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# Risk: a neglected component of strategy formulation

Risk: a neglected component

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**Abstract** *The hypothesis that managers believe risk to be a major component of strategy formulation, with a corresponding effect on the strategic decision-making process, was subjected to empirical examination. A total of 93 top executives of Israel's largest industrial companies, representing various business sectors, responded to the research questionnaire. Although the data supported the major research hypothesis, they also showed that managers are not inclined to use risk-assessment models. In-depth interviews with 21 participants supported the findings and suggested possible explanations. Recommendations regarding the formation of risk strategy and the incorporation of risk assessment models to strategic decisions are suggested.*

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The importance of risk management in business decision-making in general, and in strategic decisions in particular, has become apparent largely in the last 15 years. After almost 50 years of intensive research on managerial behavior under uncertainty (Lawrence and Lorsch, 1967; March and Shapira, 1987; Thompson, 1967), scholars and managers have realized that risk factors should be included in managerial models. Researchers of risk management have tackled this subject from various aspects: managers' risk behavior (MacCrimmon and Wehrung, 1990), non-coherent risk strategy (Kahneman and Lovallo, 1994), the economic aspects of risk in strategic management (Bowman, 1980, 1991), and the effect of risk on performance, strategy, and organizational processes (Jemison, 1987)

To help managers in the decision process, researchers have developed risk-assessment concepts and techniques, mainly in the area of financial investment and portfolio management. These tools, which are well covered in the literature (see for example, Levy and Sarnat, 1994), include the direct mean-variance approach, with all its shortcomings, the indirect approach of adjustment to the NPV calculations, as well as the "practical" applications of "simulation analysis" and "decision trees". However, risk-assessment techniques reflecting an *ex ante* strategic approach are only occasionally mentioned in the strategic management literature. One technique was suggested by Cardozo and Wind (1985), who showed that risk-return portfolio analysis, as originally developed in economics and finance, could be used for assessing risk in product-line portfolios. Another technique was suggested by Baird and Thomas (1985), who presented an *ex ante* contingency model of strategic risk taking in which environment, industry, organization, decision-maker, and problem characteristics are seen as potential influences on



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corporate risk bearing. Baird and Howard (1990) concluded that the three core *ex ante* risk elements are variance of future income (adopted from financial analysts' conceptions), size of loss, and probability of loss.

Bromiley (1991) tackled risk from a different angle by measuring it as the *ex ante* uncertainty of a firm's earnings stream, which depends on the previous year's performance, industry performance, expectations, aspirations, slack, and risk. Finally, Eylon (1988), discussing the seven deadly sins of strategic risk analysis, determined the first three sins as follows:

- (1) numbers: ignoring risk analysis completely;
- (2) using a single hurdle rate to evaluate all business units, strategies, and acquisitions; and
- (3) adding "extra points" to the hurdle rate just to be safe.

He warned his readers of the dangerous consequences of ignoring the risk aspects of strategy.

Recently, Ruefli *et al.* (1999) presented the most comprehensive review of all the aspects of risk assessment, with references to articles published in the nine top strategic management journals from 1980 through 1995. Of more than 100 articles surveyed, almost all used *ex post* economic measures of risk, such as variance or  $\beta$ -CAPM. Only one article (Barney *et al.*, 1992) used a measure of risk that can be considered strategy-oriented: R&D and sales.

Corporate risk became a focal management issue only recently with the publication on 10 February 1997 of the US Securities and Exchange Commission's Regulation 229.305 (Item 305): "Quantitative and qualitative disclosure about market risk". Its implication is that organizations can no longer consider risk merely as an academic subject, but they must adopt an explicit approach to some aspects of risk and use a model of risk calculation. Two recent articles have gone so far as to consider risk a major component of strategy. Noy (1998) suggested that risk attitude is one of the five basic components of "total strategy". Eisenhardt and Sull (2001) used "risk" as one of seven major "strategic logics" to compare their newly introduced "simple rules" approach to strategy with the presently prevalent "position approach" and "resources approach".

