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ANALYSIS OF PRODUCT VIABILITY, COMPETITION AND SELECTION OF STRATEGY IN TOOL STEEL INDUSTRY: ORDINAL METHODS VS THE ANALYTIC HIERARCHY PROCESS

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Summary: *Literature in strategic management offers methodologies for conducting quantitative analysis for product viability, competition, as well as strategy formulation and selection. Most of the proposed methodologies use ordinal type of scale for measuring relative priority, which is scientifically unacceptable since it may not produce meaningful results. Cardinal scale (preferably ratio scale as used by AHP) is the valid measurement scale for multi-criteria analysis. Applying the two methods for strategic analysis in a tool steel industry, by the same decision makers, leads to different results. Market positions of the business under study as well as the expectation of the decision makers support the AHP outcomes.*

1. Introduction

Strategic business decision-making involves, among others, analyzing product viability and intensity of competition in an industry, as well as formulating and selecting a strategy for organization's survival and growth. Most methodologies offered in the literature to carry out these processes are based on ordinal scale of measurement that has been regarded as scientifically unacceptable since it may not produce meaningful outcomes. The purpose of this paper is to present an example of strategic analysis using ordinal and cardinal method and compare the results. It is based on a study to develop business strategy for PT ASSAB Austenite Indonesia (AAI), conducted by the first author to meet a requirement for the Master in Management degree from the PPM Graduate School of Management. Product viability analysis and competitor rating analysis were first carried out using ordinal methodologies, and AHP was employed for strategy selection. The approach used in strategy selection is by identifying the pros and cons of each alternative and structuring the AHP model using the bottom-up approach, with the support of the Expert Choice software. The study was soon reviewed by repeating the two analyses using the AHP and, for the sake of learning, strategy selection process was repeated using the ordinal method of the Quantitative Strategic Planning Matrix (QSPM) proposed by Fred R. David.

2. Product Viability Analysis

Product viability analysis is done to determine how well a product would survive in the market. AAI produces three types of tool steel product, i.e. cold work steel, hot work steel and plastic mould steel, each consists of three quality grades of low, medium and high. AAI needs to determine the position of the nine products in the market, measured by attractiveness and competitiveness (business strength) factors,

both at present (year 2000) and in the future (year 2002). As most businesses do, the company wants to see its products rated high in both the attractiveness and competitiveness factors.

2.1. The Ordinal Approach

Ordinal analysis usually involves the construction of a matrix of a rating system (absolute measurement), establishing intensity levels in the form of a range (e.g., 1 to 10 as we use here), applicable to all factors. The factors are a mix of quantitative and qualitative measures, which scores may represent either a range of objective values or of good-bad, high-low, small-large, or strong-weak qualities. Definition of each of the ratings, while very important to improve the degree of objectivity of subjective judgments, is seldom emphasized. It is a common practice to apply ordinal measurement, in which the range of scores is treated as continuous linear scales when objective values are involved. Decision makers were requested to assign factor priorities as well as a rating score for each factor and each time frame. It is assumed that the composite values produced by the proper operations of multiplications and additions across factors would produce valid representations of product viability being measured. As suggested in the literature, product viability is analyzed using market attractiveness and business strength (competitiveness) factors. The results of the analysis are shown in Table 1 to Table 9, which could be summarized by two by two market viability matrices shown in Figure 1 and Figure 2.

	Factor	Scoring Criteria			Weight (%)	Score 2000	Rank 2000	Score 2002	Rank 2002
		1	5	10					
Attractiveness	Market Size (Rp)	500 Mln		5 B	30	3	90	4	120
	Volume Growth	0%		20%	20	8	160	8	160
	Competitive intensity	High	Med	Low	15	3	45	2	30
	Industry Profitability	10%	25%	40%	25	7	175	8	200
	Vulnerability	High	Med	Low	10	3	30	3	30
	Total				100		500		540
Competitiveness	Product Range	Small		Large	10	5	50	6	60
	Product Efficacy	Bad		Good	15	7	105	7	105
	Service Quality	Low	Med	High	20	8	160	8	160
	Price	Comp		No Comp	25	4	100	4	100
	Associated Tech. Services	Low	Med	Good	15	8	120	8	120
	Reputation/Image	Low	Med	Good	15	9	135	9	135
	Total				100		670		680

Table 1. Cold Work Steel - Low Grade Product : Attractiveness vs Competitiveness
(Base: Market 2000: Rp10Billion with 15% growth)
Table reproduced from the thesis

