the process of working out sustainable competitive advantages. The hyperknowledge approach makes this support intuitive and effective, as the elements are linked to each other in combinations that are familiar to the user.

Key words: Strategic management, hyperknowledge, decision support systems, interactive support, forest industry

Introduction

The process of *strategic management* is about coping with complex relationships and uncertain futures in a way that enables us to create and maintain sustainable competitive advantages for a corporation and its strategic business units. This process is a dynamic one and sensitive to changes in the competitive context, at least that is what it should be. In practice, however, it has turned out that the process is often a formalistic exercise which offers very little substance to its participants. One of the many reasons for that is that rapidly changing markets and a strong competition quickly make most strategic plans obsolete; thus most

managers do not think it worth too much effort to build comprehensive plans. There are, however, some research results which show that a lot of companies can be expected to improve their strategic management processes with the help of knowledge-based support systems (1). There are a number of moments which could be handled more effectively and with much better results if some support systems technology would be applied.

Among managers *strategic management* is normally understood to cover both the strategic planning process and the implementation of its results. It is an integrated program of means by which a firm secures and sustains competitive advantages (2). This involves understanding and transforming some proper and consistent selection of strategic management concepts into specific strategic action programs.

In our specific context, the Finnish forestry industry, this translates into working out how to position strategic business units of a corporation such that the corporation can build and sustain competitive advantages in its key market segments.

As a starting point, let us first construct a conceptual skeleton of what could be the substance of strategic management:

s*trategic management* is the process through which a company for a chosen planning period (i) defines its operational context, (ii) outlines and decides upon its strategic goals and long-term objectives, (iii) explores and decides upon its strengths, weaknesses, opportunities and threats, (iv) formulates its sustainable competitive advantages and (v) develops a program of actions, which exploit its competitive advantages and ensure profitability, financial balance, adaptability to sudden changes and a sound development of its capital structure.

It is quite easy to verify that this formulation is consistent with most definitions given by various authors (cf. 2,3,4,5).

We used this fairly rough formulation as a basis and gradually worked out a joint understanding of the elements with the management teams in 15 strategic business units (SBUs) from both corporations. We actually did not have too much debate about the conceptual basis and the key concepts (the only exception was some of the corporate planning staff who were more thorough on the definitions than either we or the SBU managers). The focus was on practical issues such as (i) where to get reliable external data, (ii) how to find enough information about strengths and weaknesses of key competitors, (iii) how to determine the effects of perceived competitive advantages on competitive positions in key market segments, and (iv) how to combine and transform the results of strategic decisions to estimate profitability, financial position and capital structure for the strategic planning period.

We gradually learned that the way managers think about strategy, and make sense of their company worlds, is the basis for creating strategic visions. Visions are here seen as embedded in strategic management, both in the creation and the implementation of what we define as sustainable competitive advantages. When developing *Woodstrat* we helped the managers to form visions of how to create and articulate *sustainable competitive advantages;* these were understood as a synthesis of visions of a *market position, competitive position, production position, investments* and their related *financing;* the visions are enhanced or restricted by facts about the context, which identify the market potential, key competitive factors, the competitors and the set of possible strategies (cf. *environment*, *competitors*, *product mix*); the visions and the facts are combined to generate options and form strategic action programs, which are defined both for the strategic business unit and corporate levels; finally, the visions and the strategic action programs are evaluated in terms of profitability and capital

structure (specified as an *income estimate*, a *balance estimate, long term cash flow* and *key ratios*) which represent stakeholder interests.

The strategy formation process in *Woodstrat* helps a strategy emerge from a qualitative belief system (cf. figure 1).

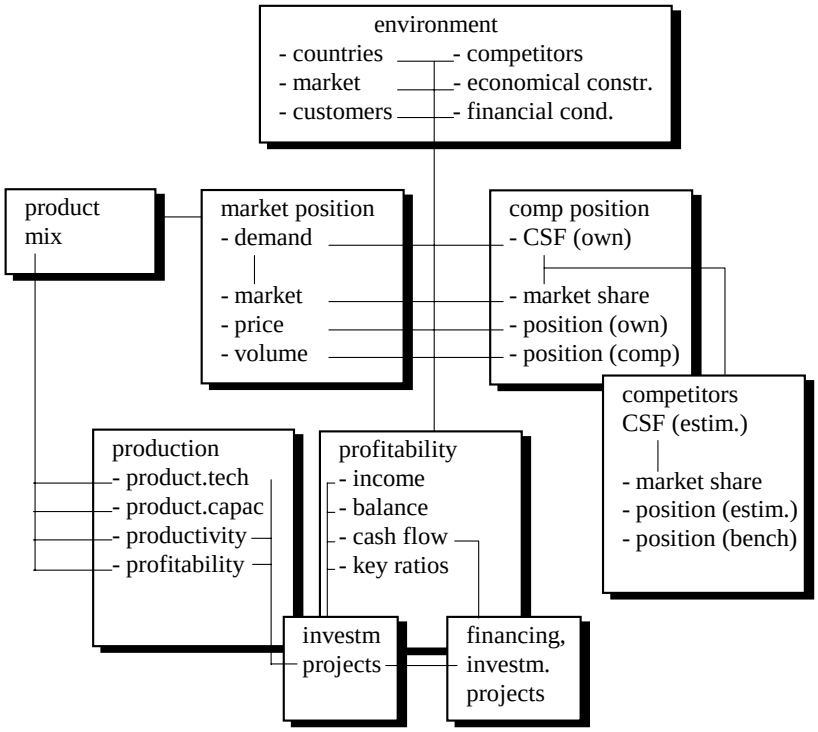


Figure 1: Strategy Formation Process

The notion of an *emerging strategy* was introduced by Mintzberg (5) and we tried to evaluate this process in a series of studies with the *Woodstrat* in 1993-94: (i) in interactive model building seminars with the managers, in which the basic logic of the system was formed; (ii) in studies of the knowledge bases used for actual strategic planning, and (iii) in workshops with the managers, in which they built their strategic plans.

