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Managerial Decision Making Under Risk and Uncertainty

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***Abstract*—This paper focuses on managerial decision making under risk and uncertainty. Since no one, so far, has studied managers´ risk attitudes in parallel with their actual behavior when handling risky prospects the area still remains relatively murky. Interviews have been done with 12 managers in the Swedish forest industry concerning how they define risk, how they handle risk, how they make risky decisions, and how the organizational context affects the decision-making process. Problems that have been identified in this study are the lack of information and precise objective data, that risk and probability estimations made by the managers are often based on inadequate information and intuition, that no formal analysis is carried out, that no computer based decision tools are used in the decision making processes, and therefore most decisions are based on intuition and gut feeling.**

***Index Terms*—Risk taking, decision making, computer based decision tools.**

I. Introduction

Today we know by experience that very few people make decisions on the basis of well-deliberated calculations, no matter if the decision situation is of private character or in a job situation. We also know that people often neglect the normative rules when making risky decisions, and that they often make decisions by intuition or on "a hunch" that seems correct. The descriptive theory gives us some explanations why people make decisions the way they actually do and why the suggested normative rules for decision-making under risk and uncertainty are not followed [1, 2]. For instance people make decisions by following well-known paths and by following well established and built in norms, see e.g. [3] and the discussion concerning *Basic Underlying Assumptions*.

We have, in the recent past, seen an increasing interest in the interaction between *normative*, *descriptive* and *prescriptive theories* of decision-making (see for example [4] and [5]). In order to develop decision aids it is of great importance to know the similarities as well as the differences between the three theories see [6] and [7]. Furthermore, decision-making and risk taking is context dependent [8], which makes it important to study the decision-making context. The context affects the form of decision analysis in many ways and the way decisions are made [9]. "*No decision takes place in vacuo: there is always a context*" [10]. In other words, the structure as well as the culture of organizations must also be examined, since they both influence the decision-making processes to a great extent. With the exception of a study by [11] and [12], empirical research has not generally focused on the conceptions of risk and risk taking held by managers. Since no one, so far, has studied managers´ risk attitudes in parallel with their actual behavior when handling risky prospects, the area still remains relatively murky.

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II. Attitudes Toward Risk

Among others [13] and [14] state that risk means different things to different people, and that they perceive risk in different ways depending on what area they are working within. Many studies have attempted to deal with this problem and studied the role of risk in their respective fields; see for example [15] and [11]. According to [16]: "risk is a much overused word; indeed, it has been used in so many senses as to become virtually meaningless." In addition [17] provide us with a useful definition of risk in the field of decision-making. Their definition distinguishes three types of decision-making situations. We can say that most decision-makers are in the realms of decision-making under either: (a) Certainty, where each action is known to lead invariably to a specific outcome. (b) Risk, where each action leads to one of a set of possible specific outcomes, each outcome occurring with a known probability. (c) Uncertainty, where actions may lead to a set of consequences, but where the probabilities of these outcomes are completely unknown. A risky situation is thus a situation where the outcome is unknown to the decision-maker, i.e. he/she is not sure which outcome will occur and the uncertainty may lead to erroneous choices.

Rather than accepting risk, managers avoid it [18] and in the classical literature (see for example [19]) it is widely accepted that most people are risk-averse, and that risk and return are positively related. Some studies, however, point out that managers may not necessarily believe that risk and return are

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positively related [20] and in a study, made by [12], 73% of the managers believed that risk was manageable. According to [21] one of the major tenets of portfolio analysis is that risk and return are positively correlated, i.e. if a person wants a higher return, he should, on average, also take a higher risk. However, others (e.g. [22] and [23]), show that there may be a negative correlation between accounting measures of risk and return. In the study by [12], 43% of the managers felt that risk and return were related in one way or another and 48% felt that the two were not necessarily related. Several studies show that managers do not accept that the risks they face are inherent in the situation, and avoid accepting risk by considering it as subject to control [24]. Rather, they believe that using skills to control the dangers can reduce risk. In the study by [12] 73% of the managers believed that risk was manageable and saw risk as controllable. They also made a definite distinction between gambling (where the odds are exogenously determined and uncontrollable) and risk taking (where skill or information can reduce the uncertainty) (ibid., p.73).