### Research objectives

The intensive research on the importance of risk in business management and the publication of the above-mentioned US Securities and Exchange Commission's regulation on disclosure of market risk, suggest that business organizations have internalized the significance of risk in strategic management and started to incorporate it into their strategic decision making. The goal of the present research was to examine this new development in applied strategic management. More specifically, three hypotheses were tested:

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- H1. Managers consider risk an important component of strategy formulation. Risk: a neglected component
- H2. Managers include aspects of risk in their decision-making.
- H3. The importance managers ascribe to risk and the incorporation of risk in the decision-making process is associated with the intensity of the use of risk-assessment tools.
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The present research was conducted among top managers of manufacturing companies in Israel. In choosing this sector we focused our research on companies for which risk is not inherent in the essence of the business, as it is for banks or insurance companies. Moreover, since manufacturers tend to engage in the largest variety of value chain activities, we were able to more precisely examine our third research hypothesis regarding the use of risk-assessment tools.

The study was executed in two phases. In the first, we conducted a survey by sending out questionnaires to managers assessing their attitudes toward risk and the use of risk-assessment tools. In the second, we conducted in-depth follow-up interviews to better understand and interpret the questionnaires' results.

## Phase I

### *Method*

*Sample.* The questionnaires were sent to 450 of Israel's largest manufacturing companies (excluding the diamond and jewelry sector) selected from Duns & Bradstreet's list of companies. The sample included various industrial sectors: electronics and electrical components and equipment, chemicals and pharmaceuticals, food and beverages, metal products, construction materials, textiles and fashion, rubber and plastics, paper and wood products, and agricultural supplies. The data on the yearly sales, exports, and number of employees indicated the size and scope of activities of the respondents' organizations. The companies' yearly sales ranged from \$10 million to \$1.7 billion, their export was up to \$1.3 billion, and their workforces numbered from 40 to 14,000. The oldest company in the group was founded in 1919 and the youngest in 1999.

Of the 450 questionnaires posted, we received 93 (20.7 per cent) responses after one reminder. Of the respondents, 97 per cent were from the highest management level in their organizations: chairman, CEO, CFO or vice president. All of them had direct responsibility and authority to make decisions regarding all aspects of risk assessment and strategy. The ages of the respondents ranged from 29 to 75.

*The questionnaire.* The questionnaire included four groups of questions: the first group examined our first hypothesis, that managers perceive risk as an

important component of strategy. It included two 1-5 bipolar items, two forced-choice items and one open question (see Appendix 1).

The second group of items tested our second hypothesis that managers incorporate risk considerations in their decision-making processes. This group included four 1-5 bipolar items and one forced-choice item (see Appendix 2).

The third group of questions referred to the hypothesis about the use of risk-evaluation tools. In case the managers were not familiar with risk-assessment models, we presented them with nine basic factors that are used in risk-measuring formulas:

- (1) optimistic forecasts;
- (2) pessimistic forecasts;
- (3) realistic forecasts;
- (4) optimistic return (ROI, RONA, ROS, whichever is relevant);
- (5) pessimistic return;
- (6) risk factor – the standard deviation of the probability of expected returns;
- (7) efficient frontier – targeted risk-return relationship;
- (8) hurdle rate – minimum acceptable return;
- (9) maximum accepted risk exposure.

The first eight factors were influenced by the formulas presented by Cardozo and Wind (1985) and elaborated on by Segev (1995) and Levy and Sarnat (1994). The last factor was suggested by one of the managers to whom we presented the draft questionnaire in a preliminary test.

The managers were asked to indicate which of the above-mentioned factors were used in 11 organizational activities for evaluating risk:

- (1) mergers and acquisitions;
- (2) financial investments;
- (3) financial risk hedging;
- (4) investments in tangible assets;
- (5) procurement and inventory management;
- (6) research and development;
- (7) entering a new market;
- (8) introducing a new product;
- (9) product-price management;
- (10) adopting new technologies; and
- (11) tender-price determination.

These activities represent most of the significant risk-prone activities among the primary and support activities of the value chain of industrial companies as defined by Porter (1985, pp. 36-45).

The fourth group of questions gathered information on the organizations and the responding managers. The information on the companies included the type of industry, dollar amount of sales, dollar amount of exports, number of employees, and year of founding. The managers reported their position in the organization, formal education, education in business or economics, and their year of birth.

