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Project risk management
Part 1:
The nature of project risk

*By Antonie M de Klerk**

Whether we like it or not, all projects have risks that if left unmanaged could easily lead to the failure of a project. Competence in risk management has become an essential skill for the project manager. This discipline has evolved over the past few decades as an important part of project management. Somewhat subtle and often challenging, this new discipline holds significant promise for business improvement.

In this introductory article of a series on project risk management, we will explore the nature of risk through some everyday examples and apply it to the project environment. Further articles will address the process of risk management and investigate its content and concepts in more detail. Although our focus will be on risk in projects, the concepts are largely universal in nature and can be applied to good effect in other areas and functions of business as well.

Why do we need to manage project risk?

History abounds with projects that have *failed to meet objectives* in one way or another. A (in)famous example is the Sydney Opera House that was planned to take 6 years to construct at a cost of A$7m, but was eventually completed after 14 years at a total cost of $102m. A well researched area is that of defence systems acquisition in the United States: projects during the 1970's and 1980's tended to overrun by 50 - 300% in cost, 20 - 100% in schedule, and fall short in performance by 0 - 20%. Some further well known examples of projects that experienced problems in one way or another are the development of the Concorde aircraft, north sea oil platforms, the Hubble space telescope, and Windows 95.

Project risk exists in not meeting the agreed objectives – usually cost, time and technical performance. If projects did not have objectives, then clearly there would be no risks – any outcome would be acceptable. So our need to manage project risk derives directly from our desire to meet certain specific objectives. *Risks are a threat to project success*.

Three important observations can be made from this. First, we must know what project success is. This may sound trivial but, given the large number of stakeholders that some projects have, is often quite difficult to answer.

Second, it follows that the very statement of *project objectives introduces risk*; for example, tight objectives clearly have a smaller chance of being met than slack ones. A generous budget and time scale will set an easier target to achieve.

Third, since by definition a project is a unique undertaking, it follows that projects have different objectives and hence also different levels of risk. For this reason we should be careful to compare levels of risk between projects. We should not, for example, require a research project to have the same level of risk as a routine construction project.

The everyday nature of risk

Risk is part of everybody's life: in that sense we are all risk "experts". When you drive to work, you may be involved in an accident. You may get sick today. You may lose your

job tomorrow. Your house may be burgled or your car stolen. You may even be struck by lightning. What do we do to deal with these risks?

Generally, we have learned to cope with them on an informal basis. Few of us would sit down and develop a formal risk management plan for, say, our property, but yet we take a number of specific actions to manage these risks. Think of the safety belt that you (hopefully) wear, the contribution to the medical scheme you make every month, the sizeable short term insurance you pay on your house and car, the burglar alarm you install in your house, and the life insurance you carry. Perhaps you have stopped playing squash to avoid further injury to your bad knee. These are all actions taken to manage risk in your personal life. There are a few important points and observations from these everyday examples.

We are all risk managers

First, we are all *intuitive risk managers*. We are all confronted with risks and have to deal with them in one way or another. What we do in project risk management is to formalize the process and analyse it better because of the size and complexity of the problem, but the concepts are the same.

Managing risk costs money

Second, more often than not *it costs money to get rid of risk* or, more generally, to manage it. The insurance company is willing to take over the risk of your car being stolen, but there are costs involved. Wearing a safety belt is somewhat inconvenient and takes a little bit of time.

Balancing risk and reward

The third, and somewhat more subtle, point is that there is a balance between the level of risk and the amount of money (or resources) we are willing to spend to reduce or get rid of that risk. If you own a car worth R150 000, then a monthly insurance premium of R100 for accident and theft sounds like a bargain, but a R1 000 like a rip-off. Somewhere in-between there is a balance.

There will be a point where you would consider it a reasonable deal, above which it will be too expensive and below it too cheap. This is the point where *risk and cost are in balance*. Project risk management is very much about achieving that balance and we will explore this concept in more detail in a future article.

Different attitudes towards risk

The fourth point follows from the third. Do you think that the point where cost and risk are in balance for a car insurance premium will be the same for all people? A little reflection provides the answer: we all know individuals who do not "believe" in insurance at all and are therefore essentially self-insured. Comparing that to the millions who do pay insurance, we can only conclude that the answer to this question must be no! In fact, extensive experiments have confirmed that individuals have *different attitudes towards risk*. The same carries over to projects.

What might be an acceptable level of risk for one company, may not be so for another. This of course also has to do with the "wealth" of the company. For example, losing your car in an accident is a major risk to you as an individual, but to the large insurance company it is just one of the many thousands of similar risks they carry. Hence we always need to talk about project risk in the context of a specific organization or individual – there is no such thing as a universal "high" or "low" project risk.