The strategy formation process shown in figure 1, is quite close to Eden's (6) formulation; he shows a practical way to cope with complexity in an orderly and systematic fashion, allowing even a theoretical basis for the approach (Kelly's personal construct theory) and proceeding to demonstrate that qualitative belief systems can both be analyzed and synthesized; he, furthermore, demonstrates that this can be done with computer support. Working with the *Woodstrat* also we have seen that modern information technology has made it possible for line managers to use formal procedures to form novel strategies for their key products in their most important market segments; this in real time and in anticipation of strategic moves by their key competitors.

The Woodstrat system is a hybrid object-oriented expert and hyperknowledge system which was built to serve as a support system for strategic management. We will show that the hybrid system allows both systematic modeling and adaptive, interactive learning; then we will demonstrate that the system is useful as a support system for strategic management. This paper is a continuation of previously published research work (cf. 7-15).

A Hyperknowledge Environment

The idea of creating a hyperknowledge environment is a fairly recent one (cf. 16-18). The first systematic discussion of hyperknowledge was published by Chang, Holsapple and Whinston (cf. 16) in 1993. They introduced the principle that a decision support system (DSS) should form a “hyperknowledge environment” with its users, that is, the DSS should be an extension of the user’s acquired knowledge management capabilities. The decision maker is described through a cognitive metaphor: a decision process is carried out by navigating through a universe of concepts. Some of these concepts are descriptive, some are procedural, and some are context dependent, abstract goal formulating and motivating concepts which serve as instruments to forge a joint value and goal system. The ideal DSS for this purpose is a knowledge-rich environment for the user, in which he can access and manipulate concepts and work out their interdependencies. The DSS is built in such a way that the interdependencies represent the internal logic of the context the user tries to understand and tackle.

Chang et al. (cf 16) have formulated “the fabric of hyperknowledge” in a series of 13 propositions, which are based on the Bonczek-Holsapple-Whinston conceptual

framework (19); as this is rather outdated - it was published in 1981 - and builds on ideas derived from a software technology more than two generations old, we will use the substance, not the technological constructs of the propositions (proposition 13 is omitted as it is inconsistent with the other 12):

1. a knowledge system (KS) is built from concepts, each of which can be referenced by a unique identifier; a problem processing system (PPS) should be built in such a way that it can operate on the identifiers;
2. there exists a concept map in the KS which shows all the definitional relationships between the concepts;
3. there exists a functional map of the concepts which together with (2) helps the PPS navigate in the KS;
4. there exists an association function in KS such that each concept can be associated with any give concept; in any association at least one concept is an *agent* and at least one other concept an *object*;
5. each association function is differentiated from all other associations in KS;
6. for each assosiation function agents and objects can be identified;
7. associations can be inherited;
8. each association belongs to a specific cardinality class;
9. it is possible to build functions for focusing on a particular concept from a set of concepts to satisfy a user's contact needs;
10. it is possible to build functions to send messages to any contacted concept; each message can be built to produce a valid kind of impact;
11. the result of impacting a concept is an output message;
12. for a full-fledged decision support environment the problem solving function must have all the properties 1-11;

This description is, on an intuitive level, quite close to the environment we created in *Woodstrat* (cf. figure 1). There are some useful characteristics of a hyperknowledge environment (cf. 16): (i) the user can navigate through and work with diverse concepts; (ii) concepts can be different epistemologically, (iii) concepts can be organized in cognitive maps, (iv) the concepts can be made interrelated and interdependent, (v) relations can be structured or dynamic, and (vi) relations can change with or adapt to the context. There are also a couple of problems with hyperknowledge (cf. 17): (vii) it has turned out to be too informal and unstructured for handling complex problems, and (viii) users get lost in a conceptually over-rich environment, i.e. they lose touch with the task they try to

accomplish. Some ways to handle these problems have been shown in (9), and have been incorporated in the knowledge-based support system discussed here.

Woodstrat

Woodstrat was built around the actual business logic recorded in 15 SBUs of two forest industry corporations. The system was developed as a series of prototypes in 1992-94; after the first versions with a Lisp-based expert systems shell proved to be too inflexible, the next versions were built with Toolbook, which introduced the notion of *hyperknowledge*. The present full-scale system was built as a hybrid system in Visual Basic in which the features of the Lisp and Toolbook versions were rebuilt as objects. With Visual Basic, it was possible to fully exploit the graphical user interface technology; we have used multiple-document interface, object linking and embedding, dynamic data exchange, effective graphics and the possibilities to add custom controls by calling procedures in dynamic-link libraries.

