

KELLOGG SCHOOL OF MANAGEMENT

Game Theory and Strategic Decision-Making

DECS-452
Week #3

Professor Bob Weber

"The final lesson of the Cuban missile crisis is the importance of placing ourselves in the other country's shoes..." Robert Kennedy, *Thirteen Days: A Memoir of The Cuban Missile Crisis*, Mentor Publishing, pg. 124.

For Friday (day section) / break (evening section):

Have I got a deal for you! I've got this great used car, and I might be willing to sell. The actual value of the car depends on how well it has been maintained, and this is known only to me; expressed in terms of the car's value to me, you believe it equally likely to be worth any amount between \$0 and \$500. You, who would utilize the car to a greater extent than I, would derive 50% more value from its ownership (e.g., if it's worth \$300 to me, then it's worth \$450 to you). How much are you willing to offer me? (I'll interpret your offer as "take-it-or-leave-it.")

For next week:

Please be prepared to discuss the Walkenhorst Chemical case in class. What would *you* advise Jack to do?

To be written up and turned in next week: The Dragon/Quantum case

As Morton indicates, there are at least two matters that Fears has overlooked in making his argument. First of all, Quantum, which has fought off a succession of challenges, is likely to be concerned with the *cost* of different competitive strategies, while Dragon, which is concerned with survival, is focusing only on the probability of success. Second, Dragon finds itself in a stronger financial position than Quantum has reason to expect. Let's modify Fears' formulation of the problem, using the following data:

Quantum's Costs (net present value):

\$60,000,000	= cost of Dragon's success
\$3,000,000	= cost of price cut
\$12,000,000	= cost of price cut + new product

Quantum's Beliefs:

0.05	= Pr (Dragon is strong)
0.95	= Pr (Dragon is weak)

Prob (new disk technology feasible) = 0.60

Dragon's Ability to Succeed (with price cut)

Change in CEI	Prob	against price cut		against price cut + new product	
		if strong	if weak	if strong	if weak
< 0%	0.05	n	n	n	n
[0%,1%)	0.15	n	n	n	n
[1%,2%)	0.10	n	n	n	n
[2%,5%)	0.60	y	n	n	n
≥ 5%	0.10	y	y	y	n

Dragon's Ability to Succeed (with new disk, if feasible)

Change in CEI	Prob	against price cut		against price cut + new product	
		if strong	if weak	if strong	if weak
< 0%	0.05	n	-	n	-
[0%,1%)	0.15	y	-	n	-
[1%,2%)	0.10	y	-	y	-
[2%,5%)	0.60	y	-	y	-
≥ 5%	0.10	y	-	y	-

(If Dragon is weak, they cannot afford to develop the disk.)

Of course, Dragon is strong — but Quantum assigns only a 5% probability to this being the case.

Determine the strategic form of the "game" between Dragon and Quantum. Remember: A strategy for Dragon should specify the action they would take if weak, as well as the action they would take if strong, and a strategy for Quantum should specify their response to either a price cut or the introduction of a disk player by Dragon. (Hint: This game is not that different from the one-card poker game you analyzed last week.)

What would you advise Dragon to do, and what response would you expect from Quantum? Please write up your analysis — in the form of a memo to Morton commenting on Fears' "analysis" — and turn it in next week.]

The License-Acquisition Problem

The sole purpose of this problem is to be sure we're in agreement concerning what a "strategy" is. The **wrong** way to get six strategies in your answer to part (a) is to list:

don't purchase
 purchase
 if good news, apply
 if good news, don't apply
 if bad news, apply
 if bad news, don't apply

A strategy must be a **complete** "plan of action", i.e., the equivalent of a memo, left behind when you go on vacation, which specifies the actions you want taken in every situation which could conceivably arise during your absence.

(a) There are 6 essentially-distinct pure strategies.

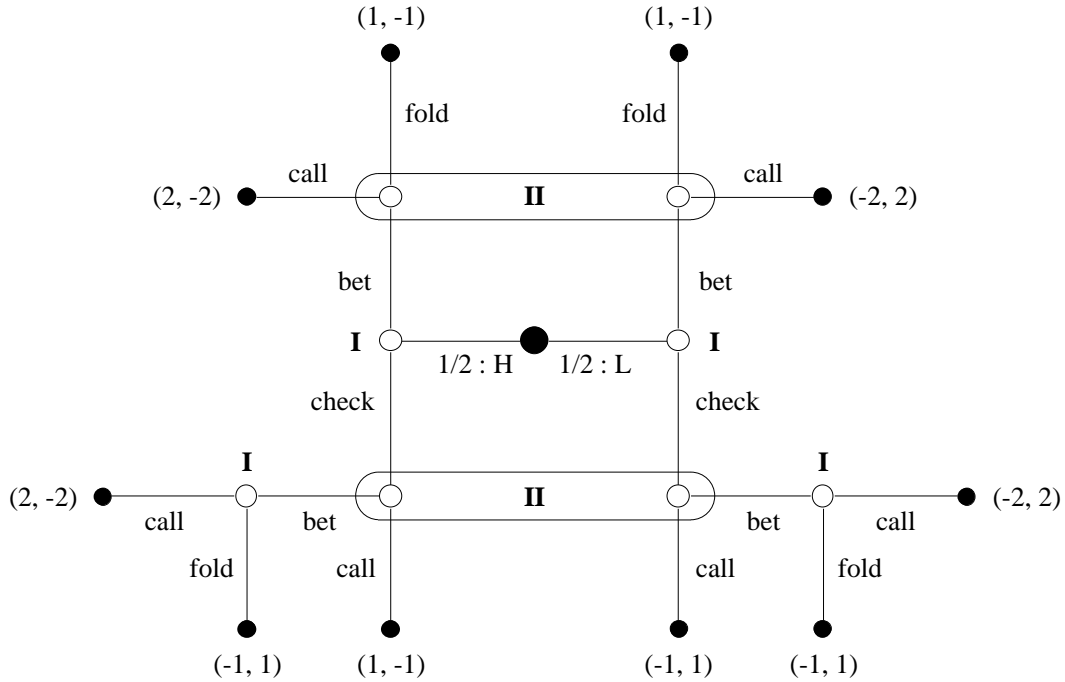
don't purchase, apply
don't purchase, don't apply
purchase: if good news, **apply** if bad news, **apply**
purchase: if good news, **apply** if bad news, **don't apply**
purchase: if good news, **don't apply** if bad news, **apply**
purchase: if good news, **don't apply** if bad news, **don't apply**

(b) There are 20 essentially-distinct pure strategies: 4 of the first type (below), and 16 of the second type.

don't purchase:	other bought: apply / don't	other didn't buy: apply / don't		
purchase:	good news, other bought: apply / don't	good news, other didn't buy: apply / don't	bad news, other bought: apply / don't	bad news other didn't buy: apply / don't

One-Card Poker

The Extensive Representation:



Player I has 16 pure strategies, 9 of which are essentially distinct. The 4 of those which are undominated are:

Hb Lb Hb Lch,f
Hch,c Lb Hch,c Lch,f

Player II has 4 pure strategies, all of which are essentially distinct. Assuming that Player I will only employ his undominated strategies, Player II's 2 undominated strategies are:

[b→call, ch→call] [b→fold, ch→call]

The Strategic Representation:

	b→c, ch→c		b→f, ch→c	
Hb Lb	2,-2	0	1, 1	1
Hb Lch,f	2,-1	1/2	1,-1	0
Hch,c Lb	1,-2	-1/2	1, 1	1
Hch,c Lch,f	1,-1	0	1,-1	0

Player I should always bet with a high card, and should bet 1/3 of the time with a low card (folding if Player II bets after a low-card check).

Player II should call after bets 2/3 of the time, and should always call after checks.

Player I should expect to win \$1/3 per play.