### Results

*Managers consider risk an important component of strategy formulation.* The data strongly support the first research hypothesis that managers consider risk an important component of strategy formulation. The distribution of their answers to the relevant items in the research questionnaire appears in Table I.

The results reveal that 82 per cent of the respondents perceived risk as an important component of corporate strategy, 13 per cent were on the indifferent line, and only 4 per cent (four respondents) were at the low end of the scale. It should be noted that three of the four respondents who gave the low ratings (two on the 1-5 bipolar scale) to the first question added that their companies do not engage in strategy formulation at all. The fourth respondent indicated that the owners are not prepared to take any risk whatsoever. None of the managers declared that risk is not considered an important strategic factor. One sample *t*-test conducted on the answers to this question revealed a significant result ( $t(92) = 37.857; p < 0.001$ ).

It should be noted, however, that this broad acceptance of the importance of risk in strategy formulation does not necessarily translate into defined risk-taking strategies. Only 43 per cent reported positively that their company has a risk strategy, 40 per cent were on the indifferent line, and 17 per cent cited a low to very low likelihood that their companies maintain risk-taking strategies (see Table I, Question 2). Despite the weak evidence for risk strategies, a surprising 97 per cent of the respondents were able to define the risk strategy of their companies, as demonstrated in Table II.

Category	Low extent			Large extent		M	SD
	1	2	3	4	5		
<i>1. To what extent do managers consider risk as a component of the company's strategy?</i>							
Frequency	0	4	12	45	32	4.1	0.80
Percentage	0	4	13	48	34		
<i>2. To what extent do you think your company has a risk-taking strategy?</i>							
Frequency	5	11	37	28	12	3.3	1.0
Percentage	5	12	40	30	13		

**Table I.**  
Distributions of answers to Questions 1 and 2



The answers to the open question, "How are managers informed of the company's 'risk strategy'?" were categorized into six groups as follows:

- (1) verbally – in meetings, discussions etc – 65.6 per cent;
- (2) written instructions – 5.4 per cent;
- (3) written standard procedures 6.5 per cent;
- (4) there is no clear risk strategy – 3.2 per cent;
- (5) others – 4.5 per cent;
- (6) no answer – 15.0 per cent.

These results indicate that risk strategies are rarely formally defined in writing.

*Managers consider the risk aspect in their decision-making.* The answers to the three items pertaining to the second research question supported our second hypothesis. Their frequencies, means and standard deviations are presented in Table III.

**Table II.**  
Distribution of definitions of a company's risk strategy

Risk strategy	Frequency	Percent
Conservative	11	12
Cautious	29	31
Balanced	31	33
Daring	5	6
Irresponsible	1	1
Combined <sup>a</sup>	13	14
Total	90	97
No answer	3	3

**Note:** <sup>a</sup> More than one strategy

**Table III.**  
Distributions of answers to Questions 3, 4 and 5

Category	Never					M	SD
	1	2	3	4	Always 5		
<i>3. To what extent does management conduct discussions on risk-taking strategy in general?</i>							
Frequency	14	9	34	27	9	3.1	1.2
Percentage	15	10	37	27	10		
<i>4. To what extent does management conduct discussions on risk-taking strategy in specific functions?</i>							
Frequency	0	4	22	38	29	4.0	0.85
Percentage	0	4	24	41	31		
<i>5. To what extent does management take risk into their considerations in each case on its own merit?</i>							
Frequency	0	1	16	52	24	4.1	0.69
Percentage	0	1	17	56	26		

The results show that despite the fact that managers tend not to define a unified risk strategy for the company, they do consider risk aspects in their decision making. They are more inclined to weigh risk prospects for individual decisions or distinct organizational activities than at the overall strategy level. One may see that when the strategic issues under consideration are specific, managers are more likely to actively consider risk aspects. The mean rating for the first question was 3.08 (sd = 1.17, strategy in general), whereas the mean ratings for the second and third questions were 4.0 (sd = 0.68, specific activities) and 4.1 (sd = 0.85, own merit) respectively. One-way repeated measures ANOVA conducted on this data set showed that although the answers to the three questions differ significantly ( $F(2, 184) = 48.69$ ;  $p < 0.001$ ), the difference between the answer to the first question and the other two explains most of the variance ( $F(1, 92) = 56.126$ ;  $p < 0.001$ ).