	Factor	Scoring Criteria			Weight	Score 2000	Rank 2000	Score 2002	Rank 2002
		1	5	10					
Attractiveness	Market Size (Rp)	500 Mln		5 B	30	2	60	5	150
	Volume Growth	0%		20%	20	8	160	9	180
	Competitive intensity	High	Med	Low	15	2	30	2	30
	Industry Profitability	10%	25%	40%	25	7	175	8	200
	Vulnerability	High	Med	Low	10	3	30	4	40
	Total				100		455		600
Competitiveness	Product Range	Small		Large	10	6	60	6	60
	Product Efficacy	Bad		Good	15	7	105	8	120
	Service Quality	Low	Med	High	20	8	160	9	180
	Price	Comp		No Comp	25	3	75	4	100
	Associated Tech. Services	Low	Med	Good	15	8	120	8	120
	Reputation/Image	Low	Med	Good	15	9	135	9	135
	Total				100		655		715

Table 2. Cold Work Steel - Medium Grade Product : Attractiveness vs Competitiveness.
(Base: Market 2000: Rp7Billion with 13% growth)
Table reproduced from the thesis

	Factor	Scoring Criteria			Weight	Score 2000	Rank 2000	Score 2002	Rank 2002
		1	5	10					
Attractiveness	Market Size (Rp)	500 Mln		25 B	30	2	60	5	150
	Volume Growth	0%		20%	20	3	60	8	160
	Competitive intensity	High	Med	Low	15	3	45	2	30
	Industry Profitability	10%	25%	40%	25	8	200	8	200
	Vulnerability	High	Med	Low	10	3	30	2	20
	Total				100		395		550
Competitiveness	Product Range	Small		Large	10	5	50	6	60
	Product Efficacy	Bad		Good	15	7	105	9	135
	Service Quality	Low	Med	High	20	8	160	9	180
	Price	Comp		No Comp	25	4	100	3	75
	Associated Tech. Services	Low	Med	Good	15	8	120	8	120
	Reputation/Image	Low	Med	Good	15	9	135	9	135
	Total				100		670		705

Table 3. Cold Work Steel - High Grade Product : Attractiveness vs Competitiveness.
(Base: Market 2000: Rp5Billion with 5% growth)
Table reproduced from the thesis

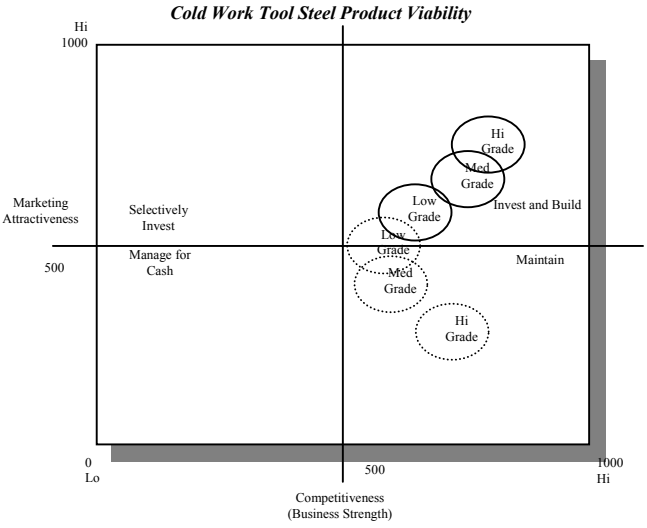

Figure 1 : Chart of Cold Work Market Viability : Current vs Future
Figure reproduced from the thesis

The dotted circles in Figure 1 show today's situation and the lined circles the future.
The analysis suggests that in 2002 AAI would have a better chance of gaining a good and growing business from the High Grade Cold Work Tool Steel. Although there may be no significant change in the business strength (competitiveness), the product was indicated to be much more attractive to the future market.

Below are the tables for Hot Work Steel:

	Factor	Scoring Criteria			Weight	Score 2000	Rank 2000	Score 2002	Rank 2002
		1	5	10					
Attractiveness	Market Size (Rp)	500Mlln		5Bl	30	5	150	6	180
	Volume Growth	0%		20%	20	8	160	8	160
	Competitive intensity	High	Med	Low	15	5	75	6	90
	Industry Profitability	10%	25%	40%	25	7	175	8	200
	Vulnerability	High	Med	Low	10	3	30	3	30
	Total				**100**		**580**		**660**
Competitiveness	Product Range	Small		Large	10	5	50	6	60
	Product Efficacy	Bad		Good	15	7	105	7	105
	Service Quality	Low	Med	High	20	8	160	8	160
	Price	Comp		No Comp	25	4	100	4	100
	Associated Tech. Services	Low	Med	Good	15	8	120	8	120
	Reputation/Image	Low	Med	Good	15	9	135	9	135
	Total				**100**		**670**		**680**

Table 4. Hot Work Steel - Low Grade Product : Attractiveness vs Competitiveness.
(Base: Market 2000: Rp15Billion with 15% growth)
Table reproduced from the thesis