To be able to improve the managerial decision-making by providing decision makers with prescriptive decision aids we need to interview decision makers concerning their way of making decisions. In addition, we must study the organization and the decision-making context where the decision-making takes place; an aspect that none the less is often neglected.

This study aims to examine how managers in the Swedish forest industry define risk, how they handle risk, how they make risky decisions and how the organizational context affects the decision-making process. So, the main problems to be examined are; how do managers make real decisions and what type of problems do they actually experience when dealing with decision situations involving risk and uncertainty?

III. THE STUDY OUTLINE

This study was carried out in two major Swedish forest companies and includes interviews with twelve managers. The research method can be characterized as descriptive and explorative. The semi-structured interviews were based on an interview protocol, and the respondents received the interview protocol in advance. The protocol served as the basis for the interviews and “probing” was used whenever it was necessary in order to gain more information from the respondents. Each interview lasted between two and three hours. The interview study is a two-stage study, the first stage consists of the interviews and the second stage consists of the questionnaire in which the managers choose from different risky prospects. In the first half of the interview study, ideas of [12] serves as a basis. The amount of money in the offered prospect varied, since the aim was to examine if the behavior of the managers changed when the sums increased. The participants in the study were not chosen at random. Instead, an effort was made to secure a broad spectrum of managers from many different spheres of activities. Since there are relatively few respondents participating in the study, the results are not generally applicable.

IV. THE STUDY

A. *WHAT IS RISK?*

When asking the managers how they defined risk, most of them distinguished between different types of risks, such as fire risk, financial risk, technical risk, commercial risk, and investment risk. They said that a risky situation is a situation where the outcome is unknown to the decision-maker, i.e. he/she is not sure which outcome will occur and the uncertainty leads to erroneous choices. When the managers were asked to describe a risky decision they had recently made, or a risky situation they had been involved in, more than half of them associated this with different kinds of investment activities and divided them into such categories as (a) investing in new machines and techniques, (b) acquisition of new companies, (c) development of new products and entering new markets.

(a) They were uncertain about whether they would reach the expected production speed within the scheduled time, if they would be able to produce top quality paper, and the reliability of the new machines. One manager said, “New techniques are always riskier than old techniques. So, we must decide if we, for example, want to be first in a new market or the first with a new product, or if we should hold back for a while and enter the market as number two. Another risky area pointed out by a manager was that they were very vulnerable concerning issues related to information technology.

(b) One problem that a manager did bring up is related to the acquisition of other companies. He said, “I do not think that we really are aware of how to estimate different types of risk that we need to deal with.” He also said that even though the “mathematical part” of many problems was easily solved since they have figures concerning the cash flow, the potential development and so on, they are still greatly governed by the “soft aspects” of the decision-making process. He also said that they often invest in projects that they believe will be good investments, and that they do not only focus on figures or the investment index. Three others expressed the same sentiments concerning the acquisition of new companies by saying that they sometimes even ignore the figures they have and base their decisions on their “gut reaction”.

(c) One example of risk, which is difficult to estimate and predict, is when to leave an existing market. The risky element in such a case is that once you have left a market you can not return. One manager, who refers to such a case concerning entering a new market with newspaper-paper, said, “These kinds of decisions are very unreliable.” Therefore, many decisions of that type are based on subjective appraisals of the decision-makers – not on any calculations. Regarding the future interest rates risk one of them said, “We used to consult a bank and some other institutions regarding these kinds of matters, but we make the final decision by “gut feelings”, i.e., we choose the alternative that feels good.”

1) Risk and return – are they related?