We sought possible explanations for the different levels of acceptance of the importance of risk in strategy formulation via correlation analysis of the characteristics of the companies and the responding managers. We did not find any meaningful correlation to the company's characteristics, but there is some notable correlation to managers' personal characteristics. We found a significant positive correlation of the managers' position in the organization with the level of importance they attributed to the risk aspect of strategy ( $r = 0.259$ ;  $p < 0.05$ ) and with the level of discussions of the importance of risk ( $r = 0.261$ ;  $p < 0.05$ ). We also found a negative correlation between the managers' position in their organization and their level of education in general ( $r = -0.262$ ;  $p < 0.01$ ) and their education in business or economics ( $r = -0.346$ ;  $p < 0.01$ ).

*The use of conventional tools to assess risk in strategic decision-making is very limited.* The data did not support our third hypothesis. When presented with the nine factors that are the building blocks of risk-evaluation models, managers demonstrated minimal use of risk-assessment tools in their decision making. They reported using only 18 per cent (1,454 factors) of the possibilities presented in the questionnaire: 8,064 factors = 11 activities multiplied by 93 answered questionnaires minus 127 "not relevant" activities multiplied by nine factors (see Appendix 3).

The most popular factor managers used, appearing in 56 per cent of relevant cases, was realistic forecast, which is needed for any future-oriented evaluation regardless of risk considerations. On the other hand, the two more sophisticated factors, risk factor and efficient frontier, had very limited use – only 7 per cent each. Hurdle rate, which Eylon (1988) takes for granted, was used in only 8 per cent of the cases.

Taking a different view, namely, looking at the number of factors used for risk measurements gives the results presented in Table IV.

This analysis shows that managers make almost no serious attempt to use the common models of risk evaluation. The picture is discouraging even if we adopt the most lenient approach to get some hint of their propensity for risk evaluation. This approach uses a minimum of three factors, two factors out of

optimistic forecast, pessimistic forecast and realistic forecast, or optimistic return and pessimistic return, and at least one of the reference factors – risk factor, efficient frontier, hurdle rate, or maximum accepted risk exposure. Only 18.5 per cent used three or more factors and a minority of 9 per cent used four factors or more (see Appendix 4).

**Phase II**

As a second phase of the research, 21 in-depth interviews were conducted to enhance the understanding of the results of the analysis of the questionnaires.

*Method*

*Sample.* Of the 33 respondents who responded positively to the question “Would you agree to be interviewed if needed?” which appeared in the original questionnaire, we were able to reach only 21. However, as they were almost identical in their characteristics to the 93 respondents to the questionnaires, we considered them to be sufficiently representative. Of the managers who were interviewed, 18 agreed to be tape-recorded.

The leading question presented to the managers interviewed concerned the disparity between the declared perception of the importance of risk and its inclusion in the decision-making process, and the very limited use of risk-assessment models, as demonstrated by the responses to the questionnaires.

It should be noted that some of the managers interviewed had not yet grasped the implications of the risk-calculation instruction incorporated into the Israel Securities Authority regulation “Qualitative reporting on the exposure to market risks and their management”, which is similar to SEC Regulation 229.305. This regulation has been in effect in financial reporting as of the year that ended 31 December 1999.

*Results*

The explanations provided by the managers for not using risk models reflected one or more of three rationales. In what follows we present quotations pertaining to each of these three categories:

*The models are based on risky forecasts.* This attitude was well defined by the manager who said:

The limited amount and unreliability of information for calculating risk usually makes any risk calculation worthless.

**Table IV.**

Number of factors used for risk assessment

Number	0	1	2	3	4	5	6	7	8	9	Total	3-9
Frequency	130	457	143	84	21	27	12	10	10	2	896	166
Percentage	14.5	51.0	16.0	9.4	2.3	3.0	1.3	1.1	1.1	0.2	100	18.5



Another manager supported this view, arguing that:

... the risk-assessment models are effective in low and moderate risk situations because of the reliability of the forecasts involved. In high-risk situations, usually the reliability of the forecasts is very low, so the models are not effective.