	Factor	Scoring Criteria			Weight	Score 2000	Rank 2000	Score 2002	Rank 2002
		1	5	10					
Attractiveness	Market Size (Rp)	500Mlln		2Bl	30	2	60	5	150
	Volume Growth	0%		20%	20	3	60	8	160
	Competitive intensity	High	Med	Low	15	3	45	2	30
	Industry Profitability	10%	25%	40%	25	8	200	8	200
	Vulnerability	High	Med	Low	10	3	30	2	20
	Total				**100**		**395**		**580**
Competitiveness	Product Range	Small		Large	10	5	50	6	60
	Product Efficacy	Bad		Good	15	7	105	9	135
	Service Quality	Low	Med	High	20	8	160	9	180
	Price	Comp		No Comp	25	4	100	3	75
	Associated Tech. Services	Low	Med	Good	15	8	120	8	120
	Reputation/Image	Low	Med	Good	15	9	135	9	135
	Total				**100**		**670**		**705**

Table 6. Hot Work Steel - High Grade Product : Attractiveness vs Competitiveness.
(Base: Market 2000: Rp8Billion with 5% growth)
Table reproduced from the thesis

	Factor	Scoring Criteria			Weight	Score 2000	Rank 2000	Score 2002	Rank 2002
		1	5	10					
Attractiveness	Market Size (Rp)	500Mlln		2Bl	30	6	180	7	210
	Volume Growth	0%		20%	20	8	160	9	180
	Competitive intensity	High	Med	Low	15	2	30	2	30
	Industry Profitability	10%	25%	40%	25	7	175	8	200
	Vulnerability	High	Med	Low	10	3	30	4	40
	Total				**100**		**575**		**660**
Competitiveness	Product Range	Small		Large	10	6	60	6	60
	Product Efficacy	Bad		Good	15	7	105	7	105
	Service Quality	Low	Med	High	20	8	160	9	180
	Price	Comp		No Comp	25	3	75	4	100
	Associated Tech. Services	Low	Med	Good	15	8	120	8	120
	Reputation/Image	Low	Med	Good	15	9	135	9	135
	Total				**100**		**655**		**700**

Table 5. Hot Work Steel - Medium Grade Product : Attractiveness vs Competitiveness.
(Base: Market 2000: Rp7Billion with 13% growth)
Table reproduced from the thesis

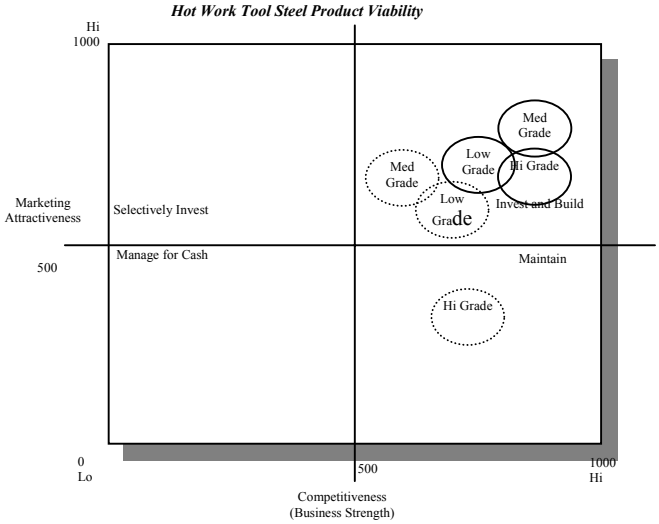

Figure 2 : Chart of Hot Work Market Viability : Current vs Future
Figure reproduced from the thesis

The above analysis indicates that in 2002 AAI would have a better business with the Medium Grade Hot Work Tools Steel. However, the significant improvement of market attractiveness in the future for the High Grade products suggests that there would be an opportunity for a higher business growth for this product.

Below are the viability tables for Plastic Molds:

	Factor	Scoring Criteria			Weight	Score 2000	Rank 2000	Score 2002	Rank 2002
		1	5	10					
Attractiveness	Market Size (Rp)	500 Mln		5 B	30	4	120	7	210
	Volume Growth	0%		20%	20	8	160	8	160
	Competitive intensity	High	Med	Low	15	5	75	5	75
	Industry Profitability	10%	25%	40%	25	7	175	8	200
	Vulnerability	High	Med	Low	10	3	30	3	30
	Total				**100**		**560**		**675**
Competitiveness	Product Range	Small		Large	10	6	60	8	80
	Product Efficacy	Bad		Good	10	7	70	7	70
	Service Quality	Low	Med	High	20	8	160	8	160
	Price	Comp		No Comp	30	5	150	5	150
	Associated Tech. Services	Low	Med	Good	15	8	120	8	120
	Reputation/Image	Low	Med	Good	15	9	135	9	135
	Total				**100**		**695**		**715**

Table 7. Plastic Mould Steel - Low Grade Product : Attractiveness vs Competitiveness.
(Base: Market 2000: Rp10Billion with 10% growth)
Table reproduced from the thesis