The Ware Case (dollar amounts in 000's)

discount rate	10%	years 1-2	190.9%
		years 3-7	344.6%
Data			
Pr (material feasible)	50%	margin	20%
Ware entry cost	\$500	Pr (Ware wins race)	50%
National entry cost	\$1,000	Ware share after loss	50%
		forecast range	\$15,000
		(uniform distribution)	\$20,000

The Strategic Form (market value = \$17.5 million)

		National		
		0.633	0.367	
		in	out	
Ware	0.734	in	(\$2,462) (\$401)	Ware National
			(\$955) \$0	
	0.266	out	(\$3,015) \$1,106	Ware National
			\$0 \$0	

The Extensive Form (with incomplete information)

Ware	cutpoint = \$16,480	National	
Pr (in)	0.704	Pr (in)	0.672
Pr (out)	0.296	Pr (out)	0.328

Payoff Calculations (dollar amounts in 000,000's)

Ware "in": $-\$0.5 \cdot 190.9\% - \text{Pr}(\text{Nat'l "in"}) \cdot 50\% \cdot 50\% \cdot 50\% \cdot 20\% \cdot E[\text{sales}] \cdot 344.6\%$

Ware "out": $-\text{Pr}(\text{Nat'l in}) \cdot 50\% \cdot 50\% \cdot 20\% \cdot E[\text{sales}] \cdot 344.6\%$

National: $+\text{Pr}(\text{Nat'l in}) \cdot [-\$1.0 \cdot 190.9\%$
 $+ 50\% \cdot 50\% \cdot 50\% \cdot 20\% \cdot (\$20.0 + \text{cutpoint}) / 2 \cdot 344.6\% \cdot (\$20.0 - \text{cutpoint}) / (\$20.0 - \$15.0)$
 $+ 50\% \cdot 50\% \cdot 20\% \cdot (\$15.0 + \text{cutpoint}) / 2 \cdot 344.6\% \cdot (\text{cutpoint} - \$15.0) / (\$20.0 - \$15.0)]$

Ware's Expected Payoff from Entry

		National's Probability of Entry					
		0%	20%	40%	60%	80%	100%
Ware's Demand Estimate	(millions)						
	\$15.00	(\$0.95)	(\$1.21)	(\$1.47)	(\$1.73)	(\$1.99)	(\$2.25)
	\$15.50	(\$0.95)	(\$1.22)	(\$1.49)	(\$1.76)	(\$2.02)	(\$2.29)
	\$16.00	(\$0.95)	(\$1.23)	(\$1.51)	(\$1.78)	(\$2.06)	(\$2.33)
	\$16.50	(\$0.95)	(\$1.24)	(\$1.52)	(\$1.81)	(\$2.09)	(\$2.38)
	\$17.00	(\$0.95)	(\$1.25)	(\$1.54)	(\$1.83)	(\$2.13)	(\$2.42)
	\$17.50	(\$0.95)	(\$1.26)	(\$1.56)	(\$1.86)	(\$2.16)	(\$2.46)
	\$18.00	(\$0.95)	(\$1.26)	(\$1.57)	(\$1.89)	(\$2.20)	(\$2.51)
	\$18.50	(\$0.95)	(\$1.27)	(\$1.59)	(\$1.91)	(\$2.23)	(\$2.55)
	\$19.00	(\$0.95)	(\$1.28)	(\$1.61)	(\$1.94)	(\$2.26)	(\$2.59)
	\$19.50	(\$0.95)	(\$1.29)	(\$1.63)	(\$1.96)	(\$2.30)	(\$2.63)
\$20.00	(\$0.95)	(\$1.30)	(\$1.64)	(\$1.99)	(\$2.33)	(\$2.68)	

Ware's Expected Payoff from Abstention

		National's Probability of Entry					
		0%	20%	40%	60%	80%	100%
Ware's Demand Estimate	(millions)						
	\$15.00	\$0.00	(\$0.52)	(\$1.03)	(\$1.55)	(\$2.07)	(\$2.58)
	\$15.50	\$0.00	(\$0.53)	(\$1.07)	(\$1.60)	(\$2.14)	(\$2.67)
	\$16.00	\$0.00	(\$0.55)	(\$1.10)	(\$1.65)	(\$2.21)	(\$2.76)
	\$16.50	\$0.00	(\$0.57)	(\$1.14)	(\$1.71)	(\$2.27)	(\$2.84)
	\$17.00	\$0.00	(\$0.59)	(\$1.17)	(\$1.76)	(\$2.34)	(\$2.93)
	\$17.50	\$0.00	(\$0.60)	(\$1.21)	(\$1.81)	(\$2.41)	(\$3.02)
	\$18.00	\$0.00	(\$0.62)	(\$1.24)	(\$1.86)	(\$2.48)	(\$3.10)
	\$18.50	\$0.00	(\$0.64)	(\$1.28)	(\$1.91)	(\$2.55)	(\$3.19)
	\$19.00	\$0.00	(\$0.65)	(\$1.31)	(\$1.96)	(\$2.62)	(\$3.27)
	\$19.50	\$0.00	(\$0.67)	(\$1.34)	(\$2.02)	(\$2.69)	(\$3.36)
\$20.00	\$0.00	(\$0.69)	(\$1.38)	(\$2.07)	(\$2.76)	(\$3.45)	

Ware's Preference ("In"- "Out")

		National's Probability of Entry					
		0%	20%	40%	60%	80%	100%
	(millions)						
	\$15.00	(\$0.95)	(\$0.70)	(\$0.44)	(\$0.18)	\$0.08	\$0.34
Ware's	\$15.50	(\$0.95)	(\$0.69)	(\$0.42)	(\$0.15)	\$0.11	\$0.38
Demand	\$16.00	(\$0.95)	(\$0.68)	(\$0.40)	(\$0.13)	\$0.15	\$0.42
Estimate	\$16.50	(\$0.95)	(\$0.67)	(\$0.39)	(\$0.10)	\$0.18	\$0.47
	\$17.00	(\$0.95)	(\$0.66)	(\$0.37)	(\$0.08)	\$0.22	\$0.51
	\$17.50	(\$0.95)	(\$0.65)	(\$0.35)	(\$0.05)	\$0.25	\$0.55
	\$18.00	(\$0.95)	(\$0.64)	(\$0.33)	(\$0.02)	\$0.29	\$0.60
	\$18.50	(\$0.95)	(\$0.64)	(\$0.32)	\$0.00	\$0.32	\$0.64
	\$19.00	(\$0.95)	(\$0.63)	(\$0.30)	\$0.03	\$0.35	\$0.68
	\$19.50	(\$0.95)	(\$0.62)	(\$0.28)	\$0.05	\$0.39	\$0.73
	\$20.00	(\$0.95)	(\$0.61)	(\$0.27)	\$0.08	\$0.42	\$0.77

National's Expected Payoff

		National's Probability of Entry					
		0%	20%	40%	60%	80%	100%
	(millions)						
	\$15.00	\$0.00	(\$0.08)	(\$0.16)	(\$0.24)	(\$0.32)	(\$0.40)
Ware's	\$15.50	\$0.00	(\$0.05)	(\$0.11)	(\$0.16)	(\$0.22)	(\$0.27)
Demand	\$16.00	\$0.00	(\$0.03)	(\$0.05)	(\$0.08)	(\$0.11)	(\$0.13)
Estimate	\$16.50	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.01
Cutpoint	\$17.00	\$0.00	\$0.03	\$0.06	\$0.09	\$0.12	\$0.15
	\$17.50	\$0.00	\$0.06	\$0.12	\$0.18	\$0.24	\$0.30
("In" if	\$18.00	\$0.00	\$0.09	\$0.18	\$0.27	\$0.36	\$0.45
estimate	\$18.50	\$0.00	\$0.12	\$0.24	\$0.37	\$0.49	\$0.61
exceeds	\$19.00	\$0.00	\$0.15	\$0.31	\$0.46	\$0.62	\$0.77
cutpoint)	\$19.50	\$0.00	\$0.19	\$0.37	\$0.56	\$0.75	\$0.94
	\$20.00	\$0.00	\$0.22	\$0.44	\$0.66	\$0.89	\$1.11

Exhibit 1: The advice I'd give to Ware a month before they must choose how to act

To: Ware R&D Committee
From: Your outside strategic consultant
Date: One month before the day you must finally decide what to do
Re: Whether to be "in" or "out"

Based on the economic data you've provided me, I've analyzed the problem you're facing. There's one critical piece of information I will require a month from now: your assessment of the likelihood that National will choose to pursue this research opportunity (see Exhibit 3).

At the current time, I recommend that you begin collecting information in order to help make that final assessment. I also recommend that you make this information-collection activity an organization-wide effort. (Here's a Web reference to some information you might find of use with regard to this: <http://www.kellogg.northwestern.edu/faculty/weber/decs-452/CI.htm>) Who can tell what member of your staff might come across a relevant piece of information concerning National's intentions?

In addition, please note that – whatever your own final decision – you will always be better off if National chooses to be "out" of the race rather than "in," and National will be most likely to choose to be "out" if they consider it likely that you are "in." This provides several opportunities worthy of consideration:

- You could seek ways to publicly commit yourself to being "in." This will oblige you to invest in the two-year research program, but should completely eliminate the chance of losing half of your future market to National.
- You could seek ways to publicly signal your intention to be in this R&D race. If your current reputation is such that National would interpret the signals as having a sufficiently high chance (73.4% or greater) of being legitimate this time, you could cash in on that reputation by giving the signal and not actually carrying through with the research program. If you attempt this, please make a note to occasionally leak out information concerning the fictitious program over the next two years, and to eventually announce your researchers' failure to demonstrate feasibility. You might as well try to maintain your reputation for veracity so you can cash in on it again in the future.
- You could try to disinform National about your intentions, by "planting" information concerning your intention to pursue this research opportunity in places where National's executives are likely to come across the false information and trust its source.