Let us work through the *Woodstrat* system step by step: *Business Unit I* is one of the SBUs (the name and all the figures are fictitious); it is operating in several countries, with well-defined product groups and specified customer segments. Markets and segments differ for different product groups, and their importance varies over the planning period; the 1993 volumes and prices are used as starting points (the two small input boxes in the lower left hand corner, cf. figure 2) in order to calibrate the estimates to be given. The strategic Market Position (MP) is determined hierarchically; segments are defined for each product group and product groups are selected for each country; for each segment demand and price development estimates are made and consolidated to product group and country levels. The weighted average of the growth and price development estimates update the *Net sales* line in the income statement (cf. figure 8) through some functional links when the *CEO*-button is activated. In this way the market visions are formulated and immediately evaluated in terms of the income statement[1].

[1] cf the principles shown in fig. 1.

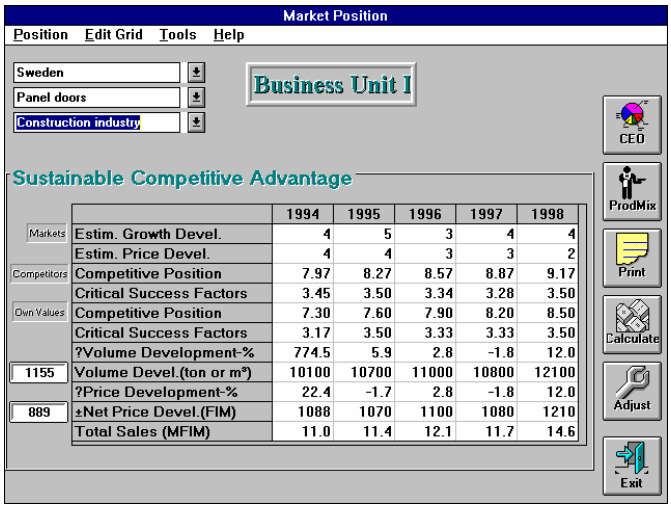


Figure 2: Market Position

The *Woodstrat* is supported with a fairly extensive database of country specific economic indicators and related forecasts, and market and segment specific forecasts on the development of price and demand levels. We found out that this helps the SBU managers to calibrate their assessments of growth and price developments - they do not have to guess or rely on some vague recollection of facts they happen to have acquired (cf. figure 3). With this model visions are anchored to facts about the strategic context (but price and demand estimates are not updated).

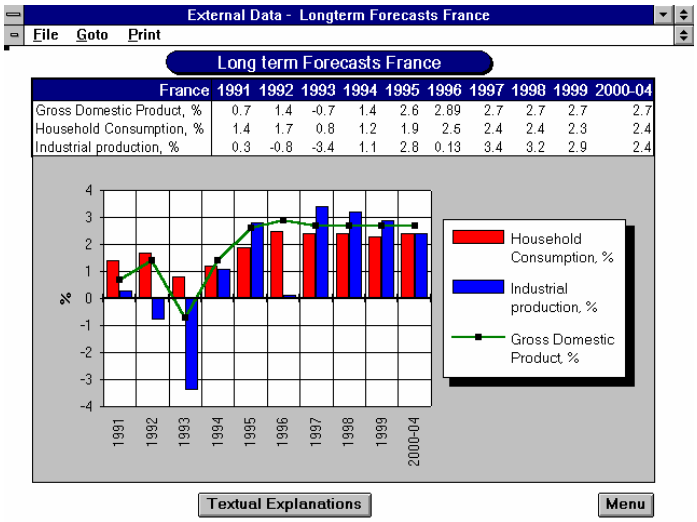


Figure 3: External Data

The Competitive Position (CP) is activated (with logical links) from the same level as the MP, and the MP and CP are worked out in parallel. The CP is determined in terms of critical success factors (these are SBU-specific and were determined successively in a series of seminars with the managers) by assessing the relative changes to the previous year, and as changes to the CP worked out for the previous year. This process is one of reassessing visions on MP when evaluated against critical success factors and the relative strengths of the competitors.