	Factor	Scoring Criteria			Weight	Score 2000	Rank 2000	Score 2002	Rank 2002
		1	5	10					
Attractiveness	Market Size (Rp)	500 Mln		5 B	30	2	60	5	150
	Volume Growth	0%		20%	20	8	160	9	180
	Competitive intensity	High	Med	Low	15	2	30	2	30
	Industry Profitability	10%	25%	40%	25	7	175	8	200
	Vulnerability	High	Med	Low	10	3	30	4	40
	Total				**100**		**455**		**600**
Competitiveness	Product Range	Small		Large	10	6	60	6	60
	Product Efficacy	Bad		Good	15	7	105	8	120
	Service Quality	Low	Med	High	20	8	160	9	180
	Price	Comp		No Comp	25	3	75	4	100
	Associated Tech. Services	Low	Med	Good	15	8	120	8	120
	Reputation/Image	Low	Med	Good	15	9	135	9	135
	Total				**100**		**655**		**715**

Table 8. Plastic Mould Steel - Medium grade Product : Attractiveness vs Competitiveness.
(Base: Market 2000: Rp10Billion with 10% growth)
Table reproduced from the thesis

	Factor	Scoring Criteria			Weight	Score 2000	Rank 2000	Score 2002	Rank 2002
		1	5	10					
Attractiveness	Market Size (Rp)	500 Mln		25 B	30	2	60	5	150
	Volume Growth	0%		20%	20	3	60	8	160
	Competitive intensity	High	Med	Low	15	3	45	2	30
	Industry Profitability	10%	25%	40%	25	8	200	8	200
	Vulnerability	High	Med	Low	10	3	30	2	20
	Total				**100**		**395**		**550**
Competitiveness	Product Range	Small		Large	10	5	50	6	60
	Product Efficacy	Bad		Good	15	5	75	9	135
	Service Quality	Low	Med	High	20	8	160	9	180
	Price	Comp		No Comp	25	3	75	3	75
	Associated Tech. Services	Low	Med	Good	15	8	120	8	120
	Reputation/Image	Low	Med	Good	15	9	135	9	135
	Total				**100**		**615**		**705**

Table 9. Plastic Mould Steel - High grade Product : Attractiveness vs Competitiveness.
(Base: Market 2000: Rp8Billion with 10% growth)
Table reproduced from the thesis

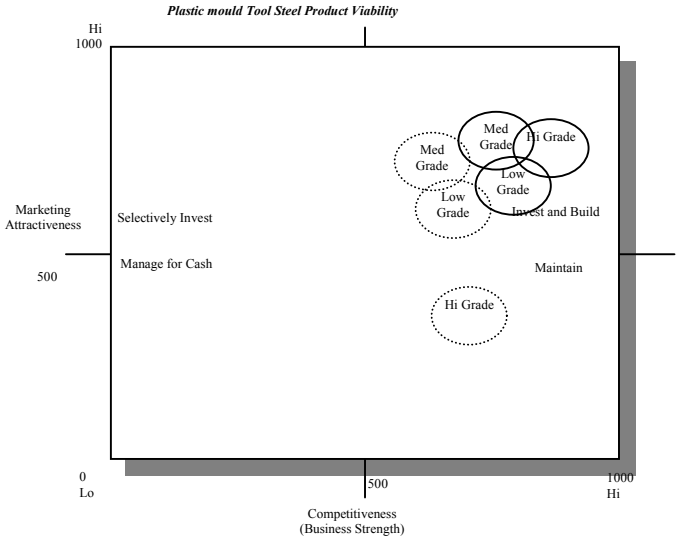

Figure 3 : Chart of Plastic Mould Market Viability : Current vs Future
Figure reproduced from the thesis

Here, the analysis indicates that in 2002 AAI could gain a good business from the High Grade Plastic mould. The overall results indicated that all products are still profitable, but High Grade Hot Work Steel and High Grade Plastic Mold Tool Steels would give AAI the best business. Plastic Mould products are indicated to give the best business of all to AAI.

2.2. The AHP Approach with ratio scale.

Product viability analysis with the AHP has been made convenience with its supporting software Expert Choice. Similar to the ordinal analysis above, there were three AHP models but we show here only the one for Cold Work Steel category as an example (Figure 4). The decision makers were asked to provide pairwise comparison judgments of relative importance of the factors as well as of relative preference of products with respect to each and every factor. Here the relative measurement approach of the AHP was used.