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The lack of confidence in forecasts, which are the cornerstone of risk-assessment models, was stated more precisely by two other managers:

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In our industry, the uncertainty of even the near future is so high that the risk-assessment models are of no use. I consider my intuition more reliable than probability forecasts;

and

We have been in this market for many years and have found that the deviations from forecasts are so large that we have to rely on our experience and intuition.

Another manager expressed the same ideas but from a practical point of view:

In most of our R&D projects it is impossible to compute risk return because sales expenses are a material part of our expenditures but are connected with present sales activity, and the marginal expenses cannot be estimated.

This argument can be concluded by quoting the manager who said:

Had we gone through the regular procedure of risk assessment, this new very successful project might have been initially rejected.

*Many managers are not familiar with risk-assessment models.* Many managers are unaware of the tools for risk calculation, and some of them hide this fact under the excuse of "there is no time", "there are no resources" or "there is no specific know-how". Three managers were quite candid about the subject: "We are not using any risk-assessment models because we are not aware of their existence"; "We do not use risk-assessment models because we are not familiar with them" and "We are not so familiar with risk-assessment models".

A manager who was using some elements of risk-assessment models told us:

We are using optimistic, pessimistic and most-probable forecasts for our project evaluations. But on the other hand, we are not assigning them their future probabilities, even though they can be estimated, because we are not familiar with the mathematical tools for risk evaluation.

There were also various comments doubting the benefits of risk-assessment models. Three examples make the point:

In our industry, when deviation from market forecast can be very small, the risk-assessment tools can have no added value in strategy formulation...

In our industry, the market forecasts for the commodity we produce are very accurate, so the tools of risk assessment are not useful...

and

In our industry the uncertainty of forecasts is very small, so the risk-assessment models are not useful.

*Using certain conventional calculations in decision-making is sufficient for risk assessment.* Two managers told us that sensitivity analysis was a popular substitute for risk-assessment models. One said: "A sensitivity analysis is made for every project's financial plan, and the decision is taken based on the more pessimistic forecast." The other put it this way: "We do sensitivity testing on many aspects of our business plans to give us a sense of the risk involved."

Other substitutes for risk-assessment models are described in the following examples:

The different target of the rate of return for different cases inherently includes the magnitude of the risk involved...

and

In M&A, the company's riskiest activity, we calculate the optimistic outcome and the pessimistic one. If both are positive or negative, there is no problem. In the other case, we give more weight to one of them, and this makes us decide.

Similarly:

In R&D, we use optimistic, pessimistic and realistic forecasts without giving them their probabilities, as they are not reliable. On the other hand, we use the probability of the success of the project, before we start it and in the periodic progress reports.

Another comment in this vein was:

The realistic forecast is frequently an unconscious weighted average of optimistic and pessimistic forecasts...

A different angle on the same attitude appeared in the following argument:

The importance of risk in our organization is reflected in the way we ask for a well-documented feasibility study for any investment, and the attitude toward risk is manifested in the acceptance of the forecasts.

Similarly:

We take care of risks by assigning a proper margin of unforeseen expenses and time, which we control very tightly.

One particularly assertive manager said:

The only tool we use for risk assessment is maximum accepted risk exposure. I take calculated risks in currency, interest, and price of raw materials based on my knowledge, experience and the solid cash position of the company, which boils down to "maximum accepted risk exposure".

But as we probed more deeply into this declaration, we found that his calculated risk was in fact not based on any accepted risk assessment tool. This personal attitude toward risk assessment was also explained by a manager who said:

In our strategic planning we use optimistic and pessimistic forecasts. Being myself a risk seeker, I usually choose the one with a higher return, which naturally has a higher risk.

Two managers favored maximum accepted risk exposure as the single factor for risk assessment. One said:

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A very useful risk-assessment tool is the maximum accepted risk exposure, which very often has the strongest influence on our decision.

The other claimed:

Maximum accepted risk exposure is the only tool we may use in our risk assessment.

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Explanations from the few managers who use common risk-evaluation tools included:

We are a very large company and are using all the risk-assessment tools because forecasts are very reliable. . .

and

We make the largest use of quantitative tools for risk assessment in M&A.