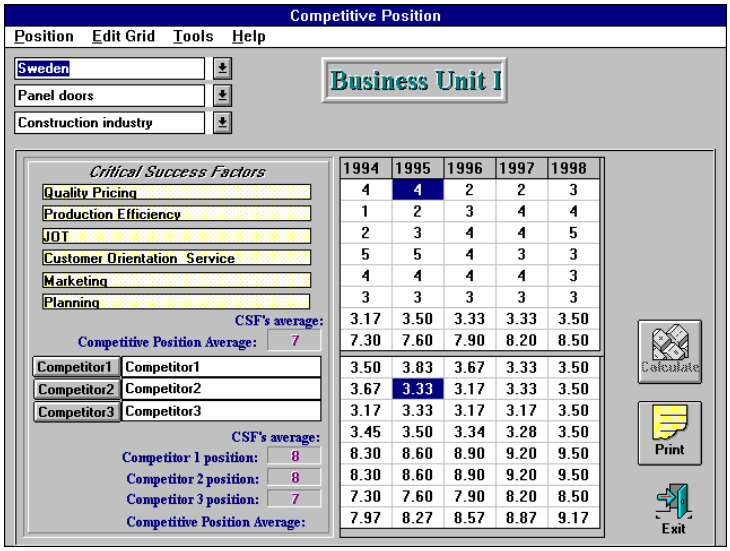


Figure 4: Competitive Position

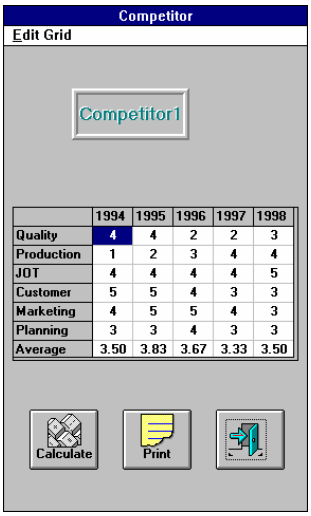


Figure 5: Competitors

Three selected competitors are evaluated on the same critical success factors (CSF); as this is a benchmarking approach, quite a lot of time was used to select "good" competitors; CSF and CP averages were determined for the competitors; the relative difference in competitive positions is calculated and transferred with logical links to the CP, where it is used as a basis for assessing relative strategic CPs. There are functional links to MP, which are used to calculate an estimated development in volumes and prices; this function is only voluntary as the SBU managers can always make their own estimates and thus override the suggested development. This process anchors visions of relative CPs to facts (as they are known) about competitors.

A summary of relative strategic CPs and the expected development of the studied markets is shown in a summary graph (cf. fig. 6), which now is the first summarized, visual consequence of the MP and CP visions.

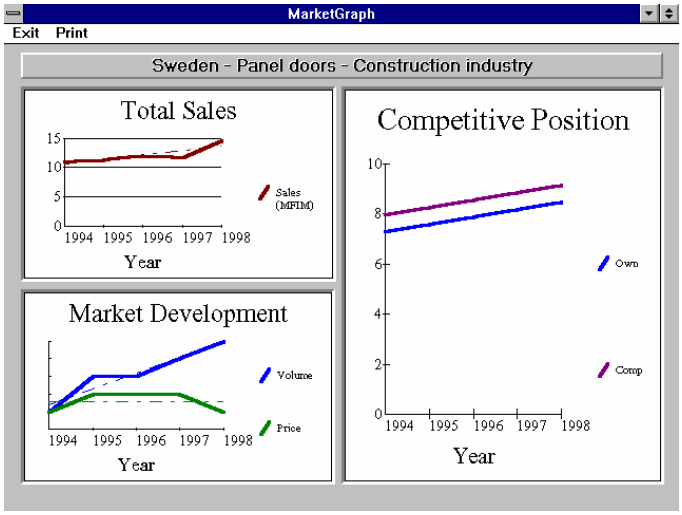
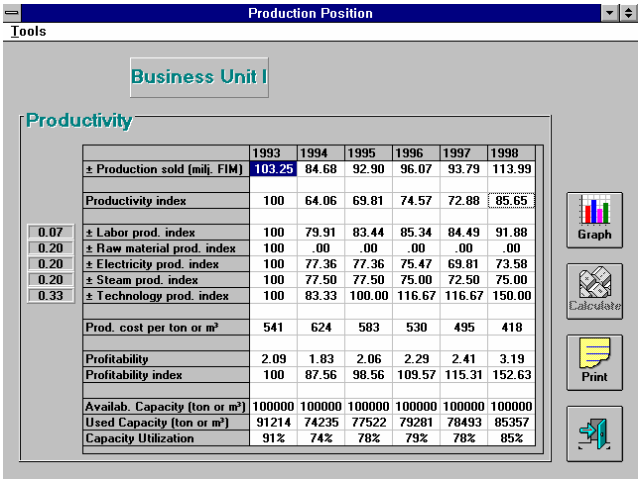


Figure 6: Market Graph

The third element, the Production Position (PRO)[2], estimates productivity as a consequence of the MPs and the CPs. *Production sold* is determined and transferred from the growth and price development specified in the MP; *productivity* is determined from several factors - labor, raw material, electricity, steam and technology; finally, there are lines for checking profitability and capacity limits (cf. figure 7). The productivity factors are updated from corresponding cost lines of the income statement (cf. figure 8) through functional, knowledge based links. The productivity and profitability measures are numerical consequences of key success factors of the MP and CP visions.

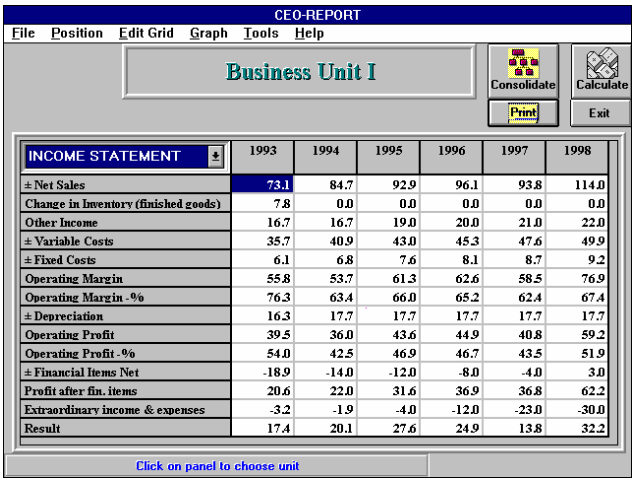
[2] cf. the principles shown in fig. 1.