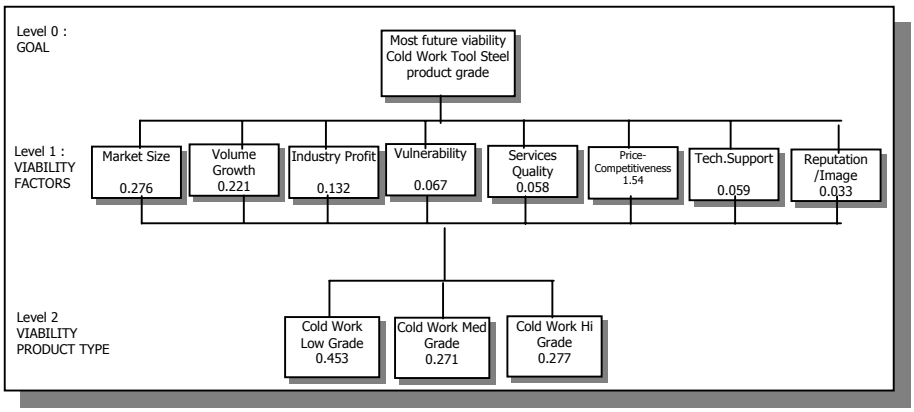

Figure 4 : AHP chart for Cold Work Steel, EC results .

Preceding the analysis using the same routines for Hot Work Steel and Plastic Mould Steel, we obtained the following results.

	Viability Factors								AHP Results		
	Mkt Share	Vol Growth	Profit	Vulnerability	Svc Quality	Price Competitiveness	Tech Support	Reputation	Lo Grade	med Grade	Hi Grade
Cold Work	0.276	0.221	0.132	0.067	0.058	0.154	0.059	0.033	0.453	0.271	0.277
Hot Work	0.246	0.265	0.143	0.043	0.046	0.168	0.061	0.028	0.391	0.287	0.322
Plastic Mold	0.191	0.201	0.162	0.063	0.086	0.184	0.076	0.037	0.365	0.273	0.362

Table 10 : Results of AHP for Viability Analysis

The AHP outcomes above suggest that the company should focus more on the low-grade products instead of the medium and high grades as recommended by the results of ordinal analysis.

3. Competitor Rating Analysis

There are four other major and prominent players in the Tool Steel industry: Bohler, Thyssen, Hitachi and Daido. The rest are small players that are not considered as potential threat to AAI at this point of time.

3.1. The Ordinal Approach

Capacity, Quality, Delivery, Price, New Product, Technical Back-up, and Reputation have been identified as the critical success factors (CSF) to compete in the industry. Each CSF is weighted with respect to importance to the success of the company. The total weight is 100; in low-grades, Price is considered as the most important factor (scores 30) and Reputation is the least important one (scores 5). The scores reflect the decision makers' perception on the relative importance of the CSF for every grade of each product type: score 1 means very unimportant and score 10 means very important.

Critical Success Factor	Weighting	ASSAB		Bohler		Thyssen		Hitachi		Daido	
		Score	Total	Score	Total	Score	Total	Score	Total	Score	Total
Capacity	20	10	200	9	180	9	180	6	120	4	80
Quality	15	10	150	10	150	8	120	10	150	6	90
Delivery	20	9	180	9	180	8	160	10	200	7	140
Price	30	8	240	10	300	9	270	10	300	7	210
New Product	5	8	40	6	30	7	35	9	45	6	30
Technical Backup	5	8	40	9	45	9	45	6	30	6	30
Reputation	5	9	45	8	40	6	30	6	30	7	35
Total	100		885		925		840		875		615

Table 11. CSF for Low Grade Steel Product of each player.

Table reproduced from the thesis

Critical Success Factor	Weighting	ASSAB		Bohler		Thyssen		Hitachi		Daido	
		Score	Total	Score	Total	Score	Total	Score	Total	Score	Total
Capacity	5	8	40	9	45	9	45	6	30	4	20
Quality	20	10	200	10	200	10	200	10	200	6	120
Delivery	25	9	225	10	250	9	225	10	250	7	175
Price	25	9	225	10	250	9	225	10	250	7	175
New Product	5	9	45	6	30	7	35	9	45	6	30
Technical Backup	15	9	135	9	135	9	135	6	90	6	90
Reputation	5	9	45	9	45	7	35	6	30	7	35
Total	100		915		955		900		885		645

Table 12. CSF Medium Grade Steel Product of each player.

Table reproduced from the thesis

Critical Success Factor	Weighting	ASSAB		Bohler		Thyssen		Hitachi		Daido	
		Score	Total	Score	Total	Score	Total	Score	Total	Score	Total
Capacity	5	7	35	9	45	9	45	6	30	7	35
Quality	35	10	350	10	350	10	350	9	315	9	315
Delivery	20	9	180	8	160	8	160	10	200	9	180
Price	20	8	160	9	180	9	180	10	200	7	140
New Product	10	8	80	6	60	8	80	9	90	10	100
Technical Backup	5	8	40	9	45	9	45	6	30	6	30
Reputation	5	9	45	8	40	7	35	6	30	7	35
Total	100		880		880		895		895		885

Table 13. CSF High Grade Steel Product of each player.

Table reproduced from the thesis

The results rated Bohler the best for low and medium grade product category, and Thyssen and Hitachi shared the top position for the high-grade product category.

3.2. AHP Approach

The same competitor analysis is now performed by employing the AHP approach. There are three hierarchies, one for each product type, using the same CSF but different relative importance.