A month from now, be sure to take your own assessment of your success (in whichever of these activities you choose to engage in) when assessing the likelihood that National will be in the race.

Finally, be aware that National might well be attempting to gather information concerning your intentions, or trying to seek confirmation of information you've chosen to leak (see Exhibit 2). Remember: Loose lips sink ships. (In case everyone on your committee is too young to recognize this last slogan: It dates back to World War II.)

Exhibit 2: The advice I'd give to National a month before they must choose how to act

To: National R&D Committee
From: Your outside strategic consultant
Date: One month before the day you must finally decide what to do
Re: Whether to be "in" or "out"

Based on the economic data you've provided me, I've analyzed the problem you're facing. There's one critical piece of information I will require a month from now: your assessment of the likelihood that Ware will choose to pursue this research opportunity (see Exhibit 4).

At the current time, I recommend that you begin collecting information in order to help make that final assessment. I also recommend that you make this information-collection activity an organization-wide effort. (Here's a Web reference to some information you might find of use with regard to this: <http://www.kellogg.northwestern.edu/faculty/weber/decs-452/CI.htm>) Who can tell what member of your staff might come across a relevant piece of information concerning Ware's intentions?

In addition, please note that – whatever your own final decision – you will always be at least as well off if Ware chooses to be "out" of the race rather than "in," and Ware will be most likely to choose to be "out" if they consider it likely that you are "out" as well. This provides several opportunities worthy of consideration:

- Avoid any publicly-observable actions that might signal to Ware your own interest in this R&D opportunity.
- Alternatively, you could seek ways to publicly signal your intention to stay out of this R&D race. If your current reputation is such that Ware would interpret the signals as having a sufficiently high chance (36.7% or greater) of being legitimate this time, you could cash in on that reputation by giving the signal and then investing in the R&D program. If you attempt this, please do all you can to conceal all information concerning your research program over the next two years, and if your researchers eventually fail to demonstrate feasibility, close the project down quietly. You might as well try to maintain your reputation for veracity so you can cash in on it again in the future.
- You could try to disinform Ware about your intentions, by "planting" information concerning your intention to forgo this research opportunity in places where Ware's executives are likely to come across the false information and trust its source.

A month from now, be sure to take your own assessment of your success (in whichever of these activities you choose to engage in) when assessing the likelihood that Ware will be in the race.

Finally, be aware that Ware might well be attempting to gather information concerning your intentions, or trying to seek confirmation of information you've chosen to leak (see Exhibit 1). Remember: Loose lips sink ships. (In case everyone on your committee is too young to recognize this last slogan: It dates back to World War II.)

Exhibit 3: The advice I'd be give Ware on the day they must act

To: Ware R&D Committee
From: Your outside strategic consultant
Date: The day you must finally decide what to do
Re: Whether to be "in" or "out"

Based on the economic data you've provided me, I've analyzed the problem you're facing. There's one critical piece of information I still require: your assessment of the likelihood that National will choose to pursue this research opportunity.

Once you provide me with this assessment, my advice will be simple: If you believe the chance that National will be "in" to be greater than 63.3%, invest in the research project yourself. Hope that National ends up being "out", or that the composite process is not feasible, or that you beat National to demonstrating feasibility. Anticipate the economic consequences of this problem, if you choose to be "in," to be the cost of your two years of research, combined with a long-term expected loss of $\Pr(\text{National is "in"}) * 50\% * 50\% * \$6,030,000$ (NPV).

In assessing the likelihood that National will be "in", you should certainly take into account the following information:

- whether National can afford to finance the research
- who within the National organization holds the ultimate responsibility of deciding whether to be "in" the race
- that manager's current status and track record within the National managerial hierachy
- any other "incidental" information of relevance that you or others within your organization have recently come across that may be of relevance
- how high you believe National might currently be assessing the likelihood that you will choose to be in this R&D race (see Exhibit 4)

Exhibit 4: The advice I'd give National on the day they must act

To: National R&D Committee
From: Your outside strategic consultant
Date: The day you must finally decide what to do
Re: Whether to be "in" or "out"

Based on the economic data you've provided me, I've analyzed the problem you're facing. There's one critical piece of information I still require: your assessment of the likelihood that Ware will choose to pursue this research opportunity.

Once you provide me with this assessment, my advice will be simple: If you believe the chance that Ware will be "in" to be less than 73.4%, invest in the research project yourself. In this case, hope that the composite process is feasible, and that Ware ends up being "out," or and that you beat Ware to demonstrating feasibility. Anticipate the economic consequences of this problem, if you choose to be "in," to be the cost of your two years of research, combined with an expected long-term gain of $[\text{Pr}(\text{Ware is "out"}) + \text{Pr}(\text{Ware is "in"}) * 50\%] * 50\% * \$6,030,000$ (NPV).

In assessing the likelihood that Ware will be "in," you should certainly take into account the following information:

- whether Ware can afford to finance the research
- who within the Ware organization holds the ultimate responsibility of deciding whether to be "in" the race
- that manager's current status and track record within the Ware managerial hierarchy
- any other "incidental" information of relevance that you or others within your organization have recently come across that may be of relevance
- how high you believe Ware might currently be assessing the likelihood that you will choose to be in this R&D race (see Exhibit 3)

Dragon Consumer Electronics (A)¹

Dragon Consumer Electronics, a medium-sized producer of consumer electronic devices, is involved in a decision process on which the future of the firm may well turn. Dragon specializes in home video recorders, a growing industry in which there are at present six firms. Five of the firms are much like Dragon — they manufacture relatively expensive, high-quality video recorders. The sixth firm, Quantum Manufacturing, is the exception — Quantum produces a lower quality recorder, called the X50, that they are able to sell at a price substantially below that charged by their competitors. Quantum has the lower end of the market completely to itself, a position it attained by resorting to price cutting whenever another firm threatens them with the introduction of a new, low-cost recorder.

Analysts at Dragon have come to the conclusion that the growth potential for home video recorders is enormous and that most of the growth will come in the low quality end of the market. So the Board of Directors at Dragon has decided to mount an attack against Quantum's stranglehold on this end of the market. The question is: What form should this attack take?

A possible mode of attack has been identified. At the present time, Dragon manufactures two basic recorders, the Alpha and the Alpha+. The Alpha model is the cheaper of the two — in fact, it is the second-least-expensive recorder on the market, after Quantum's X50. The plan originally put forward by Ken Morton, Chief Executive Officer of Dragon, is to shave the price of the Alpha sufficiently to become competitive with the X50 and hope that the difference in quality will suffice to break into the larger, low-price market. It is expected that Quantum will respond by cutting the price of the X50, but if Dragon responds by shaving its price some more, they figure that they will get the volume needed to make a go of it. Even if the Alpha is priced a bit higher than the X50, it is felt that the difference in quality will allow the Alpha to attain sufficient market share. There is some risk in this — the general state of the economy is not good. There is a chance that there will be a general economic slow-down, or even a recession, in the near future, and if Dragon is to get necessary volume, it is necessary that the economy pick up within a couple of years. But economists at Dragon have looked at this, and they have decided that even if Quantum cuts the price of the X50, the chances that Dragon will get the necessary volume are about seven in ten. The reason that they think they can succeed where others have failed (in taking on Quantum) is that their financial position is good, they have discovered ways to lower somewhat their production costs, and (unlike in previous attempts to break into Quantum's market) they will not be introducing an entirely new product. So in April of 1980, the Board of Directors at Dragon tentatively approved this plan, with the price cut scheduled to come in September, to try to pick up Christmas sales.

Some opposition to this plan had been voiced by Tom Fears, Vice President for Production and Development. Fears had claimed that the plan was doomed to failure because the analysis that had been performed had seriously underestimated Quantum's response to the price cut. At Fears' insistence, the Board had decided to make the decision tentative: A final decision would not come until the June meeting. Meanwhile, the Board asked Fears to prepare an analysis that buttressed his claims.

On May 6, Fears circulated the following memorandum:

¹This case has been prepared as the basis of classroom discussion only. While based on an actual industrial situation, it is not an accurate description of any situation involving the consumer electronics industry.