### Discussion and implications

The strong support for the proposition presented by Noy (1998) and Eisenhardt and Sull (2001), that risk is an important component of strategy formulation, appears to be a natural outcome of recent developments in market behavior. The increase in the pace of changes in the environment and the diminishing of time to market limit the time available to companies for planning and evaluation. This kind of business environment has caused very costly forecasting errors and forced managers to consider risk factors in their decision-making.

Similar conclusions can be found in an article by Courtney *et al.* (1997), who argued that the traditional approach to strategy, which relied on powerful analytical tools to predict the future, is feasible only for stable business environments. In the present turbulent environment, however, managers need a highly risk-oriented strategy to cope with the perils of high uncertainty. Collins and Porras (1997) also found that "commitment to risk" is a common practice of long-lasting "visionary companies".

This acceptance of the importance of risk was also demonstrated by the fact that 97 per cent of the managers were prepared to define their company's risk strategy. At the same time, however, only 13 per cent of the respondents confirmed unequivocally that their organizations had a risk-taking strategy, with another 30 per cent agreeing to a lesser extent. The explanation for this contradiction can be found in the answers to the questions about incorporating risk in the decision process. Risk aspects are more commonly discussed with regard to discrete cases than regarding the risk strategy in general; it appears that managers are aware of an emergent risk strategy but do not necessarily have a well defined and deliberate one. This was also implied verbally by some of the managers interviewed. When answering the question about their risk

strategy, they referred to the formal explicit strategy. When, however, they considered the question of the definition of their company's risk strategy, they stated the prevailing emergent strategy. This conclusion is supported by the descriptive answers the managers gave to the question: "How are managers in the company informed as to the company's 'risk strategy'?"

Only 11.9 per cent of the respondents confirmed that risk strategy is deliberately defined in written instructions or procedures, while in most of them, 65.6 per cent, verbal explanations in management meetings sufficed. This finding implies that the important risk strategies are more emergent than deliberate and thus, in some ways, open to personal interpretation.

Further insight into this phenomenon may be gained from the significant positive correlation we found of the managers' position in the organization to the level of importance they attribute to the element of risk in strategy and to discussions they held on the importance of risk in various activities (see Appendix 5). At the same time, the negative correlation between the manager's position in the organization and their level of education in general and education in business or economics in particular, is yet another indication. These findings might indicate that the importance that managers attribute to risk is based more on experience and responsibility than on theory. Moreover, the positive correlation between their position and age shows that the managers completed their formal education when risk in strategic management was in its infancy. This might also provide one explanation for the limited use of models to assess risk, the lack of familiarity with the models, and the reliance on basic economic calculations for risk evaluation.

Our finding of the limited use of risk-assessment models corroborates the observation made by Levy and Sarnat (1994, p. 282), following an elaborate discussion of all the economic aspects of risk and risk-assessment techniques, that "the adoption of sophisticated risk analysis by business firms has lagged behind the theoretical literature". Levy and Sarnat (1994) did not, however, give any reason for this behavior.

The finding of limited use of risk-assessment tools, emanating from a lack of faith in forecasting, unfamiliarity with the models, or use of alternative conventional economic tools, can be supported by research of risk taking from behavioral studies of organizational decision-making. Shapira (1995) found that managers are more concerned with the magnitude of possible risk than with its probabilities and do not accept forecasts or risk estimates that do not correspond to their "feel".

March and Shapira (1987), in their research into "managerial perspectives on risk and risk taking", concluded that the way managers think about risk does not fit into the theoretical concept of risk, nor do managers follow the rules of decision theory. Their behavior ignores one of the important theorems of "decision under uncertainty", namely that additional information improves the outcome of a decision (see for example McGuire, 1986). In this case, models for risk assessment provide additional information that can improve strategic decisions.



Looking into the reasons presented by managers for not using risk assessment models, one can see that they are not consistent with accepted business managerial procedures.

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*The models are based on risky forecasts*

Many common business decisions and all strategic decisions are "forward looking" in nature. Testing the feasibility of building a new production line, introducing a new product, or entering a new market have to be based on forecasts. The techniques of forecasting have been constantly improving and have reached a stage of relatively high precision. Excellent coverage of the topic of forecasting can be found in Armstrong (2001).