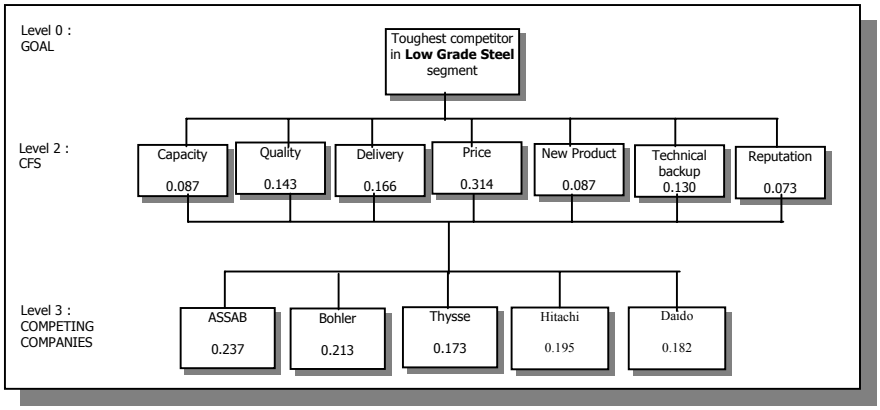

Figure 5 : AHP model of toughest competitor in Low Grade Steel

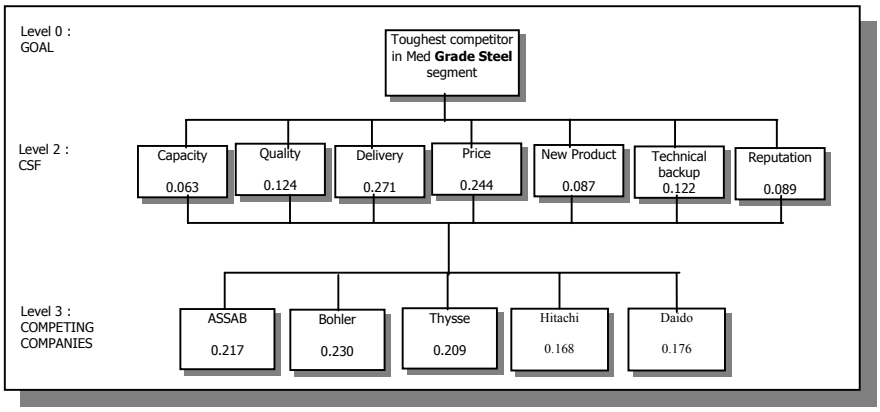

Figure 6 : AHP model of toughest competitor in Med Grade Steels

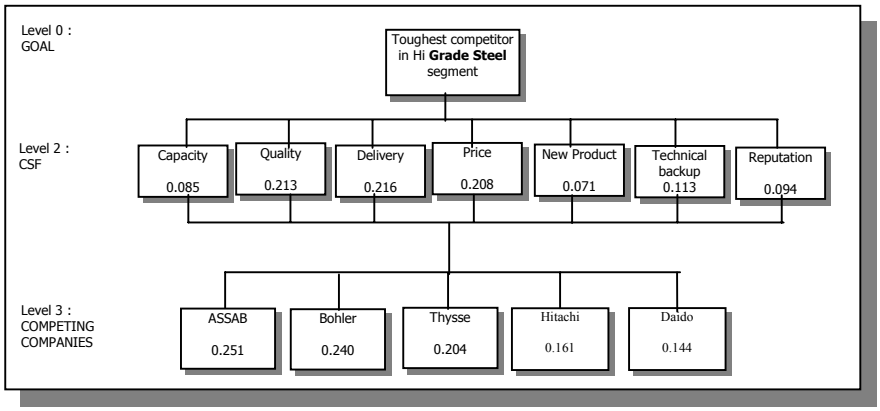

Figure 7 : AHP model of toughest competitor in Hi Grade Steels

The results above are tabulated in the table below, giving the highest competitive ratings of ASSAB in Low and Hi Grade, and Bohler in Med Grade.

Grades	ASSAB	Bohler	Thyssen	Hitachi	Daido
Low Grade	0.237	0.213	0.173	0.195	0.182
Med Grade	0.217	0.23	0.209	0.168	0.176
Hi Grade	0.251	0.24	0.204	0.161	0.144

Table 14 : AHP Results of Competitor analysis

The fact that currently AAI is the market leader for all product types indicates that AHP results represent reality better. However, the AHP analysis marginally ranked AAI second to Bohler for medium grade products. It indicates the need for a review process that we did not do here.

4. Strategy Rating Analysis

4.1. Ordinal Approach

Many methods have been proposed to select the best among a set of alternatives. Here the Quantitative Strategic Planning Matrix (David, 1996, p.169) is used as the ordinal method for selecting the best business strategy. The tool used for developing alternative strategies are the Threats-Opportunities-Weaknesses-Strengths (TOWS) matrix. Ordinal methods do not usually emphasize the importance of defining intensity ratings for each factor, leading to highly subjective judgments.