The managers in this study were asked their opinion with regard to the following argument, "When taking larger risks there are expectations of larger returns." Ten of them explicitly said that risk is related to profit in one way or another. Statements such as the following were made: "Higher risk must result in higher profit", "Yes, everything is about maximizing the return, and in order to do so we must take risks all the time", "Higher risk corresponds to higher potential profit." and "I believe that if you are not willing to take any risk at all you will not receive a good profit either." However, although most of them agreed with the statement that there is a relationship between risk and return, four of them said that it is important to minimize the risks and not take too great risk. Two of them also said that they were no gamblers and therefore were very careful when taking risks, which was the recurring statement during the interviews. All of them agreed to the statement that "if you don't take risks there will be no returns." Four of them were convinced that it was necessary to take risks almost always – "otherwise nothing will get done" as one of them pointed out.

Four of the managers regarded risk and uncertainty as almost the same thing and thought that they are strongly correlated. Some statements made were: "For me there is a strong relation between risk and uncertainty, I cannot see any difference between them", and "If you know all the necessary facts then you do not take any risk, but if you do not know all about the future, which you do not!, then you take a risk. Risk and uncertainty are thus correlated." In the last quotation we also find a recurring statement, namely that uncertainty refers to a future state. The opinion of four of the managers was that uncertainty was the reason for the existence of risk. According to them, the level of uncertainty could in many cases be reduced if the actual case was analyzed in an orderly fashion

2) Dealing with risk

The managers were asked what they did when faced with a problem that involves risk, and they had to rank the alternatives below;

(a) Avoid taking risks (5,28)
(b) Collect more information (1,68)
(c) Check different aspects of the problem (1,86)
(d) Actively work on the problem to reduce the risk (2,54)
(e) Delay the decision (4,71)
(f) Delegate the decision (5,50)
(g) Other (specify)

The responses are displayed in the right-hand column. The sum is the average of the answers (1 was the most preferred alternative and 6 was the least preferred alternative).

The pattern of how they try to tackle decision problems involving risk was fairly clear. In order these were (b) collect more information, (c) check different aspects of the problem, (d) actively work on the problem and in due time (e) delay the decision. The majority of them agreed that taking risks was necessary for the organization. However, four of them stressed that they would avoid taking risks if the consequences could be "catastrophic", i.e. if the organization could not manage the situation if it turned out wrong. An interesting statement made by several of the managers was that if the financial status of the company was poor then they would avoid all kinds of risk taking.

3) Can risk be managed?

When asking the managers if they thought that risk could be managed all of them said yes. They said that risk could be managed if you have correct information, sufficient knowledge about the problem, and if you are experienced in the field it concerns. Most of them, once more, emphasized the importance of alternatives (b) Collect more information, (c) Check different aspects of the problem, and (d) Actively work on the problem to reduce the risk. Five of the managers also mentioned that they use their intuition or feeling to decide what is right or wrong, in other words they make subjective estimations about future states of the world. Other ways that the managers attempted to manage the risk included:

- buying insurance, thus reducing the consequences of a risk,
- carrying out a pilot-study before making decisions,
- using check-lists of points to take into consideration when making decisions,
- "sign-away" at least a part of the risk when for example buying a new machine (i.e. let the supplier take part of the risk and make this clear in the purchase contract).

The risk estimates made by the managers were often based on what they identified as experience and intuition. Only one of the managers explicitly expressed that he tried to calculate and quantify the risk.

4) Is it possible to identify risk-prone and risk-averse persons?

According to five of the respondents risk-prone people are those who want to make progress and go forward and three of them also said that risk-prone people work more independently than others do. Several of the managers considered risk-prone persons as those who are willing to make a decision without having "everything" perfectly clear. Other characteristics that were identified among risk-prone individuals:

- their risk behavior has more to do with their personality, and less with their background and education,
- people "who are risk-prone are not afraid of making mistakes"
- people higher up in the organization were more risk-prone.