MEMO TO: Board of Directors and Operating Officers
FROM: Tom Fears, Vice President for Production and Development
SUBJECT: Getting into the low cost market for video recorders

(1) The proposed plan to cut the price of the current Alpha model recorder has very little chance of succeeding. Analysis that indicates that we would have a good chance (70%) of succeeding is based on the assumption that Quantum will respond by cutting the price of their model X50. If Quantum does act in this manner, and if we do chase their price cut, we will succeed with high probability, as long as the economy does pick up. But I question the assumption that Quantum will respond in this fashion.

(2) Another option that Quantum will have is to cut the price of their X50 *and* to introduce an upgraded version that will directly compete with our Alpha in terms of price and quality. There is no doubt that Quantum has this capability, and could react almost instantaneously to our move. If they do this, they destroy the basis of our plan: to be uniquely positioned with a competitive cost and higher quality recorder. Should they adopt this strategy, we could expect to attain volume sufficient to survive *only if* consumer expenditure rises (in real terms) by around 5% per annum over the next three years. Our economists assess that the chances of this are less than one in ten. (The figures to support my argument can be supplied if there is any question about them.)

(3) I am in complete agreement with the general proposition that we must attempt to break into the low cost market. But to have a substantial chance of success, it is imperative that we confront Quantum "directly." We must attempt to develop a product that competes on even terms with their X50 in terms of price. We *may* have the technology available to do this. Recent advances in our development laboratory lead me to believe that we can develop a video recorder using a "disk" for storage instead of tape (the current technology). There are some technological difficulties with this, but I believe that we can probably resolve them. (Marketing this sort of product will be possible because such storage devices are manufactured and sold for use with home computers — We will only have to adapt these devices to a video storage purpose.) My analysis indicates that by going ahead with this plan, assuming Quantum takes those actions that will minimize our chance of success (which will surely be their objective), we will have an 80% chance of success as long as the disk storage technology works. And I assess a chance of 60% that the difficulties that remain with this technology can be surmounted. Thus, we will have an overall chance of 48% of success - much higher than the 10% chance of success with the current plan.

When Ken Morton read this memo, he felt somewhat uneasy. He knew that Fears wanted to develop the new technology — Fears always pressed for the adoption of new and untried methods. (Morton had to admit that this was what made Fears a superlative V.P. for Production and Development.) But in this case, he wasn't so sure that Fears' judgment was correct. The logic in Fears' memo seemed correct, and he had little doubt that Fears could back up all his probability judgments, but his intuition told him that Fears somewhere had made an erroneous assumption.

Dragon Consumer Electronics (B)¹

The May 6 memo from Tom Fears, presented in the Dragon Consumer Electronics (A) case, was troubling to Ken Morton. Since he did not quite follow the logic of Fears' argument, he asked Fears for further explanation. At a meeting on May 14, Fears made the following basic presentation.

"As I see it, our objective must be to maximize the probability of a successful penetration into the low end of the market, short, of course, of bankrupting the company. There will be tremendous growth in the low end of this market, and I just don't see how we will be able to survive competitive pressures if we don't grow with this part of the market. Quantum, if they hold the low end all by themselves, will eventually introduce a full product line, and we won't be able to compete with them.

"Their objective is clearly to block us from penetrating the low price end of the market. They will make substantial profits if they can hold onto that market all by themselves, profits that they will be forced to share with any significant competition. Look at how they've behaved previously when someone tried to enter their 'territory.' They responded immediately with more than enough force to repel the 'invasion.' I can't see any reason why they would do otherwise now. In fact, I would think that as time goes on, they have more and more to lose by not fighting off any entrant — each time they fight they forego some profits — they've invested more in this market, making it more important that they hold it.

"My main point, very simply, is that we stand a much better chance of penetrating the low-price market by gambling on the new disk technology than if we follow the original plan of shaving the price of our Alpha model. Whether we get a sufficient foothold or not depends on three factors: our strategy, Quantum's response, and the general state of the economy. By the way, I'm taking a 25% share within two years to be a sufficient foothold, although I'm not sure that it will be enough.

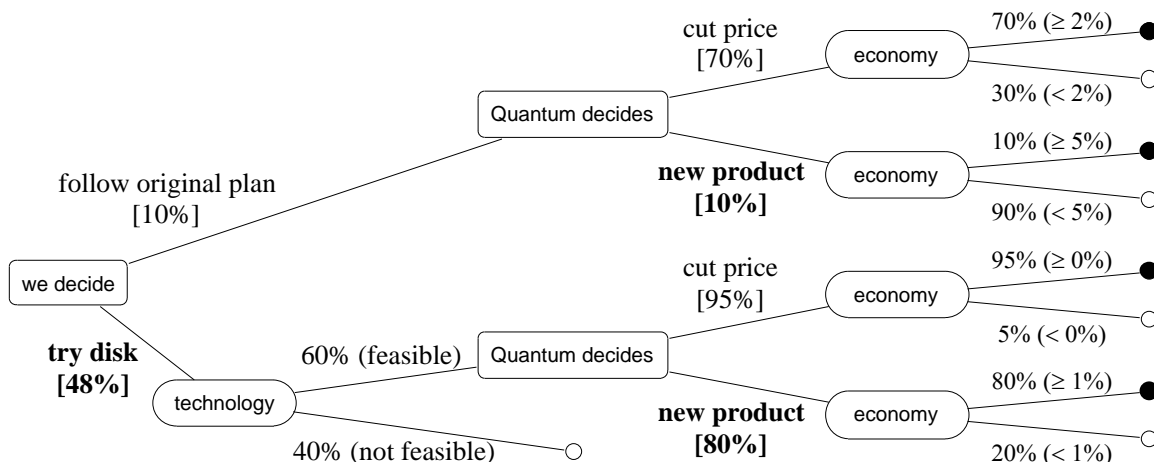
"We have two strategies we can try. There is the original strategy of trying to cut the price of the Alpha model, and there is my suggestion of trying the new disk technology. Quantum has two responses available — They can simply try price competition, by cutting the price of their X50 model (with accompanying increases in advertising and so forth) or they can try to cut the price of the X50 and at the same time bring in a new product aimed at a slightly higher market segment. As I pointed out in my memo, this second strategy will kill us if we try the original strategy, because it makes us compete with the new product directly, and the X50 still holds tight to the bottom end of the market. The overall economy would really have to pick up if we are going to make it under these circumstances. In general, I've put together some figures saying what has to happen to consumer expenditures over the next few years if we're going to achieve the market share that we need to make a go of it. My figures are summarized in the following table:

¹This case has been prepared as the basis of classroom discussion only. While based on an actual industrial situation, it is not an accurate description of any situation involving the consumer electronics industry.

given our strategy, and Quantum's, for us to succeed, consumer expenditures must ...		Quantum's response	
		cut X50 price	cut price and bring in new product
our strategy	cut price of Alpha	rise by at least 2% per annum	rise by at least 5% per annum
	try new disk technology	not fall over the next few years	rise by at least 1% per annum

"Of course, the figures in the second row are predicated on the disk technology working. Now these are pretty rough figures, but I think they are indicative. And from the economic forecasts that I've seen, I'd say that there is a pretty low chance, say one in ten, that consumer expenditures will rise by 5% or more, a 70% chance of a 2% or greater rise, an 80% chance of 1% or greater rise, and a 95% chance that consumer expenditures will not fall.

"Accordingly, I see the problem we face as being adequately portrayed by the tree below. I've evaluated the outcomes in win-loss terms — good for us if we make it, and bad for Quantum in that case — bad for us if we fail, and good for Quantum. And I've rolled it back, and written our chances of winning in brackets. As you can see, Quantum is going to try the new product no matter what we do, so my plan is better. Of course, this is a vastly simplified analysis, but I think that it captures the salient features of this situation."



"I have one question," replied Morton. "Why can't we try both? Why don't we try the disk technology and, if it doesn't work, we can fall back on the original plan? Or maybe we should even do both — if the disk technology works, we will use that as a low price entry and at the same time drop the price of the Alpha model."

"That might be a strategy worth thinking about, but my off-the-cuff reaction is that it isn't feasible financially. The original strategy of cutting the price of the Alpha will give us a short-run negative cash flow. We have financial resources sufficient to stand that for a while, as long as we aren't losing cash

elsewhere. But it will be costly to complete development of the disk technology, and even if it works, it will be costly in the short run to market. If we could raise a bigger financial cushion, maybe doing both would be a good idea. But even then I have my doubts — If the disk technology does work, we might want to phase out the Alpha model. In any case, if it's to be one or the other, I think we should go with the disk."