Although the use of forecasting is well accepted in common management decision procedures, it seems that the managers we interviewed who expressed this rationale, might not have considered it fit for strategic decisions.

*Unfamiliarity with risk-assessment models*

"...Ignorance is bliss", is a poor justification for not using a tool that can improve important decision-making processes by supplying additional information.

*Using certain conventional calculations in decision-making is sufficient for risk assessment*

The risk assessment models and the conventional calculations used in decision making are not mutually exclusive but should be complementary, and each one of them contributes information that improves the outcome of decisions under uncertainty. There might be two implicit explanations for the excuses we received for avoiding risk assessment models that were not mentioned explicitly by the managers:

- (1) Non-financial executives perceived risk assessment models as "financial tools" used by the CFO and his or her people, and did not grasp their implication to strategic decision-making. Out of the 93 managers who answered the questionnaires, only six explicitly defined themselves as CFOs (6.5 per cent), but they used 176 of the total 1,454 factors for risk assessment (see Appendix 3) which amounts to 12.1 per cent!
- (2) The definition of risk strategy used by managers is qualitative rather than quantitative, so those managers do not feel the need for quantitative risk assessment information.

The findings on the use of risk assessment models are epitomized by the expression "we take calculated risks," used by many managers. Rather than a description of real actions, this expression is essentially lip service. Most so-called calculated risks are not calculated at all but are simply based on subjective perceptions of past experience.

### Conclusions and recommendations

Managers are well aware of the importance of risk as a material part of strategy formulation. This is demonstrated by their adoption of a defined risk strategy and the inclusion of a risk aspect in their decision processes. But the definition of risk is usually not formalized, so managers cannot assure that the risk strategy is consistent in the company. In order to facilitate the incorporation of well-defined risk strategies into the strategic decision process we suggest the following:

- To adopt the latest finding of Noy and Ellis (2003) that risk strategy does not have to be uniform across all functions or activities of the organization, but rather may differ along the functions which are its core business.
- To define a risk strategy by using a quantitative model.

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#### Appendix 1. Questions on managers' perception of risk as an important component of strategy

- (1) To what extent do managers consider "risk" as a component of the company's strategy? (1-5 bipolar scale)
- (2) If you marked 1 or 2, please select one of the following explanations to indicate why.
  - The company does not deal with strategy at all.
  - Risk is not considered as an important strategic factor.
  - Risk is not considered an important managerial factor.
  - Other.
- (3) To what extent do you think your company has a risk strategy? (1-5 bipolar scale)
- (4) How would you define your company's risk strategy?
  - Conservative.
  - Cautious.
  - Balanced.
  - Daring.
  - Irresponsible.
  - A combination of more than one risk strategy (indicate at least one of the six alternatives).
- (5) How are managers informed of the company's "risk strategy"? (Open question).



**Appendix 2. Questions assessing managers' incorporation of risk consideration in their decision-making processes**

- (1) To what extent does management discuss the strategy of risk-taking in general?
- (2) To what extent does management discuss risk-taking strategy in specific activities?
- (3) To what extent does management consider the risk aspects of each case on its own merits?
- (4) If you marked 1 or 2 on the 1-5 bipolar scale in response to question 3, the reason is that:
  - It is not considered significant enough.
  - There is no knowledge of the matter.
  - It is not considered an important managerial factor.
  - Other.

**Appendix 3. Use of risk assessment tools according to risk assessment factors and corporate activities**

Corporate activities	Risk assessment factors									Total	NR
	OF	PF	RE	OR	PR	RF	EF	HR	MR		
1	20	24	40	26	25	7	9	13	8	172	17
2	8	17	29	11	11	8	9	7	10	110	22
3	10	18	29	9	13	7	6	5	10	107	21
4	15	20	51	18	15	7	9	13	6	154	3
5	13	13	50	4	3	6	1	2	7	99	10
6	19	18	38	16	13	4	8	5	10	131	16
7	28	29	57	10	10	7	4	8	12	165	2
8	29	29	60	14	12	8	5	7	8	172	2
9	7	15	59	14	10	4	1	6	4	120	7
10	21	18	51	12	11	7	5	8	9	142	3
11	8	12	41	6	7	0	2	2	4	82	24
Total	178	213	505	140	130	65	59	76	88	1,454	127
Non- use	718	683	391	756	766	831	837	820	808	6,610	
Per cent used <sup>a</sup>	20	24	56	16	15	7	7	8	10	18	