Quantitative Strategic Planning Matrix (QSPM)									
INTERNAL FACTORS	Weight	IMAGE		PARTNERSHIP		NEW PRODUCT		FACILITY	
		Contribution	Total	Contribution	Total	Contribution	Total	Contribution	Total
	Contribution : 1=small;3=med;5=big								
Strengths.									
1. Independent Metalography Steel Lab and Failure Analysis	0.03	2	0.06	4	0.12	5	0.15	5	0.15
2. Recognized and reputable name, domestic (TIRA) as well as internationally (ASSAB).	0.10	5	0.5	3	0.3	5	0.5	2	0.2
3. Good longstanding relationship with customers.	0.10	2	0.2	5	0.5	5	0.5	2	0.2
4. ISO 9002 certified mill plants all over the world.	0.03	4	0.12	4	0.12	5	0.15	5	0.15
5. ASSAB and Uddeholm group are always the leader in new tool steel product.	0.10	5	0.5	3	0.3	5	0.5	5	0.5
6. Comfortable profit margin.	0.05	2	0.1	2	0.1	5	0.25	2	0.1
7. Strong financial cash backup.	0.05	1	0.05	2	0.1	5	0.25	4	0.2
8. Management's drive to improve productivity.	0.05	3	0.15	4	0.2	5	0.25	5	0.25
9. AAI has viable products.	0.03	1	0.03	4	0.12	5	0.15	2	0.06
Weaknesses.									0
1. Inappropriate Lab engineering staff.	0.03	5	0.15	4	0.12	5	0.15	5	0.15
2. Sales staff lack of selling skills.	0.03	4	0.12	4	0.12	5	0.15	4	0.12
3. Inadequate Sales Analysis Information Systems.	0.10	2	0.2	2	0.2	5	0.5	2	0.2
4. Price is driven by company high profit target rules.	0.05	3	0.15	2	0.1	2	0.1	1	0.05
5. Stock is not well managed.	0.10	2	0.2	4	0.4	2	0.2	1	0.1
6. Inaccuracy of manufacturing industry sales projections.	0.15	1	0.15	2	0.3	2	0.3	1	0.15
Total	1.00		2.68		3.1		4.1		2.58
EXTERNAL FACTORS									
Opportunity.									
1. Complex Casting/Moulding Industry introduction.	0.10	1	0.1	5	0.5	5	0.5	5	0.5
2. Introduction of import duties on new complex castings.	0.03	1	0.03	1	0.03	4	0.12	4	0.12
3. New markets for new products.	0.06	2	0.12	4	0.24	5	0.3	1	0.06
4. Industry standard ISO-9002.	0.06	2	0.12	1	0.06	4	0.24	5	0.3
5. Plant relocation to Indonesia.	0.05	1	0.05	4	0.2	4	0.2	3	0.15
6. Increasing number of local steel foundries.	0.08	1	0.08	4	0.32	4	0.32	4	0.32
7. Take over direct import by customers.	0.05	1	0.05	1	0.05	2	0.1	1	0.05
T h r e a t s.									
1. Increasing trend in quantity of competitors.	0.03	1	0.03	2	0.06	4	0.12	4	0.12
2. Expanding capacity of competitors.	0.03	1	0.03	1	0.03	4	0.12	5	0.15
3. Reduction in import duties for manufacturing industry products/ASEAN free trade.	0.08	1	0.08	1	0.08	2	0.16	1	0.08
4. Fluctuating demand in market.	0.08	1	0.08	3	0.24	4	0.32	1	0.08
5. Trend for client to provide in-house facilities.	0.08	3	0.24	2	0.16	4	0.32	5	0.4
6. Exchange rate for rupiahs.	0.13	1	0.13	1	0.13	4	0.52	4	0.52
7. Competition from competitors in AAI competencies.	0.05	4	0.2	3	0.15	4	0.2	3	0.15
8. Market-leadership is too thin.	0.03	4	0.12	1	0.03	3	0.09	2	0.06
9. Improving quality of competitors.	0.03	3	0.09	4	0.12	4	0.12	4	0.12
10. More competitive price by competitors.	0.03	2	0.06	2	0.06	3	0.09	2	0.06
Total	1.00		1.61		2.46		3.84		3.24
GRAND TOTAL			4.29		5.56		7.94		5.82

Table 15 : Strategy Selection using QSPM

Employing the QSPM method suggests that AAI should implement New Product strategy. With the insight understandings of the strength and opportunity, this result is reasonable because every factors lead to AAI to develop new products. However we have not consider other factors the determining criteria of precise pairwise comparison between each factors. While QSPM is superb in making selection in situation where intuition on decision making factors are unchallenged, we finally found ourselves in a situation where we have to take decision where we actually prefer to a different one.