An interesting angle is that, even though both risk-prone and risk-averse behavior are desirable qualities in different situations, the managers thought that risk-prone behavior was something positive and that risk-averse behavior was something negative. For instance, one manager said that "a risk-prone person is someone who really wants to make progress and that is the kind of people companies are looking for." Risk-averse people, on the other hand, were identified as those who would "rather be safe than sorry", and three of the managers said that many people in the forest industry belong to this category. What do the managers think of themselves - are they risk prone or risk averse? Two of them said that they do not like risk taking, four of them said they consider themselves neither one way nor the other, and finally the remaining six stated that they like risk taking.

5) Do the managers use any computer-based decision aids when working with risk estimations and/or decision problems?

None of them used, or had ever used, any kind of computer-based decision-tool or program. However, after some probing it appeared that one of them sometimes did use Excel when he made some risk estimations regarding financial risks. A couple of the others said that they sometimes use Excel for modeling when doing investment calculations and also when following up as to whether investments had succeeded. Why do they not make more use of computers when making decisions and handling risk? One of the very top managers said "I have never ever, in any company, in any council or in any other situation, used any kind of computer based decision aid. I think that many people try to ´take the easy way´ and that they therefore do not spend time learning how to use such decision tools – which is a pity since I think it could be advantageous in many situations."

B. THE DECISION MAKING CONTEXT

The managers in this study were asked, "How do you perceive the *structure* of the organization?"

(a) Mechanistic (*Bureaucracy*) with highly centralized decision-making
(b) Organic (*Adhocracy*) with decentralized decision-making
(c) Other

The answers they gave were only in one single case just (a), (b) or (c). Several of them thought that the structure is a mixture of the alternatives offered and three of them said that it is something between (a) and (b). Three others said that it is (b) or at least on its way towards (b) and one of these three said "the decision-making becomes more and more decentralized, and there has been a lot of progress made during the past ten-years." Half of the respondents, irrespective of whether they chose (a) or (b), had one opinion in common, namely that they agreed that decentralized decision-making was only true up to a certain level, i.e. that most of the important decisions where made higher up in the hierarchy. One manager said "the organization is organic and decentralized at the ´factory level´, but very bureaucratic above that level – which is unpleasant." Moreover, one of the middle level managers said that "many of us are afraid of making decisions that ´daddy´ perhaps may disapprove of." Similar "feelings" were expressed by others who said that the forest industry, by tradition, has been very hierarchical and that you must always be aware of what people above your level like or dislike. Another observation made in this study was that people at the middle management level did not, to the same extent, think that the decision-making in the organization is decentralized as those higher up in the hierarchy. Thus, we can see from this study that the managers' answers were not unanimous and that it was not possible to say whether the studied organizations were mechanistic or organic. The organizations were rather, according to the managers, a mixture of both. It could perhaps be explained by the fact that several of the managers perceived the organizations as organic at the factory level, but on the other hand, as mechanistic at the top level.

The managers were also asked to choose between two alternatives regarding the *culture* in the organization, concerning the level of trust in subordinates.

The alternatives were:

(a) Autocratic with a low level of trust in subordinates
(b) Democratic with a high level of trust in subordinates
(c) Other.

A majority of them chose alternative (b), but once again, even those who had chosen alternative (b) said things that reinforced the feeling that trust and commission were somehow limited. A few examples of what they said are: "Relatively democratic decision-making, but the final decisions are always made higher up in the hierarchy", "Democratic, yes, but not when it comes to the big decisions", "The top man is the one and only one in charge." The managers were also asked about whether they thought there were, or not, unconscious, taken-for-granted beliefs that guide the decision-makers in some way. Eight of them said that there definitely were more of unconscious and taken-for-granted beliefs that guided them when they made different kinds of decisions. Three of them made statements such as the following: "There are some patterns that implicitly guide people to act in some ways ´as it always has been done´", "Yes, there is definitely a built-in culture that tells people what is right and what is wrong" and "I think we have quite a lot ´built into the walls´, a lot of unwritten rules that guide people in their decision-making." Three of the other managers talked about discipline and the importance of adapting to the organizational norms. One of them said that many of the workers had become very disciplined and the reason was, according to him, that either the workers chose to "adapt the style" or leave/lose their job. He also added that "We are free, to a large extent, to perform our job as we want – as long as it fits in to the built in norms." Several of the mangers also talked about the importance of "adapting the style", to learn what is right and what is wrong – even though most of the rules are in unwritten form. Two of the top-level managers also discussed these matters, and they agreed that it is important to employ people who possess fundamental values that will suit the business concept. Furthermore, they wanted to see employees who are willing to adapt to the style of the firm and who suit the prevailing culture. One of them also said that “People have a tendency to follow a well-worn path in the organization. Most of those who have worked in the company for a long time have adapted to the style of work and how to make decisions – stated by others who have been working there even longer.”