		1993	1994	1995	1996	1997	1998
	± Production sold (milj. FIM)	103.25	84.68	92.90	96.07	93.79	113.99
	Productivity index	100	64.06	69.81	74.57	72.88	85.65
0.07	± Labor prod. index	100	79.91	83.44	85.34	84.49	91.88
0.20	± Raw material prod. index	100	.00	.00	.00	.00	.00
0.20	± Electricity prod. index	100	77.36	77.36	75.47	69.81	73.58
0.20	± Steam prod. index	100	77.50	77.50	75.00	72.50	75.00
0.33	± Technology prod. index	100	83.33	100.00	116.67	116.67	150.00
	Prod. cost per ton or m³	541	624	583	530	495	418
	Profitability	2.09	1.83	2.06	2.29	2.41	3.19
	Profitability index	100	87.56	98.56	109.57	115.31	152.63
	Availab. Capacity (ton or m³)	100000	100000	100000	100000	100000	100000
	Used Capacity (ton or m³)	91214	74235	77522	79281	78493	85357
	Capacity Utilization	91%	74%	78%	79%	78%	85%

Figure 7: Production Position

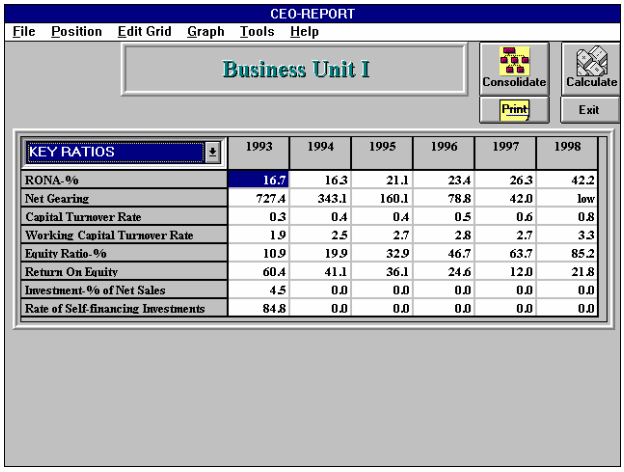
The CEO Report is activated from the summary level of MP. Functional, knowledge based links from the MP and a module for raw material costs update the revenue and cost lines of the projected income statement (cf. figure 8), which is linked with the balance sheet, the statement of funds and the key ratios (cf. figure 9); all these modules update each others with logical, knowledge based links in a way which follows proper accounting principles. Most of the lines are further specified in more details, but the summary reports are mostly sufficient for strategic planning purposes.



INCOME STATEMENT	1993	1994	1995	1996	1997	1998
± Net Sales	73.1	84.7	92.9	96.1	93.8	114.0
Change in Inventory (finished goods)	7.8	0.0	0.0	0.0	0.0	0.0
Other Income	16.7	16.7	19.0	20.0	21.0	22.0
± Variable Costs	35.7	40.9	43.0	45.3	47.6	49.9
± Fixed Costs	6.1	6.8	7.6	8.1	8.7	9.2
Operating Margin	55.8	53.7	61.3	62.6	58.5	76.9
Operating Margin -%	76.3	63.4	66.0	65.2	62.4	67.4
± Depreciation	16.3	17.7	17.7	17.7	17.7	17.7
Operating Profit	39.5	36.0	43.6	44.9	40.8	59.2
Operating Profit -%	54.0	42.5	46.9	46.7	43.5	51.9
± Financial Items Net	-18.9	-14.0	-12.0	-8.0	-4.0	3.0
Profit after fin. items	20.6	22.0	31.6	36.9	36.8	62.2
Extraordinary income & expenses	-3.2	-1.9	-4.0	-12.0	-23.0	-30.0
Result	17.4	20.1	27.6	24.9	13.8	32.2

Figure 8: Income Statement

The Income Statement is enhanced with several specified reports, of which only the report on Key Ratios is shown here (cf. figure 9):



KEY RATIOS	1993	1994	1995	1996	1997	1998
RONA-%	16.7	16.3	21.1	23.4	26.3	42.2
Net Gearing	727.4	343.1	160.1	78.8	42.0	low
Capital Turnover Rate	0.3	0.4	0.4	0.5	0.6	0.8
Working Capital Turnover Rate	1.9	2.5	2.7	2.8	2.7	3.3
Equity Ratio-%	10.9	19.9	32.9	46.7	63.7	85.2
Return On Equity	60.4	41.1	36.1	24.6	12.0	21.8
Investment-% of Net Sales	4.5	0.0	0.0	0.0	0.0	0.0
Rate of Self-financing Investments	84.8	0.0	0.0	0.0	0.0	0.0

Figure 9: Key Ratios

The main benefit with the automatic linking of the modules of the CEO Report is that the managers do not have to interrupt their work on strategic assessments in order to check on the profitability and the financing - a task which is hard on non-specialists. The links have also turned out to be major time-savers.

As Return on Net Assets (RONA) is a forestry industry standard, a graphical simulation module for RONA allows the managers to quickly find critical sales or operating cost levels for reaching target levels of the RONA (cf. figure 10):