(I can't edit the above paragraph, needs HK to clarify)

4.2. AHP Approach

Rather than using the SWOT elements directly as suggested by David, we did pro-cons analysis to select strategy with the AHP, using the Benefits-Opportunities-Risks-Costs framework. We show the model in Figure 8, and the results of our analysis in Table 16. We used the same hierarchy for all the four analysis within the framework, but with different priority judgments for each.

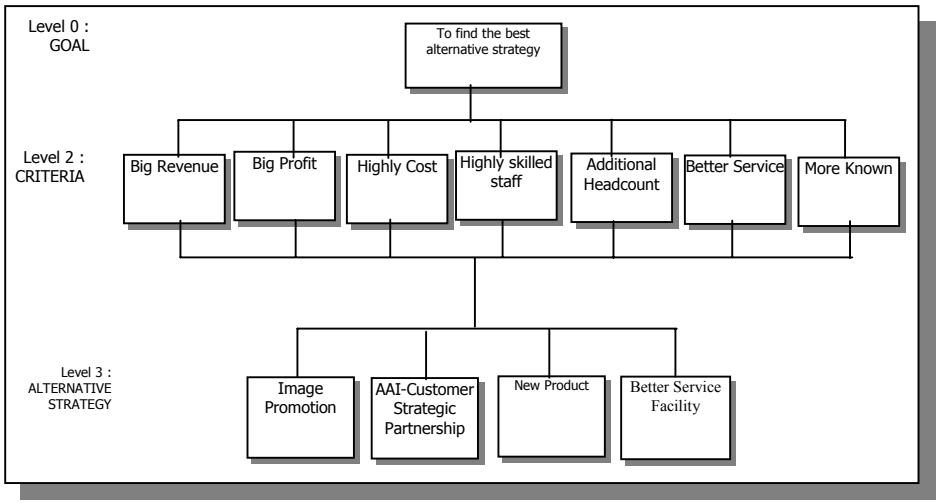

Figure 8 : AHP results of Strategy Selection
Figure reproduced from the thesis

Employing the AHP indicated Strategic Partnership (total weighted score 1.646) as the recommended strategy. The final score was obtained using the following formula:

$$\text{WEIGHT} = \frac{M_{BENEFIT} * M_{OPPORTUNITY}}{M_{COST} * M_{RISK}}$$

	Strategic Partnership	Image Promotion	Better Service Facility	Introduce New Products
COST	0.260	0.271	0.297	0.173
BENEFIT	0.532	0.258	0.130	0.080
RISK	0.430	0.278	0.112	0.181
OPPORTUNITY	0.346	0.254	0.212	0.188
WEIGHTED	**1.646**	**0.870**	**0.829**	**0.480**

Table 16 : Results of Strategy Selection using AHP with EC
Table reproduced from the thesis

AAI executives consider the strategy of new product development, as suggested by the outcome of the QSPM analysis, as a good strategy. However, they decided that Strategic Partnership is the one to implement since it has a longer-term strategic direction.

5. Conclusion

It is disturbing to find that applying both ordinal and ratio scale methods for the same analysis, by the same decision makers, leads to different conclusions. Product viability analysis with ordinal method expects the decision makers to judge the overall conclusion based on the product map presented in a two by two matrix because there is no trade-off judgments between business strength and market attractiveness factors. The analysis with AHP allows the decision makers to input their judgments regarding such trade-offs. It is difficult to conclude whether the significantly different results are more caused by the multiplication operations of ordinal numbers, which is prohibited from the theory of measurement perspective, or by the different ways the trade-off judgments between the two factors are applied in the analysis. In this case, however, the superiority of the AHP can be judged only from the fact that AHP has a solid scientific foundation and that it facilitates a more accurate elicitation of trade-off judgments between business strength and market attractiveness factors.

Again, there are different results of competitor ratings between ordinal and AHP assessments. The ordinal methods rated AAI in the second place for low and medium grade products, and in the third for the high-grade product since two of its competitors are tied at the top rank. Unlike product viability analysis, the result of competitor rating can be validated using market share position. Data indicated that AAI is the market leader for all product types. The difference in the actual market shares of the top competitors is quite small (around 2%), indicating that the AHP is more accurate in assessing the winner of such a close competition. At the same time, however, the inaccurate result of the competitor analysis for the medium-grade product emphasized the need for a review process as an integral process with the AHP.

Applying ordinal method and AHP for strategy selection also produced different recommendations. At this stage, we can only use the decision makers' expectation to judge which outcome makes a better sense to them. In this case, the decision makers appeared to be more committed to implement the AHP recommendation of strategic partnership than the product selection strategy suggested by the ordinal method.

It is useful to note that the task of strategic managers is to create values to the management decision. It is very critical to ensure precision in formulating the goal, the criteria and alternatives. As we have experienced, we may conclude that the AHP - with its supporting software Expert Choice – is the most reliable tool to obtain accuracy in making a difficult choice among close competing alternatives.

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