C. HOW DO THE MANAGERS CHOSE RISKY PROSPECTS?

When studying how the managers chose from the risky prospects in situations 1 – 3 (see appendix) we observed the *certainty effect*. We can see that the majority of them preferred alternatives that are certain in preference to alternatives that are merely probable, even though the expected value is higher in the alternative that was not certain. We can thus see that they preferred prospects that had a small variance or no variance at all. However, if the variance becomes larger in the prospects, such as from 100% to 25% in situations 2.1B and 2.2B, and from 80% to 20% in situations 2.1A and 2.1B, then they instead chose the alternative that offered the largest possible outcome. This was, however, not always true. In situations 4.1 and 5.1 we can see that if the difference in the variance was large then most of them had a tendency to choose the alternative where winning was more probable. We can, on the other hand, see in situations 4.2 and 5.2 that if the probability of winning dramatically decreases and the chance of winning is possible but no longer probable, then they chose the alternative that offered the largest gain. We can, at this stage, establish that the managers did not act in accordance with the expected utility rules.

When replacing wins by losses we can observe a phenomenon called the *reflection effect*, i.e. that the risk aversion in the positive domain is replaced by risk seeking in the negative domain, see situations 7–9. In situation 8.1 we can for instance see that eight of the managers preferred the certain alternative (3.000.000 SEK, 100%) to the uncertain one (4.000.000 SEK, 80%). But, when looking at the loss domain, in situation 8.2, we can see that most of them were willing to accept an 80% risk of losing -4.000.000 SEK in preference to a certain loss of -3.000.000 – although situation 8.2A has a lower expected value. In situation 10 we can observe the reflection effect in a different form. In the positive domains the majority of them disregarded the fact that the probabilities are low if the possible outcome is large. In the loss domain, on the other hand, we can see that most of them chose the certain loss of -500 SEK in preference to -500.000 SEK with probability 0,001%. Finally, in situations 11 and 12 we can observe the *isolation effect*. The isolation effect appeared when the majority of the managers made their choices, obviously not taking into account the components that the alternatives shared, which in situation 11 is 100.000 SEK and in situation 12 is 200.000 SEK. So, even though the offered prospects are identical in final states, i.e. the expected value in all four situations is 150.000 SEK, they proved to have risk-averse tendencies for positive prospects and risk-seeking tendencies for negative prospects. The results in situations 11 and 12 also exhibited framing problems, i.e. that people may choose in opposite ways and end up with contrary results when data are presented in different, but mathematically equivalent, ways.

So, what about the managers in this study – are they risk-prone or risk-averse? Half of them labeled themselves as risk takers. Only two of them said that they are risk-averse and the other four stated that they are somewhere in between. When analyzing the choices they have made among the offered prospects in the questionnaire we can, nevertheless, see that a majority prove to be risk-averse in positive domains, see e.g. the results in situations 1.1, 2.1, 3.1, 4.1, 5.1, 6.1, and 8.1. In the negative domains, on the other hand, most of the managers tend to exhibit risk-prone behavior; see e.g. situations 7-9 where the reflection effect appears. Results from the study indicate that the managers do not act in a completely rational manner, nor in accordance with the suggested normative rules.