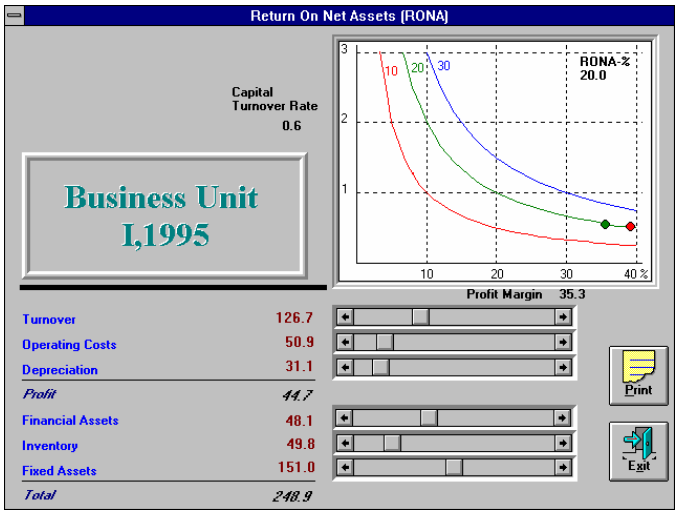
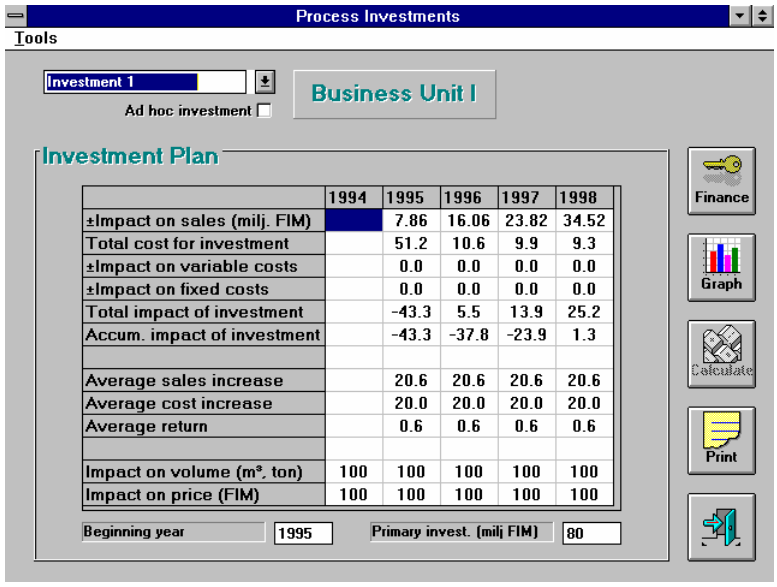


Figure 10: RONA Simulation

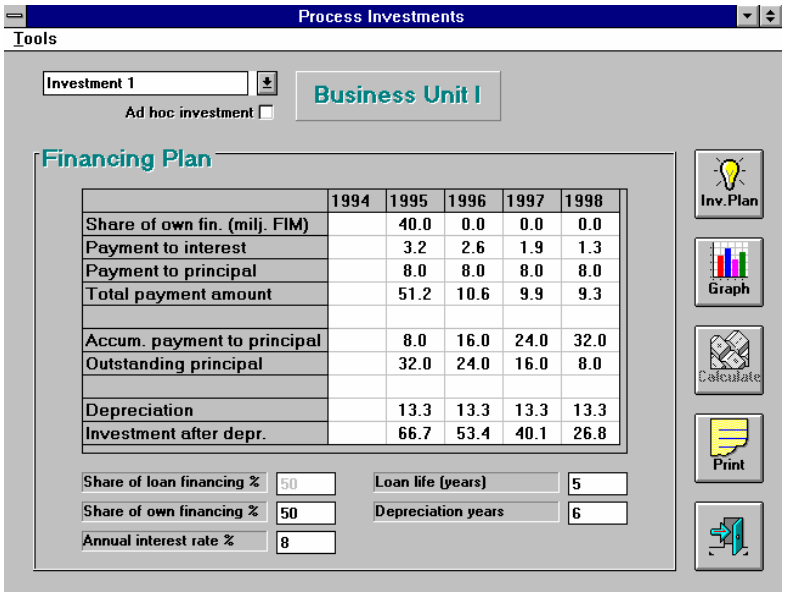
A feature which won much approval among the SBU-managers were the integrated modules for simulating investment alternatives and corresponding alternative

financial models, which showed their impacts on cash flows and key ratios (cf. figures 11 and 12).



	1994	1995	1996	1997	1998
±Impact on sales (milj. FIM)		7.86	16.06	23.82	34.52
Total cost for investment		51.2	10.6	9.9	9.3
±Impact on variable costs		0.0	0.0	0.0	0.0
±Impact on fixed costs		0.0	0.0	0.0	0.0
Total impact of investment		-43.3	5.5	13.9	25.2
Accum. impact of investment		-43.3	-37.8	-23.9	1.3
Average sales increase		20.6	20.6	20.6	20.6
Average cost increase		20.0	20.0	20.0	20.0
Average return		0.6	0.6	0.6	0.6
Impact on volume (m³, ton)	100	100	100	100	100
Impact on price (FIM)	100	100	100	100	100

Figure 11: Investment Plan



	1994	1995	1996	1997	1998
Share of own fin. (milj. FIM)		40.0	0.0	0.0	0.0
Payment to interest		3.2	2.6	1.9	1.3
Payment to principal		8.0	8.0	8.0	8.0
Total payment amount		51.2	10.6	9.9	9.3
Accum. payment to principal		8.0	16.0	24.0	32.0
Outstanding principal		32.0	24.0	16.0	8.0
Depreciation		13.3	13.3	13.3	13.3
Investment after depr.		66.7	53.4	40.1	26.8