After this discussion, Morton felt that he understood Fears' argument. And he still didn't quite believe it. He agreed with Fears' assertion that Dragon had to try to penetrate this market — he had arrived at that conclusion long ago — and while maximizing the probability of a success was very simplistic, it didn't give too bad a picture of how he felt. He also believed that Fears' analysis of the options open to each side and the implications of those options and the economy for whether Dragon made it or not were correct. But granting all that, he still thought that Quantum would resort only to a price cut if Dragon tried the original plan. After all, that's what Quantum had done successfully in previous cases of "invasions" of its market. Dragon hoped to succeed because of its superior financial resources, lower production costs, and working with an established product — one with an image in the market place already. Quantum would, of course, know that Alpha had this brand name already, but would they know about Dragon's other two "aces"? If Dragon didn't have these other two advantages, then Morton suspected that a price cut by Quantum would be quite effective in blocking entry — in that case Dragon would have only a 10% chance of success.

Still, if it were the case that Dragon had neither a cost advantage nor financial resources, if Quantum both cut the price of the X50 and introduced the new product, they would be virtually certain to block successful penetration. So why wouldn't Quantum choose to do this? Why hadn't they taken this course of action to repel previous invasions? One possible reason was that no previous invasion had been quite like this one — Quantum had never confronted a "flank attack" where the competitor tried to cut out a niche a bit above the X50. So previous data wasn't conclusive. But another possibility was that Quantum was not simply interested in minimizing the probability of a successful invasion, at whatever cost. Surely Quantum attached a lot of weight to this goal, but they also had to marshal their financial resources in case of future invasions. Introducing a new product would be costly to Quantum — a cost that they might well trade off against the cost of a successful entry.

Walkenhorst Chemical

Jack Walkenhorst, a young chemical engineer and president-treasurer of Walkenhorst Chemical Corporation, is faced with a problem — his company may be about to go bankrupt, and he thinks there ought to be a way to prevent it.

In his Ph.D. thesis, Walkenhorst had shown that it was theoretically possible to produce a certain class of catalysts in a radically new way. These catalysts were extremely important in the production of synthetic fibers and so were quite valuable. Walkenhorst had not shown in his thesis how this process could be made practical, but he had pointed to three possible ways this might be done. The first two were quite similar and looked very promising. If they worked, they would enable production of the catalyst at a cost far below that of the currently employed process. The third method was more problematic. Walkenhorst had thought the chances of it working were only one in twenty. But if it *did* work, it would be cheaper still.

Walkenhorst, upon completion of his dissertation and with the financial help of his spouse, friends and relatives, had incorporated and proceeded to develop the first method. Everything had fallen into place exactly as he had expected, and he had applied for and obtained a patent. Considerable capital was required to initiate production, and on the strength of his patent, Walkenhorst had raised the necessary funds through a combination of debt and new equity — mostly debt. Production had been initiated, and over the past two years Walkenhorst had seen a steady rise in sales and profits. He seemed to have it made.

Then, four months ago, Lakeland Industries, a giant chemical conglomerate, had announced that they would soon begin to sell the catalysts at a price somewhat below Walkenhorst's. Upon investigation, Walkenhorst had ascertained that Lakeland was planning to use the second process, for which they had requested a patent. Walkenhorst believed that because this process was similar to his own, his patent was valid. He had therefore filed an objection to Lakeland's application, and the matter had been referred to a patent referee. Walkenhorst wasn't certain what the results of this would be — he believed that the odds were about even that his objection would be upheld or that the patent would be granted. (Moreover, any knowledgeable observer would have roughly the same assessment.) Walkenhorst had asked that Lakeland not be permitted to produce and sell the product until the referee's report was in, and this had been granted. The referee's report (and subsequent decision) would be made in approximately one month.

If this report upheld Walkenhorst's complaint and denied Lakeland their patent, Walkenhorst would be safe. But if the patent was granted to Lakeland, Walkenhorst figured that he would go under quickly — with Lakeland's massive resources they would be able to set up the necessary physical plant quickly, and because of their size and distributional advantages they would destroy Walkenhorst's markets. Without the cash flow from his sales, Walkenhorst would be unable to service his debt and would inevitably be forced into bankruptcy.

What really galled Walkenhorst about this was that he possessed information that *could* solve all his problems, if *only* he could communicate it safely and believably to Lakeland. In his own researches, he had discovered that the third production method, the potentially cheapest but most problematic, was indeed possible. He felt certain that no one else had this information or was so far along in the development process as was he. Moreover, he was certain that Lakeland continued to assess only a 5% probability that this third method was feasible. Walkenhorst now *knew* that it was feasible, but some technical details remained to be cleared up before he could file for a patent. Walkenhorst estimated that he would be ready to file in eight months.

Walkenhorst was certain that he could get this patent, and that no conceivable competitor to this method existed. Moreover, this process would produce the catalysts at *half* the cost of the other two methods. Thus if Lakeland was granted their patent and proceeded to acquire the necessary physical plant to use their patent, they would end up *losing* most of the value of their investment — they wouldn't be able to withstand the competition of Walkenhorst's third method. This would be true even if Walkenhorst was forced into bankruptcy — although this would hurt Walkenhorst financially, he would be able to reorganize and eventually "win".

Suppose Lakeland gets their patent. If Walkenhorst could communicate his possession of the third method to Lakeland *and* convince them of the truth of this, they would hold off on setting up their physical plant and production until they could ascertain that Walkenhorst did indeed have the process. This would save Walkenhorst the cost of bankruptcy and reorganization, and it would save Lakeland most of the value of their investment (which is why Lakeland would hold off).

But how, Walkenhorst wondered, could he convince Lakeland that he had the third method? A simple announcement of this fact would not be believed — if Walkenhorst did *not* have the process, he would still say that he did if this would stall Lakeland, in order to hold his monopoly for as long as possible. The only way Walkenhorst could see to make such an announcement believable would be to reveal so much of what he knew that his eventual possession of the patent would be placed in doubt — Lakeland, having all this information, might even beat Walkenhorst on the final stages of development and get the patent themselves. It seemed to Walkenhorst that all he could do was wait for the referee's report, hoping that his objection would be upheld. And if it wasn't, he would have to suffer through the bankruptcy and reorganization, consoled (somewhat) by the knowledge that *eventually* he would return.

Walkenhorst, an old undergraduate friend of yours, has described this tale of woe to you over a few beers. He appeals to you — is there anything he can do to convince Lakeland that they *don't* want to set up their plant if they get the patent? What can you come up with as possibilities? What questions / comments / suggestions do you have? (There is an "answer" contained in this case, if certain reasonable assumptions are made. But this "answer" isn't obvious.)

Espionage fight shifts to corporate battlefield

Lawns offer little help; cost from spying is put at \$100 billion a year

By Ronald E. Yates
TRIBUNE STAFF WRITER

During the height of the Cold War, stories of foreign spies who purloined American secrets were almost commonplace. But today, with capitalism on the march and the world seemingly embracing profits rather than Marxist ideology, the era of government-sponsored espionage is supposed to be over.

Try telling that to General Motors Corp. and hundreds of other American companies that believe they have been victimized by sophisticated espionage operations mounted by foreign competitors and governments. Earlier this month, General Motors sued German rival Volkswagen AG, alleging that Europe's largest automaker masterminded the theft of top-secret strategic plans, new vehicle designs and other confidential information.

And during recent hearings before the Senate Intelligence Committee, Senator Arlen Specter (R-Pa.) said at least 51 nations, including Japan, Russia, China, Israel, France and Germany have deployed spies in the U . S. to steal technology from largely unsuspecting American companies. "U.S. businesses are losing \$100 billion a year because of foreign spying," said Specter, who is committee chairman. "Job losses are estimated to be over 6 million in this decade alone due to economic espionage."

FBI Director Louis Freeh, testifying at the hearings late last month, said foreign companies, often in league with government intelligence agencies, have targeted thousands of U.S. companies in such industries as aerospace, biotechnology, telecommunications, advanced materials and coatings, semiconductors, transportation and energy. "Since the FBI initiated its Economic Counterintelligence Program in 1994 we have seen a 100 percent increase in the number of economic espionage-related cases," Freeh said.

Last year, the FBI investigated some 400 cases of economic espionage involving foreign companies or governments. So far this year, it has 300 more under investigation. Some are classic cases in which the foreign company, often assisted by its government, plants a "mole" inside the U.S. company to feed it information on such things as technology, strategy or pricing. Others involve deceptive "alliances" designed to drain a U.S. company of its strategic plans and technology.