V. DISCUSSION

One main problem that has been identified in this study is the lack of information and precise objective data. The risk and probability estimations made by the managers are therefore often based on inadequate information and intuition. Furthermore, many of the managers said that they did not have the necessary skills to estimate different types of risks and that they therefore make their decisions based on intuition and gut feeling. Most of the managers also pointed out the lack of information as a source of risk and uncertainty. Moreover, all of them thought that risk could be managed if one has the correct information and good knowledge about the problem. Ten of them explicitly said that risk is related to profit in one way or another, and all twelve of them agreed with the statement that “if you don’t take risks there will be no returns.” The managers were also asked to choose between two alternatives about the culture in the organization, as to whether the level of trust in subordinates was low or high. Most of them did choose the alternative that expressed that the organization is organic and that the decision-making in the organization was decentralized. But, once again many of them said that the decentralized decision-making was only partly true. Most of them said that there were a lot of unwritten rules built into the culture and three of them said things such as: “there are some patterns that implicitly guide people to act in some ways - as it always has been done.” When asking the managers how they perceived the structure of the organization most of them agreed that it is a mixture of a bureaucratic and an organic organization with a mixture of centralized and decentralized decision-making. This question is crucial for many reasons since the structure sets or creates the boundaries within which people are expected to act, i.e. make their decisions.

According to the managers it is relatively easy to identify whether a person is *risk-prone* or *risk-averse*. Five of them said that risk-prone persons are those who want to make progress and go forward, and three of them also said that risk-prone persons work more independently than others – "they do not have to ask about everything." Other characteristics of risk-prone persons that the managers pointed out were; the capacity to make rapid decisions, the ability to make decisions without having "everything" perfectly clear, and that risk-prone persons are not afraid of making mistakes. In contrast to the opinions about the risk-prone persons the risk-averse persons were labeled as those who "complain about innovations", and as those "who do not like any kind of change." And while risk-prone persons were perceived as those who could make decisions without having control of everything, risk-averse persons were, according to two of the managers, those who wanted to have control of everything before making a decision. Interestingly, however, it was observed that risk-prone persons were regarded as the "desired ones", and that the risk-averse were regarded as the "undesired ones". For instance, one of the managers said, "It is always better to work with persons who take risks in comparison to those who try to avoid risk in every situation." One of them said, "A risk-prone person is someone who really wants to make progress and that is the kind of person companies are looking for."

VI. CONCLUSIONS

Conclusively, the managers did not act in accordance with suggested normative rules, explicitly expressed their inability to handle many risky situations due to lack of information and expressed their fear of doing something wrong, e.g. making poor decisions. A majority of the managers also stressed the fact that there are a lot of unwritten rules built into the culture that guide them when making decisions. Using computer-based decision support could be one way to circumvent such traditional, well-established, ways of thinking and making decisions.

The analysis of the managers' behavior tells us, furthermore, that it would be beneficial to do a formal analysis of several of the decision problems they deal with. When doing such a formal analysis of decision situations, computer-based decision tools would be useful, e.g. in order to do sensitive analysis, risk estimations and to visualize the outcomes of different prospects. Today, however, only a few of the managers use computers when making decisions and none of them actually use any type of decision analysis tool.

Furthermore, a major obstacle when analyzing managerial decision problems is the elicitation processes and the practical use of probabilities as well as utilities. Therefore, in order to improve the use of computer-based decision tools, it is of great concern to develop better techniques and methods for the elicitation of utility and probability measures. This is a quite new and vivid area of research covering a quite extensive field of formal and informal methodologies (cf., e.g. [25], [26] and [27]), but so far, little has been concluded. This is particularly true when handling scenarios involving imprecise data.

In conclusion, a prescriptive computer-based approach that attempts to help the managers make better decisions by identifying the discrepancies between real (descriptive) and idealized (normative) decision-making, would undoubtedly be of great value for the managers in their decision making processes.