The eye of the beholder

The fifth point: to you, the loss of your car through theft is a risk, but to the thief it is a conscious decision. The same physical event can therefore be a risk to one party but not to another. An example in a project environment is labour action: a risk to the project

but calculated action by labour management. Thus, *risk is very much in the "eye of the beholder"*. What is a risk to you may not be a risk to me.

Good Management vs. Good Luck

Our final point from the everyday examples can be illustrated through the following question: if I spent R6 000 on car insurance last year but nothing happened to my car, was that money well spent or not? Answers will vary from person to person. The project risk manager faces very much the same question: how do I convince management to spend an additional R1m now to avoid a possible future adverse event, which may in fact never occur? If the event occurs, I will look good, but if it doesn't, many will think I just wasted the company's money. The point is that we should *depend on good management, not good luck*. We should also reward good management rather than good luck.

So what is risk?

Our discussion of the everyday nature of risk has produced valuable insights, but has not said much about the notion of risk itself. The word "risk" carries a negative connotation. The Oxford dictionary describes it as "hazard, chance of bad consequences, loss, etc." and "exposure to mischance". So, it concerns the possibility of a negative consequence. There are two components to risk: the probability of occurrence of an (unwanted) event and the consequence/impact of that event. In mathematical terms, the degree of risk is defined by the simple equation:

Risk = Probability x Consequence

The level or magnitude of risk is given by the product of the probability of a risk event and the consequence of that event. For example, if there is a 10% probability that we will have to incur a further R100 000 on a project, we can say that the magnitude of risk is R10 000. One way of interpreting this is to say that we have to put aside R10 000 on average to "cover" this risk – or that we need a contingency amount of R10 000. (However, life is unfortunately not exactly as simple as that, but we will say more about this in a future article).

We should also immediately note that we will never spend R10 000, but either R100 000 or nothing (depending on whether the risk event occurs or not). The R10 000 is just a measure or proxy to help us evaluate, aggregate and manage risk.

A useful graphical tool to characterise the relationship between probability and consequence is the two-dimensional map shown in Figure 1.

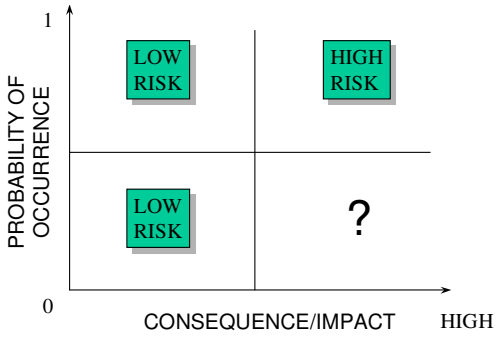

Figure 1: Probability-Consequence Map

In the lower-left quadrant the probability is low and the consequence is small. This clearly presents a low risk. In the top-left quadrant the probability of occurrence is high but the consequence is small, hence this should also be considered a low risk. The top-right quadrant is an area of high probability and high consequence; there should be little argument that this constitutes a high risk.

But what about the lower-right quadrant? The probability of occurrence is low, but if the risk would occur, the consequence is high. Is this then a high risk or a low risk? There is no unique or simple answer to this. We should exercise caution in this area. For

example, does the small chance of being killed in a plane crash during a routine flight from Johannesburg to Cape Town constitute a high risk or a low risk?

The two-dimensional graph is a useful tool to map the different risks on a project. Usually we have a whole list of risks and the map allows us to see which ones are more important than others. This provides guidance as to where we should spend our risk management efforts. Usually we only have resources to give attention to the most important risks. We do not need exact numbers to do this type of mapping; often a qualitative assessment of probability and consequence is enough to do a first-order evaluation.

Another commonly accepted way of determining the importance of a particular risk is to calculate its magnitude according to the equation above. Then we can order risks simply according to magnitude and direct our attention to those that come out at the top of the list. But there is a danger to this. Consider the following two examples:

Construction Accident
Say the chance that somebody gets killed on a project construction site is one in a million and that the consequence is R1m (if ever we can put a price on a life!). Hence

Risk = 1/1 000 000 x R1 000 000 = R1

Scratch Card
Say a scratch card costs R1 and the chance of winning is one in a hundred. The probability of losing that R1 is therefore 99 out of a 100 and the risk is

Risk = 99/100 x R1 = R0,99 ~ R1

What can we now conclude from this? Can we say that the risk of the construction accident is the same as that of the scratch card? Clearly this is nonsense, yet the numbers tell us this. We intuitively know that the risk of the construction accident is much higher because of its fatal outcome, but this is hidden from us if we only look at the product of the two numbers. The point in this is that we should be very *careful when looking at risk numbers only* and using these blindly to rank-order risks. In a project with many risks, this can easily happen. The two-dimensional map keeps the two components of risk in view at all times.

In the next article
In Part 2 of this series we will look at the process of project risk management, examine each of the main steps, and consider the relationship between risk and opportunity. Also, we will identify a number of standards and guidelines that are available in the field and provide some useful references.

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