"This is not a small problem," Freeh said. "It's an ominous sign that foreign nations and corporations are increasing their espionage activities in the U.S." Giant companies such as Motorola Inc. and GM are well aware of what Freeh and Specter are talking about. Executives at GM, while refusing to put a precise dollar figure on the value of the information VW acquired, say the civil suit will seek hundreds of millions of dollars in damages.



GM alleges in a civil suit that former executive Jose Ignacio Lopez and seven aides were part of an espionage ring orchestrated by Volkswagen.

For small, innovative companies such as Ellery Systems Inc., the damage is even more costly: It can be fatal. In the early 1990s, Ellery developed a proprietary and highly sophisticated communications software for NASA and was about to commercialize it when the source code for the software was surreptitiously obtained by a Chinese competitor.

By 1994, the small Boulder, Colo., company was out of business, unable to compete with the much larger Chinese company that was mass-producing its software faster and more cheaply in China. An FBI investigation confirmed that Ellery had been the victim of a carefully planned economic espionage operation mounted by the Chinese company. It found that a former Ellery employee had been paid some \$550,000 by the Chinese company to hand over copies of the company's software code and other proprietary information.

But because no federal statute directly addresses economic espionage or the protection of proprietary economic information, attempts to combat the problem using existing laws are ineffective, Freeh said. In the Ellery case, for example, neither the mole nor the Chinese company that misappropriated Ellery's software code have been prosecuted and probably never will be.

The problem for companies like Ellery, Freeh said, is that the theft of information which is wrongfully duplicated and transmitted across domestic and international borders doesn't fall under the traditional "goods, wares, or merchandise" category of the decades-old Interstate Transportation of Stolen Property Act. And state laws, such as the 8-year-old Illinois Trade Secrets Act, simply don't have the reach or power to deal with foreign-sponsored economic espionage.

Specter says that's one reason he has introduced legislation designed to address information theft and economic espionage. But it could be years before the bill becomes law. In the meantime, thousands of companies like Ellery will continue to be at risk in a competitive environment for which they are not properly equipped.

GM's case against Volkswagen is less problematic, but may end up the same way if German authorities refuse to prosecute the people GM says are responsible. The GM case dates back to November 1992, not long after Jose Ignacio Lopez was named GM's vice president of worldwide purchasing. That's when GM alleges in the civil suit filed in U.S. District Court in Detroit that Lopez and seven accomplices became part of an industrial espionage ring orchestrated by Volkswagen against GM and its European subsidiary, Adam Opel AG.

During the next five months, according to the suit, Lopez and his devoted group of aides shipped thousands of confidential documents on everything from worldwide costs of vehicle parts and components to new car designs and plans for an advanced manufacturing facility GM still cryptically refers to as "Plant X."

Since then, the suit alleges, VW has used the information to cut costs, develop new cars and design high-tech factories that compete directly with GM and Opel.

"If there has ever been a more brazen case of industrial espionage at the highest levels of a company, we are not aware of it," said Thomas A. Gottschalk, GM vice president and general counsel.

Volkswagen, meanwhile, has denied that it or Lopez stole any documents. "Time and again over the past three years, Volkswagen has rejected the allegations advanced by GM/Opel," a company statement said. "The complaint is unfounded."

GM's 100-page suit charges that, beginning in the summer of 1992, Volkswagen Chairman Ferdinand Piech contacted Lopez and began a series of secret discussions that quickly turned into negotiations for an employment contract for Lopez at VW. Those discussions, which included quadrupling Lopez's salary from \$375,000 at GM to \$1.6 million at VW, also called for Lopez and his lieutenants to collect and ship to VW a wide range of sensitive and proprietary information, the suit alleges. In return, each of Lopez's aides also was hired by VW.

"Lopez did this surreptitiously, while remaining a senior official of GM and amassing a huge volume of GM's most confidential data and documents," Gottschalk said. "Throughout this period Lopez falsely professed loyalty to GM."

Lopez and his aides secretly amassed more than 20 cartons of confidential GM and Opel information, the GM complaint says. Then, over the next several months they used a system of couriers to transport the information to Germany and to Lopez's home in Spain.

"With Volkswagen's knowledge and assistance, Lopez and his followers shipped the stolen information from Detroit and from Opel's offices in Germany to Volkswagen headquarters in Wolfsburg – often aboard a Volkswagen corporate aircraft," the suit alleges. But the activities didn't stop there, GM says. The suit charges that VW equipped a suite of offices at its headquarters with computers, copiers and shredders – first to copy the documents and enter the information into VW's computer system, and then to shred the evidence.

The scheme might have succeeded, says GM's complaint, but German police found four boxes of unshredded material in the home of a Lopez aide in June 1993. That led German authorities to launch an investigation of Lopez and several VW executives; including Piech. So far, that 34-month investigation has not resulted in any charges. Hans-Herrmann Eckert, head of the Darmstadt prosecutor's office, said he would decide this spring whether to bring charges.

"These investigations and lawsuits mean nothing," said Henry Clements, vice president of Technology Strategic Planning Inc., a Stuart, Fla., company headed by a former U.S. intelligence official. The firm specializes in helping American companies protect technology and create technology strategies. "For one thing, they are too late," Clements said. "The damage has already been done. VW already has what it needs from GM. On today's competitive terrain, the kind of information VW got from GM is priceless. By comparison, any fine it receives or damages it may have to pay will be like coffee money."

What U.S. companies have to learn is the way the game is being played today, say those involved in economic espionage. "There are new rules, and most American companies don't even know what they are," said Gregor Eschenbacher, a former East German intelligence officer who consults with companies on security and counterespionage matters.

"A lot of countries, like Russia, the former communist states of Eastern Europe, China, and even a lot of industrialized nations like France, Germany and Japan, view business as a form of warfare: The goal is to win, not simply to survive," he said. "Those that lose become casualties."

It's a view of business that many American companies don't understand or refuse to accept, Eschenbacher said. "The rather naive American concept of 'win-win' situations in business is not universally shared," he added.

That was a recurring theme during the Senate Intelligence Committee hearings. Some suggested a tit-for-tat response by the U.S. when other nations use government intelligence-gathering agencies to help

their companies. Until recently, the United States has resisted that course. But last summer, during critical Japan-U.S. automobile trade talks, U.S. Trade Representative Mickey Kantor and his team of negotiators came to the table allegedly armed with information gathered by the Central Intelligence Agency and the National Security Agency.

While neither the CIA nor the NSA will comment on any involvement in the talks, sources in the intelligence community say both the CIA and the NSA used their resources to eavesdrop on Japanese negotiators.

Is Washington getting ready to unleash the CIA and other intelligence agencies against foreign corporations? Not likely, say intelligence experts. That would create a whole new set of problems, such as deciding who gets the intelligence the CIA or NSA gathers.

“That means picking winners and losers – not something Washington wants to get involved in,” Eschenbacher said.

Purchasing.Online, October 8, 1998

Germans let Lopez off with monetary fine

The curtain is falling on one of the most controversial episodes ever involving a purchasing professional.

At press time, a German court was expected to settle the criminal case against Jose Ignacio Lopez, a former General Motors Corp. purchasing executive charged with stealing confidential information from GM before defecting to Volkswagen, Europe's largest automaker.

A GM spokesman confirmed that the state court in Darmstadt, Germany, planned to fine Lopez and three of his former GM cohorts \$330,000 in return for dropping the charges of industrial espionage.

Lopez, heralded by Wall Street and the business press for the radical cost-cutting techniques he used while at GM, was loathed by the supplier community for such seemingly unfair practices as tearing up existing contracts and demanding price breaks as high as 20%. Off the record, many suppliers say they still hold a grudge against GM for Lopez's heavy-handed tactics.

Lopez was about to be rewarded for such measures in 1993 with a promotion to head GM's North American Operations when he defected to Volkswagen with seven other GM executives. GM accused Lopez of taking reams of confidential information with him, including plans for a first-of-its-kind flow assembly plant.

GM settled its civil suit against Volkswagen in 1996, forcing Lopez to resign and requiring Volkswagen to pay GM \$100 million and buy \$1 billion worth of GM parts.

However, GM Spokesman Henry Wang says the United States government is still investigating whether to bring industrial espionage charges against Lopez and Volkswagen.

Tuesday, May 23, 2000 1:43:19 PM ET

Market Briefs: ex-GM executive indicted for industrial espionage

The Department of Justice indicted Jose Ignacio Lopez de Arriortua, a former executive of General Motors, for allegedly passing secret corporate documents to Germany's Volkswagen group, a firm he began working for in 1993 after leaving GM. The documents are suspected to be plans for a new model car, supplier prices, and a proposed new assembly plant. Mr. Lopez is being indicted on four counts of wire fraud and two counts of violating federal interstate transportation laws.