Figure 12: Financing Plan

Woodstrat is used for strategy formation, which was seen in the use of the various modules:

i. the database of *external data* served as an instrument to establish reference points for growth and price estimates;

ii. the *MP* module served both analysis and synthesis; it was first used to build estimates of price and volume developments for specific product groups in specific market segments;

then it was used to get a feeling for the expected development in a product group or in a country; then the estimates were reiterated until some acceptable levels were reached;

iii. the *CP* module was used for similar analysis / synthesis iterations in the same countries, product groups and market segments but the iterations were now in terms of critical success factors; reference points for these were established with analogous iterations of the critical success factors for three key competitors; the results were used to establish relative competitive positions; these positions were then used to establish a new set of reference points for the estimates of price and volume developments;

iv. the price and volume estimates were reiterated with the proposed product mix (PM) combinations, which are essential for estimating the use of raw material (a major cost factor) and production capacity;

v. the MP, CP and PM modules are then used to determine the net sales and variable costs of the income statement (PROF) in the *CEO* module; when worked out with a complete set of variable and fixed costs the resulting profit is either satisfactory or non-satisfactory; in the latter case it triggers reiterations of the MP, CP and PM modules; if satisfactory it is further evaluated in terms of the capital structure, the use of funds and key ratios (PROF); reiterations can be triggered on a number of reference points;

vi. the CP determines the need for investments; the corresponding module triggers the financing of these investments; reiterations are triggered by reference points in the income statement, the capital structure, the use of funds and key ratios;

vii. the MP and the CEO modules update and trigger the determination of the productivity index; reference points induce reiterations of investments and of the MP and CP modules;

There are a number of minor processes also included in the system, but the major processes shown in (i) - (vii) represent the strategy formation process.

Experiences of Strategy Formation with Woodstrat.

The *Woodstrat* was run in 9 SBUs in a series of seminars in the Spring of 1994[3] in sessions which involved about 40 managers in a 2-month period and culminated in presentations given by the COOs of the SBUs to the corporate board. In these presentations they used *Woodstrat* to demonstrate their strategic solutions and to show the internal logic of their plans. As we had included an on-line *Memo* function in the system and charged the mangers with continuously commenting on their assessments and conclusions in all modules, we could follow their reasoning. The most effective management team collected 15 pages of information in their Memo.

The MP module helped in determining the expected volume and price development in key market segments. The managers were able to determine their expected market development in more detail than ever before, and also found out that they now have a basis for quick and systematic evaluations of unexpected changes in both volumes and prices. The CP module was one of the key modules from the very beginning. In most SBUs it was found out that: (i) the management team does not know their key competitors as well as they would like to know them; (ii) they are not too well aware of what their critical success factors are, and what impact various levels of these might have on their success in various market segments, and (iii) they were not too sure about how they could improve on these factors or how this improvement would work out in a chosen planning interval. The CP module offered a possibility to work out all implications of the various factors systematically, and it offered a good basis for explaining their competitive solutions and defending their requirements for investments in a manner much more persuasive than before. The CP module required quite a lot of work, which felt tedious from time to time, but it was probably the most rewarding of all the modules.

The hyperknowledge environment made the evaluations of relative CPs fast and efficient. A summary of the comments showed the basic problem to be the lack of sufficient knowledge of the competitors (which in our mind was surprisingly good). The gradual assessment of relative competitive positions worked very well despite the fact that the assessments were basically analytical; the supporting discussion in the Memo showed systematic and consistent reasoning about (i) the abilities of the competitors and (ii) the possibilities to develop critical success factors through investments and increased productivity.

---

[3] The system has now been used in an additional 8 SBUs with more than 40 managers participating.

The users were quite familiar with building the elements of the CEO Report (PROF) as this part of the strategy formation process has been routine for a number of years. The contribution of *Woodstrat* was that the knowledge based links made operations more precise and much faster than before; all required operations were fully automated and a good selection of graphics objects helped to produce effective and useful summary reports.

The investments module (INV), with an integrated financing module (FIN), was built to help the SBU managers work out their investment proposals. It was found to save quite a lot of time as complex and detailed investment plans, with a number of alternatives scheduled for a number of years, and their impact on financing, key ratios, capital structure, etc. could be evaluated.

The investments module, and its interlinked financing module, was technically more advanced than the other modules; it seems that investment analysis was intuitively understood by only a select few, but that *Woodstrat* made the logic quite for all SBU managers.

At some point we almost believed that the determination of *productivity* is a form of black magic, as nobody seems to be able to come up with a reasonable definition. Finally, we built and tried out our own version of the productivity measures, and they seemed to work. Productivity is an abstract and complex measure, and the idea was to gain some insight into the effects of the MP and CP visions of changes in productivity.

There are knowledge based links to simplify the calculations, and (as we found in the Memos) the users turned out to gain an intuitive understanding of the relations between market developments and the productivity.

The External data module was built to be easily accessible and to give a benchmarking basis for estimates of the expected development of demand and prices. It worked basically as expected, but there was a further demand for better depth of knowledge and more industry-specific information. The hyperknowledge environment with quick access to data, and the possibility to browse back and forth between various databases proved to be timesaving and to promote the benchmarking processes we wanted to get started.

The Memo module turned out to be an exciting tool for us, the system developers, as it displayed all the insights the users gained in their discussions of the various alternatives. It also showed their conclusions on various items and their evaluation of their competitors. A number of factors were not known too well and the Memo was used to register those points were follow-up studies of the competitors were required; a number of questions and ideas were forwarded to sales offices in Europe for verification and follow up studies. The Memo revealed that we were

following *a strategy formation process*, which was carried out by the management teams of the SBUs.