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Appendix

Situation 1:
1.1 Which of following would you prefer?
A. 250.000 SEK with p. 33% or B. 240.000 SEK with cert.
240.000 SEK with probability 66%
0 SEK with probabilty 1%
(2 pers.) (9 pers.)
1.2 Which of following would you prefer?
A. 250.000 SEK with p. 33% or B. 240.000 SEK with p. 34%
0 SEK with p. 67% 0 SEK with p. 66%
(9 pers) (2 pers.)
Situation 2:
2.1 Which of following would you prefer?
A. 4.000.000 SEK with p.80% or B. 3.000.000 SEK with cert.
(3 pers.) (8 pers.)
2.2 Which of following would you prefer?
A. 4.000.000 SEK with p. 20% or B. 3.000.000 SEK with p. 25%
(10 pers.) (1 pers.)
Situation 3:
3.1 Which of following would you prefer?
A. 400.000 SEK with p.80% or B. 300.000 SEK with cert.
(4 pers.) (7 pers.)
3.2 Which of following would you prefer?
A. 400.000 SEK with p. 20% or B. 300.000 SEK with p. 25%
(10 pers.) (1 pers.)
Situation 4:
4.1 Which of following would you prefer?
A. 600.000 SEK with p. 45% or B. 300.000 SEK with p. 90%
(2 pers.) (9 pers)
4.2 Which of following would you prefer?
A. 600.000 SEK w. p. 0.001% or B.300.000 SEK w. p.0.002%
(9 pers) (2 pers.)
Situation 5:
5.1 Which of following would you prefer?
A. 6.000.000 SEK with p. 45% or B. 3.000.000 SEK with p. 90%
(0 pers.) (11 pers.)
5.2 Which of following would you prefer?
A. 6.000.000 SEK w. p. 0.001%or B. 3.000.000 SEK w.p.0.002%
(9 pers) (2 pers.)
Situation 6:
6.1 Which of following would you prefer?
A. 400.000 SEK with p. 80% or B. 300.000 SEK with cert.
(4 pers.) (7 pers.)
6.2 Which of following would you prefer?
A. -400.000 SEK with p. 80% or B. -300.000 SEK with cert.
(5 pers.) (6 pers.)
Situation 7:
7.1 Which of following would you prefer?
A. 400.000 SEK with p. 20% or B. 300.000 SEK with p. 25%
(10 pers.) (1 pers.)
7.2 Which of following would you prefer?
A. -400.000 SEK with p. 20% or B. -300.000 SEK with p. 25%
(3 pers.) (8 pers.)
Situation 8:
8.1 Which of following would you prefer?
A. 4.000.000 SEK with p. 80% or B. 3.000.000 SEK with cert.
(3 pers.) (8 pers.)
8.2 Which of following would you prefer?
A. -4.000.000 SEK with p. 80%or B. -3.000.000 SEK with cert.
(9 pers) (2 pers.)
Situation 9:
9.1 Which of following would you prefer?
A. 4.000.000 SEK with p. 20% or B. 3.000.000 SEK with p. 25%
(10 pers.) (1 pers.)
9.2 Which of following would you prefer?
A. -4.000.000 SEK w. p. 20% or B. -3.000.000 SEK w. p. 25%
(3 pers.) (8 pers.)
Situation 10:
10.1 Which of following would you prefer?
A. 500.000 SEK w. p. 0,001% or B. 500 SEK with cert.
(7 pers.) (4 pers.)
10.2 Which of following would you prefer?
A. -500.000 SEK w. p. 0,001% or B. -500 SEK with cert.
(2 pers.) (9 pers)
Situation 11:
In addition to whatever is going to happen in a business situation, you have already received 100.000 SEK. You are now asked to choose between
A. 100.000 SEK with p. 50% and B. 50.000 SEK with cert.
(4 pers.) (7 pers.)
Situation 12:
In addition to whatever is going to happen in a business situation, you have already received 200.000 SEK. You are now asked to choose between
A. -100.000 SEK with p. 50% and B. -50.000 SEK with cert.
(8 pers.) (3 pers.)