Tuesday, May 23, 2000

GM-Lopez case reads like current thriller on industrial spying

By Daniel Howes / The Detroit News

WIESBADEN, Germany -- For seven years, Mike Millikin and John Rahie lived Lopez. They filed a racketeering case against Volkswagen AG in 1996, settled it and then spent three more years answering questions from the Feds.

The payoff came Monday, when the Justice Department unsealed a six-count indictment against purchasing czar J. Ignacio Lopez de Arriortua, accusing him of stealing documents from General Motors Corp.

Perhaps the only surprise to the two GM lawyers is that it took so long. For them, the evidence was clear: Lopez conspired with VW to steal documents from the Detroit automaker and then use them to speed VW's turnaround.

In a 99-page lawsuit that still reads like a spy thriller, Millikin, Rahie and others assembled a story that defined industrial espionage in the '90s. The suit, settled in January 1997, fingered VW, Chairman Ferdinand Piech and the company's governing supervisory board. It also sullied Germany's cozy political-industrial complex.

German Chancellor Gerhard Schroeder, then minister-president of the German state of Lower Saxony, sat on the VW board. So did Walther Leisler Kiep, the retired insurance executive whose admission of illegal campaign contributions sparked a continuing political scandal in Germany.

Herr Schroeder was never implicated in the Lopez saga. But it's probably safe to assume his presence in the background is a contributing factor to the Justice Department's decision not to seek any charges against VW, Piech or his lieutenants.

Millikin, Rahie and GM senior executives long ago resigned themselves to the fact that neither VW nor its officers would ever be charged in the case. With the racketeering suit settled and Lopez effectively exiled to his native Spain, there is little advantage in pursuing charges against Europe's largest automaker or its key players.

But you've got to hand it to Millikin and Rahie: They are relentless.

An engineering graduate from General Motors Institute, Rahie was everywhere on the Lopez case. He tried -- twice -- in Vancouver to slap papers on Lopez and VW execs. He traveled to Spain's Basque country in a vain attempt to gather background on Lopez. He studied German to better understand the documents and news accounts that landed daily on his desk.

Millikin was a federal drug prosecutor before joining GM. His stewardship of the Lopez case, first for Vice-Chairman Harry Pearce and later General Counsel Thomas Gottschalk, earned him the job as general counsel for GM Europe. Rahie has since replaced him.

Monday's indictments won't end the Lopez saga. The Justice Department's efforts to extradite Lopez from Spain may well incite a minor diplomatic spat. And there are sure to be calls for leniency because so much time has passed and Lopez is said to still be nursing injuries suffered in a mysterious car crash.

Baloney. The Justice Department would have gotten around to this indictment a lot sooner if German investigators had stopped worrying about embarrassing the country's powerful and moved more quickly to investigate the theft and destruction of GM documents.

Instead, they dithered. When Lopez got hurt, they folded. GM, Millikin and Rahie deserve better, and soon they may get it.

Analyzing the Competition

The Development of a Strategic Monitoring Program

by James E. Svatko

The highly competitive nature of today's business environment demands that companies not only identify primary rivals in the marketplace, but also understand competitors' strengths, weaknesses, and overall business strategies. Business owners are beginning to recognize this need. reports a study by The Conference Board; more and more companies are systematically tracking their competitors. Many firms are intensifying current competitive intelligence efforts. and a sizable majority of surveyed executives say competitive intelligence in their companies will expand even further in coming years.

Competitive intelligence is vital to corporate survival for a number of reasons. Most important, the practice of predicting competitor movements in the market helps shape corporate strategy. With an effective corporate competitive intelligence program, top managers can work toward achieving five critical objectives: 1) avoiding surprises, 2) identifying threats and opportunities, 3) gaining competitive advantages by decreasing reaction time, 4) improving planning, and 5) understanding their own companies better.

Considering this new trend, firms that hold analyzing the competition low on the list of marketing priorities are operating at a great disadvantage.

Some managers may assume that because the company competes on a daily basis with its rivals that it is already familiar with competitor strategies and tactics. Others may believe that it is impossible to analyze the competition on a systematic basis. However, the company that relies solely on intuition and informal bits of information to monitor its competitors is leaving itself open to attack.

Any firm can establish a competitor analysis system that provides management with essential information about the wide range of strategies that rivals are likely pursue. The key is knowing where to gather relevant information and how to combine separate pieces of data into a coherent profile of each competing operation.

WHAT INFORMATION IS NEEDED. The first step is to develop a list of goals that the program will achieve, including what information is needed. Identify the departments in the company that will use the information, and consult with department heads as to what specific data is desired. Information sought by the program should then be classified into useful categories. An effective competitor analysis focuses on four key factors that drive companies to act and react in the marketplace. These include competitor assumptions, objectives, strategies, and capabilities.

ASSUMPTIONS

Every company operates according to assumptions about its own position in the marketplace. While these assumptions may or may not be true, they form the basis for the firm's marketing strategy. For example, a firm that believes its product has captured a certain degree of brand loyalty may be slow to react to a competitor's price cut. As a result of its false assumption, the company stands to lose a substantial portion of market share.

Firms also formulate basic assumptions about competitors and the industry environment. Again, these may or may not be correct. Assumptions are, essentially, "weak points" that can be exploited. A competitor analysis program should identify as many of these weak points as possible. The company gains a powerful advantage

Firms that hold analyzing the competition low on the list of marketing priorities are operating at a great disadvantage.

Assumptions are, essentially, "weak points" that can be exploited.

by identifying a rival firm's assumptions because these beliefs are usually adhered to rigidly. Consequently, when a competitor's assumptions are challenged, the competitor typically has no contingency plans with which to counter.

With regard to each competitor identify the following:

- beliefs that a firm holds about its position in the market
- capabilities and objectives that the rival firm attributes to other competitors, and whether these are valid
- historical identification with any particular product or products, selling approach, distribution arrangement, or operational policy
- beliefs about industry trends and market demand, and to what degree these are optimistic or pessimistic
- rigid corporate policy that dictates the way the company conducts business or reacts in a crisis.

OBJECTIVES

When a company knows the objectives a rival firm has set for itself it can better predict how a competitor will react to market forces. This information can prove invaluable in enabling a company to fine-tune its own marketing plans.

Objectives may be difficult to identify. One approach is to examine the way the firm handles basic business responsibilities. Then, management must "guess" what objectives could be motivating the actions taken. To create such profiles, answer the following questions:

Management must "guess" what objectives could be motivating actions taken by a rival firm.

- What accounting system does the competitor use?
- How are inventories evaluated?
- Is there a correlation between growth in revenues and market share?
- Do activities of the firm indicate aversion to risk?
- How does the organizational structure of the competitor affect its decision-making capacity?
- Does any particular department receive a greater share of the budget?
- What are the professional and educational backgrounds of top management within the rival firm? Is the competitor hiring employees with any specific type of skills?
- What are the backgrounds of members of the board of directors? Does the firm use outsiders to review company operations or policy?
- Has the rival company committed itself to any new contracts, joint ventures, or licensing agreements?
- Is the competitor facing any legal, environmental, or social pressures?

STRATEGY

The third step in analyzing competitive behavior involves developing statements about the competition's marketing strategies. This may be the most straightforward aspect of the competitor analysis, as variables are public knowledge and therefore easily monitored.

Pricing. Are the competitor's prices higher or lower than the industry norm? What are the levers of sale? Is pricing controlled regionally or at a central headquarters?

Sales. Does the competitor hire in-house staff to handle sales or use independent agents? Are sales groups organized by product line, by accounts, or by region?

Distribution. What distribution channels does the rival firm use? Does it offer exclusive arrangements to certain distributors?

Product line. Do production/marketing efforts concentrate on a specific product line or does the firm produce/market a variety of products?

Advertising/promotion. Does the firm appear to spend more or less than other competitors on advertising and public relations? Who is the target audience? Which form of media is used the most?

Service. Does the competitor offer service contracts? Is service tied to product sales? What is the company's service reputation among its customers?

Management can use this information to identify a firm's strategic priorities. For example, strong commitment to preserving market share is signaled by the following activities:

- price-cutting to undersell competitors
- launching new products to improve market position
- raiding key accounts of rival firms
- defending copyright, patent, or trademark infringements vigorously in court
- acquiring new firms to improve product line
- building new factories
- upgrading product packaging regularly
- aggressive spending on research and development.

Management should always attempt to determine: 1) whether competitors are gaining or losing share in target markets, 2) whether competitors' current positions can be expected to improve or deteriorate if strategies do not change, and 3) what adjustments will probably be made to improve market position.