**Notes:** <sup>a</sup>Percent of total use out of relevant possible usage; total possible usage = (93 questionnaires by 11 activities) - (127 non-relevant) = 896

Corporate activities: (1) = mergers and acquisitions, (2) = financial investments, (3) = financial risk hedging, (4) = investments in tangible assets, (5) = procurement and inventory management, (6) = research and development, (7) = entering a new market, (8) = introducing a new product, (9) = product price management, (10) = adopting new technologies, (11) = tender-price determination.

Risk assessment factors: OF = optimistic forecasts; PF = pessimistic forecasts; RE = realistic forecasts; OR = optimistic return (ROI, RONA, ROS or similar); PR = pessimistic return; RF = risk factor, the standard deviation of the probability of expected return; EF = efficient frontier, targeted risk return relationship; HR = hurdle rate, minimum acceptable return; MR = maximum accepted risk exposure; NR = not relevant

Table AI.



**Appendix 4. Number of factors used for risk assessment**

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Number of factors	0	1	2	3	4	5	6	7	8	9	Total	3+
MA	12	23	20	5	2	7	2	2	2	1	76	21
FI	12	35	12	9	0	0	0	1	1	1	71	12
FRH	17	31	12	6	1	2	2	0	1	0	72	12
ITA	14	42	16	8	1	5	2	1	1	0	90	18
PIM	13	51	11	6	2	0	0	0	0	0	83	8
R&D	13	38	11	6	1	2	4	1	1	0	77	15
ENM	8	46	14	13	5	2	0	2	1	0	91	23
INP	6	48	15	11	3	3	2	2	1	0	91	22
PPM	8	55	11	7	2	1	0	0	1	0	86	11
ANT	13	47	13	10	1	4	0	1	1	0	90	17
TPD	14	40	8	3	3	1	0	0	0	0	69	7
Total	130	457	143	84	21	27	12	10	10	2	896*	166
Percent of grand total <sup>a</sup>	14.5	51.0	16.0	9.4	2.3	3.0	1.3	1.1	1.1	0.2	100	18.5

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**Notes:** <sup>a</sup>Total possible answers = 93 questionnaires by 11 activities – 127 non-relevant = 896  
 MA = mergers and acquisitions, FI = financial investments, FRH = financial risk hedging,  
 ITA = investments in tangible assets, PIM = procurement and inventory management, R&D  
 = research and development, ENM = entering a new market, INP = introducing a new  
 product, PPM = product price management, ANT = adopting new technologies, TPD =  
 tender-price determination

Table AII.

**Appendix 5. Means, standard deviations and correlation of risk attitude and personal characteristics of managers**

	Mean	Standard deviation	Position	Age	Level of education	Education bus./eco.
Importance of risk in strategy	4.129	0.7971	0.259*	0.121	-0.268**	-0.224*
Discussions of risk strategy in general	3.086	1.1764	0.261*	0.206*	-0.026	0.031
Discussions of risk strategy on activities	3.989	0.8533	0.168	0.045	0.035	-0.004
Discussions of risk strategy in specific cases	4.064	0.6885	0.156	0.031	-0.015	-0.083
Having a risk strategy	3.333	1.0250	0.103	0.089	-0.092	0.049
Definition of risk strategy	2.849	1.5600	-0.063	-0.103	0.175	-0.038
Position in the organization	2.380	0.8099	1.000	0.230*	-0.262**	-0.346**
Age	46.56	13.9021	0.230*	1.000	0.049	-0.173
Level of education	3.301	0.8442	-0.262*	0.049	1.000	0.516**
Education in business or economics	2.483	1.5080	-0.346**	-0.173	0.516**	1.000

**Notes:** \*Correlation is significant at the 0.05 level (2-tailed); \*\* Correlation is significant at the 0.01 level (2-tailed)

Table AIII.