Conclusions

Woodstrat is a hybrid of an object-oriented expert system and a hyperknowledge support system, and is thus constructed to provide both advanced level knowledge support in strategic management and an environment for linking assessments of qualitative factors with systematic quantitative evaluations of their consequences. We found out in the *Woodstrat* project that hyperknowledge can be created with object-oriented visual tools, which represent a new software technology for KBS construction. The objects can be given semi-expert properties and then be linked with the type of relations that form the hyperknowledge environment.

Woodstrat is a support system for strategy formation. The links between the logical elements of the system follow an intuitive, internal logic which has gradually emerged through interactive work with the SBU-managers. This has created the foundations for a quick and effective user acceptance.

Woodstrat appears to have a number of useful features as reported by the users:

- the system guides the user to focus on important issues which eliminates unnecessary work;
- although I have for several years done strategic planning "my way", after having used the Woodstrat system I would not change it for anything;
- I am very pleased with the system, it really is a working system; although I also have (paper) documents of the SBU plans, I work only with the Woodstrat system; I have got very positive feedback from the CEO on the computer-based presentation of the division's and the SBUs' strategic plans; perhaps I ought to allow the SBUs to carry out group and division consolidations - this I believe would generate internal competition to attain divisional goals and objectives;
- Woodstrat compared to "my old way"? - I worked more thoroughly and I used more time than normally; next year the work will be accomplished in much less time as I now have a fairly complete basis as a starting point;
- the final version which we presented to the corporate executive board took us 1,5 day to finish (preparatory work done) ; our group - six people - worked as a team and found the system very useful for teamwork;
- the support system “imprisoned us; the drawback was that we concentrated too much on details in the MP and CP;

- we had our basic visions and missions in mind, and found out through *Woodstrat* that our visions of chlorine free pulp changed; there exists - after all - a demand big enough for the new product we had discussed;
- the planning process was real team work;

The *Woodstrat* system was built as a series of interactive prototypes, with the eventual users being part of the design process from the beginning. In the *Woodstrat* project we were able to get even senior managers to become active systems users, as they found out that they could use the KBS technology to formulate their own perceptions of a strategic context.

References

1. **Rowe**, Alan J. and Boulgarides, James D. Managerial Decision making, Macmillan Publishing Company, New York (1992)
2. **Day**, George, **Weitz**, Barton and **Wensley**, Robin, (ed.) *The Interface of Marketing and Strategy*, Jay Press Inc., Greenwich (1990)
3. **Mintzberg**, Henry *The Rise and Fall of Strategic Planning*, Prentice Hall (1994)
4. **Ansoff**, H. Igor Critique of Henry Mintzberg's 'The Design School: Reconsidering the Basic Premises of Strategic Management', *Strategic Management Journal*, Vol 12 (1991), 449-461
5. **Mintzberg**, Henry Patterns in Strategy Formation, *Management Science*, Vol 24, No. 9, (1978)
6. **Eden**, Colin Strategy Development and Implementation-Cognitive Mapping for Group Support, in Hendry and Johnson (eds): *Strategic Thinking: Leadership and the Management of Change*, (1993)
7. **Carlsson**, Christer Expert Systems as Conceptual Frameworks and Management Support Systems for Strategic Management, *International Journal of Information Resource Management*, Vol 2, No. 4, (1991), 14-24
8. **Carlsson**, Christer New Instruments for Management Research, *Human Systems Management*, Vol 10, No. 3 (1991), 203-220
9. **Carlsson,** Christer Knowledge Formation in Strategic Management, *Proceedings of the HICSS-27 Conference*, 1994, 221-240
10. **Carlsson,** Christer and **Walden,** Pirkko Strategic Management with a Hyperknowledge Support System, *Proceedings of the HICSS-27 Conference*, 1994, 241-250

11. **Carlsson**, Christer and **Walden,** Pirkko Cognitive Maps and a Hyperknowledge Support System in Strategic Management, *Group Decision and Negotiation*, (1995, forthcoming)

12. **Carlsson**, Christer and **Walden**, Pirkko On Fuzzy Hyperknowledge Support Systems, *NGIT'95 Proceedings*, Tel Aviv 1995

13. **Walden**, Pirkko and **Carlsson**, Christer Enhancing Strategic Market Management with Knowledge Based Systems, *HICSS-26 Proceedings*, IEEE Computer Society Press, Los Alamitos, 240-248

14. **Walden**, Pirkko and **Carlsson**, Christer Strategic Management with a Hyperknowledge Support System, *HICSS-27 Proceedings*, IEEE Computer Society Press, Los Alamitos, 241-250

15. **Walden**, Pirkko and **Carlsson**, Christer Hyperknowledge and Expert Systems: A Case Study of Knowledge Formation Processes, *HICSS-28 Proceedings*, IEEE Computer Society Press, Los Alamitos (1994)

16. **Chang**, Ai-Mei, **Holsapple**, Clyde W. and **Whinston**, Andrew B., Model Management Issues and Directions, *Decision Support Systems*, Vol 9 (1993), 19-37

17. **Gershman**, Anatole and **Gottsman**, Edward Use of Hypermedia for Corporate Knowledge Dissemination, *HICSS-26 Proceedings*, IEEE Computer Society Press, Los Alamitos, 411-420

18. **Lange**, Danny B. Object-Oriented Hypermodeling of Hypertext Supported Information Systems, *HICSS-26 Proceedings*, IEEE Computer Society Press, Los Alamitos, 380-389

19. **Bonczek,** R.H., **Holsapple**, C.W. and **Whinston**, A.B. *Foundations of Decision Support Systems*, Academic Press, New York 1981