CAPABILITY

Always attempt to determine whether competitors are gaining or losing share in target markets.

Reverse competitive analysis:

Many marketing experts recommend a contrarian approach, i.e., reverse competitor analysis. With this method, the company attempts to learn what is thought about its own operation. Information about which operational areas of the firm are considered strong or weak by others can greatly enhance management's understanding of the competitive arena. And, as the perceptions of customers are important to developing a marketing campaign, so are the perceptions (a misperceptions) of competitors useful in the formation of a marketing strategy. This analysis can be expanded to address how the firm is perceived not only by rival companies but also by industry experts, government agencies, and vendors.

The assumptions, objectives, and strategies affect the timing, intensity, and direction of a competitor's marketing efforts. The firm's capabilities determine its ability to take on new projects and to defend itself in the marketplace.

To evaluate capabilities, examine product quality, market penetration, sales volume, internal organization, and innovation. Compare strengths and weaknesses in these areas to complete the competitor profile. Consider, for example, a competitor that has a strong sales operation but a weak R&D department. From a strategic standpoint, this company's selling strengths may be offset by another firm's ability to capture market share through new-product development.

SOURCES OF INFORMATION. Discovering where to find reliable information about rival firms may seem a formidable task. Fortunately, many managers will find they already have a good starting base when they review the information available in-house. In fact, fostering the interest and enthusiasm of company staff is an invaluable first step in the development of an effective competitor analysis program. Explain the goals of the competitor analysis program, detailing the type of information that will enable the company to meet these goals. Employees should understand that their contribution is crucial to the program's success. Emphasize that the task of intelligence gathering is actually an extension of their present duties, rather than an additional responsibility.

In addition, carefully explain the difference between relevant and unimportant information. Employees need specific guidelines about the subject matters the company hopes to study. For example,

indicate whether desired information relates to the competitor's product line, sales force, or current advertising campaign, and emphasize which particular aspects are most important.

The firm should consider providing incentives to its employees in order to keep intelligence efforts on target. Compensation can take the form of a graduated schedule of bonuses, where employees are rewarded a nominal cash award for the amount and quality of information submitted. However, incentives need not be limited to monetary awards. Company-wide recognition and personal commendations to those who have contributed significant information-particularly when such information leads to an important strategic benefit-man prove just as effective.

DEPARTMENTS AS SOURCES

Employees should be made aware that they are part of a team effort. In one form or another, each department in the company possesses useful information about the competition. Information contributed by one department will combine with that from other departments to create an overall picture. The following are examples of how a firm's own departments can be used to monitor the competition:

In one form or another, each department in the company possesses information about the competition.

Sales force. The sales force is probably the most immediate and ready source of competitor information in any organization. Consider requiring sales staff to complete monthly reports about competitor activity they observe during their selling efforts.

Purchasing. The purchasing department works daily with many of the same suppliers that service the competition. Therefore, purchasing may have direct access to information about competitors through conversations with vendors.

Distribution. Like purchasing, the distribution department works or has contact with firms that may also serve competitors. Thus, distribution staff may be able to learn about the distribution networks used by competing firms.

Personnel. Have the human resource department periodically review help-wanted advertisements for same-industry positions. By monitoring these ads, the company can judge the stability of a competitor's staff, and draw general conclusions about the effectiveness of its management.

Research and development. R&D departments typically keep files on competitors' products, design specifications, and patent information. In addition, researchers are usually in contact with universities or other research institutes that monitor important innovations taking place within the industry. A firm with an R&D department will almost always have access to valuable competitor information. If the company does not have a formal research and development operation, consider appointing a team to generate contacts that can assist in gathering this type of information.

A firm with an R&D department will almost always have access to valuable competitor information.

SOURCES OUTSIDE THE COMPANY

Information obtained through employee efforts should be supplemented with data available from outside sources. Usually, these sources require research on the part of company staff, but they can yield critical insights into competitor activities.

Trade information. Perhaps the most reliable and accessible outside source is the trade show. Monitor the calendars of events in trade publications. Advance trade show information often lists new products slated for exhibition as well as the names of the exhibitors. Exhibitor booths typically overflow with printed material explaining product specifications and service arrangements.

Further, directories distributed at trade shows and conferences should be retained. When a number of these documents have been collected, they can be studied for patterns in competitor participation and product emphasis.

Intelligence Audit: An inventory of the firm's competitor analysis capabilities. Should be conducted on a yearly basis. Typically, an intelligence audit of this type makes a survey of all company departments, listing information sources that each department contains (e.g., files, brochures, catalogues, and records). Names of department personnel who may have specialized knowledge about competitors strengths and weaknesses should be listed in the audit's report for future reference.

Note that trade journals, magazines, and newsletters can become vital to the competitor analysis system. These publications should be reviewed for leads regarding industry trends and news about other companies.

News clippings. Small local publications, as well as major city newspapers, are viable sources for monitoring business activities. The key, however, is to design a system that effectively screens these numerous sources. If in-house staff do not have the time or expertise to gather news clippings, contact a public relations or advertising agency for assistance. These firms usually provide news-clipping service or can refer clients to a news-clip vendor.

News-clipping services will search for specific information as defined by the company. Material can be requested according to general categories (i.e., all the direct marketing activities for a particular type of product) or by targeting one company for study. News-clip vendors usually charge a small fee for each clipping.

Government filings. Federal and state public filings are another information source that should not be neglected. The most frequently used federal source of information on publicly held competitors is the Securities and Exchange Commission. Public filings include financial statements as well as information concerning the issuance of new stock or a new acquisition.

Further, corporate environmental filings often reveal information on processes and materials used in production.

Advertisements. Competitors' advertising approaches are, in most cases, tied to the overall marketing strategy. By analyzing the message in print ads and other media, management may gain valuable insights. For assistance, there are firms similar to news-clipping vendors that will provide, for a fee, tearsheets of advertisements from magazines and newspapers.

Companies can also use direct mail as a means of tracking competitors' promotional materials. When different employees are put on various mailing lists, a steady influx of competitor marketing information becomes available to the company.

Companies can use direct mail as a means of tracking competitors' promotional materials.

PLAN OF ACTION. Once the above data has been gathered, the competitor analysis program requires a detailed plan of action describing how the information will be used. Many companies document planned activities in the form of a business plan so that progress toward the original goals of the program can be monitored. This written document typically includes a mission statement, timetable, and budget.

Mission statement. The mission statement sets forth the objectives of the competitor analysis program. It should be a brief paragraph defining what information is being sought and how it will be used. A typical mission statement might read as follows:

Compile, evaluate, and communicate information about competitors' market activities, advertising strategies, technological capabilities, and future products. The information will be used to keep marketing, sales, and production departments apprised of the competition so that their decision-making capabilities are enhanced.

This statement can also serve as an announcement of the competitor analysis program to the entire company. When used for this purpose, it should be posted where all employees can see it.

Timetable. A timetable for implementing the activities of the program should be established according to the information needs of the various departments involved. For instance, the sales manager may need information about a competitor's pricing schedule before attending a major trade show.

Budget. The competitor analysis program should be created as a profit-centered rather than cost-centered project. This means that financial gains generated from information produced by competitor analysis should be credited to the competitor analysis program.

CONCLUSION. Once a competitor's capabilities are assessed, a summary of findings, including assumptions, objectives, strategies, and capabilities should be developed. Attempt to answer these questions:

What are the most probable strategic changes that the competitor will make? How strong will the move be? Which other rivals will be most vulnerable? Such analysis enables the company to gauge the potential impact of any actions that might be initiated by the competitor.

There are three key elements to the development of a successful competitor analysis program: commitment, continuity, and contribution. The firm must first make a commitment to the time and resources necessary to maintaining the program. There must be a continuous monitoring of the program once it is implemented. Finally, the ultimate success of the competitor analysis effort requires the contribution of all employees within the firm.

The competitor analysis program should be treated as a profit-centered rather than a cost-centered project.

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DECS-452 Course Outline

E. The Ware case

1. Strategic form, with complete information
2. Computation of (unique) equilibrium point in mixed strategies
 - a) Decision-analytic approach: Make your best estimate of your opponent's behavior, and optimize against it.
 - b) Equalizing as a computational approach
3. Tactics
 - a) Overt signals and binding precommitments
 - b) Misinformation and disinformation
4. Incomplete information
 - a) Pure strategies for Ware, as a function of private information (based on seven-year-demand forecast)
 - b) Pure strategies for National (based, e.g., on internal discount rate)
5. Actions as a function of expectations about opposing behavior: Reconciliation of decision-analytic (optimal response to conjectured behavior) and game-theoretic (equilibrium-based) approaches