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# Towards an economic analysis of IT outsourcing risks

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## Abstract

*This paper uses a case study to focus on the economic impacts of IT outsourcing risks through price determination. Previous research on IT Outsourcing (ITO) has examined risks from a number of perspectives, invariably from its impact on cost and failure. This paper uses a two dimensional model of buyer and supplier risk to show the relationships between the two related forms of risk in ITO and the determination of prices to resolve the risk.*

**Key Words:**
IT outsourcing, risk, price, economic impact

## INTRODUCTION

Many researchers and authors (Huff, 1991; Willcocks and Fitzgerald, 1994; Clemons, 2000; Currie, 1998) rationalise that economic savings is a principal motivation for outsourcing. There is little argument that costs erode the ultimate goal of profitability. The estimated fees exchanged in the global market in 2001 to implement IT Outsourcing projects was approximately US$140 billion (IDC, 2002). The top one hundred (100) contracts in the five (5) years from 1997 through 2001 were worth approximately US$228 billion (IDC, 2003) and one report predicted that the outsourced IT market would hit US$1 trillion by 2010. Suppliers of IT outsourcing (ITO) services promise to deliver benefits of lower costs, shared benefits of a professionally managed IT function as well as to transfer operational risks away from the organisation that uses these services. Buyers on the other hand are keen to accept these ITO services and are attracted to the value proposition. This paper examines IT outsourcing risk from an economic perspective using case study data.

Such a perspective is important because of the cost implications of outsourcing failure. One recent example of a prominent ITO failure relates to a failed Customer Relationship Management (CRM) software application upgrade that cost a telecommunications company, AT&T Wireless, thousands of new customers and an estimated $100 million in lost revenue (Koch, 2004). “Almost everything that could go wrong, did go wrong with the company's CRM software.” (Orlowski, 2004). Each of the risk elements has an economic impact for both buyers and sellers (Koch, 2004).

There have also been many studies on the risks of IT outsourcing where the outcomes have been quantified either in monetary or economic terms (Aubert et al., 1998; Clemons, 2000; Clemons et al., 2000; Currie, 1998; Lacity and Hirschheim, 1993; 1995; Earl, 1996; Kern and Willcocks, 2001). Few, however, suggest ways where both the buyer and supplier can adopt ‘economic positions’ to reduce the unwanted effects of risk. This paper briefly introduces the Risk Dimension Signature (RDS) (Tho, 2004) as a tool to illustrate risks in an ITO exercise and suggests an economic perspective of hedging the various risks.

## CAUSES AND EFFECTS OF RISK IN THE ITO ENVIRONMENT

Risk in an IT outsourcing (ITO) scenario is "the possibility of loss or injury" (Boehm, 1991, p. 35). Risk in this context also refers the probability of either negative outcomes or factors that lead to the negative outcomes. Levin and Schneider (1997, p. 38) define risks as "… events that, if they occur, represent a material threat to an entity's fortune".
Risks encountered in the outsourcing of the IT function and its effects on the organisation include higher cost levels, degraded service levels and loss of expert resources (Lacity and Hirschheim, 1993; Earl, 1996; Gack, 1994; Huff, 1991).

In an ITO environment, risks are a function of key 'elements' that characterise this exercise including governance, uncertainty, competitive environment and organisational interconnectedness. In an adaptation of the notion introduced by Clemons et al. (2000), risks are a function of multiple possible sources. Here, risk is mathematically depicted by:

***ITO Risk*** = ***fn****(governance, (un)certainty, competitive environment, organisational interconnectedness).*

By implication, risks in the ITO exercise are a direct relationship with a set of causes. In the pre-contract or negotiation phase of an ITO exercise, risks are introduced for example, as effects of an innate inability to monitor partners' actions perfectly. The conditions of an outsourcing contract allow either the supplier or the buyer to behave opportunistically (Quinn and Hilmer, 1994; Lacity and Willcocks, 2001; Kern et al., 2002). The term causality is not used in a rigorous sense of cause and effect, but in a general sense; where there is a plausible relationship between the characteristics of a group or type of risk and the hazard for which an outsourcing activity or task is provided. For example, outsourcing the maintenance of the customer database would not by itself cause loss of privacy or data, but it does bear a reasonable relationship to the risk hazard of operational risk, and, thus, would be a reasonable basis for grouping risks for the outsourcing of the IT function.

The risk typology assists in classifying risks into groups (i.e. categories or dimensions) as a method of quantifying, reducing or simplifying the many risks in any particular outsourcing arrangement. This is not to say that risks are going to be 'boxed' or can be encapsulated into categories, as this would be grossly misleading. The intention, however, is to be able to simplify the understanding of the majority of risks that occur during the different phases of an ITO exercise in order to be able to manage, manipulate and reduce the effects of risks. By classifying risks in specific grouping, a picture risk landscape will be more easily understood.

This framework is illustrated in the diagram below (Figure 1). In this illustration, we assume that the risks in an ITO exercise are caused by a set of risk drivers and result in a set of effects that are experienced within the organisation.

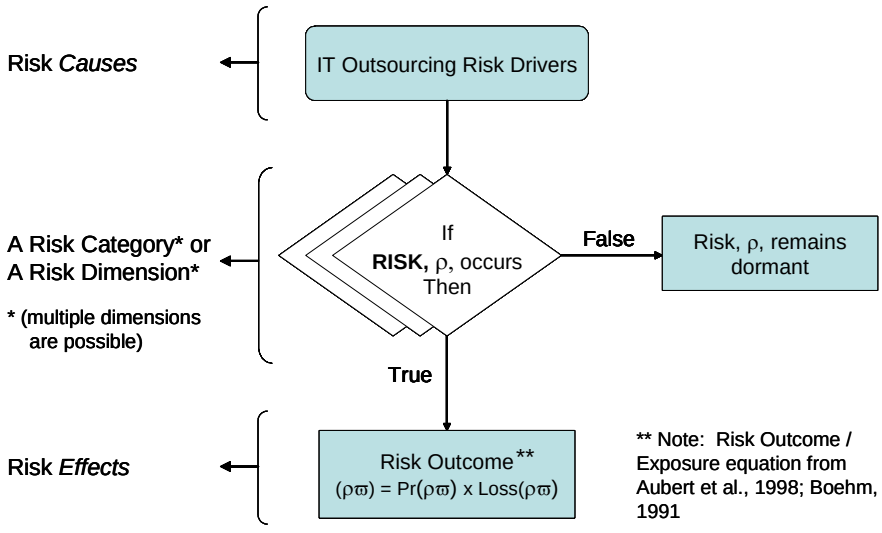


**Figure 1:** Causes and effects of risks in the IT outsourcing exercise (Tho, 2004)

The probability of an event happening whether good or bad is never predictable to any degree of certainty. In fact, uncertainty in the economy, society and politics have made forecasting based on probabilities, quite futile and counterproductive (Drucker, 1995). Drucker refers to very accurate predictions of risk rather than the generalized landscape or environment in which enterprises operate in an outsourcing scenario from causality.

The basic notion of risks in an ITO environment are proposed from ideas developed by Aubert et al. (1998) and Boehm (1991) in the context of a causal reasoning framework. The risk exposure is described as the product of the probability and the magnitude of the undesirable outcome from the relationship described in the equation (Aubert et al., 1998; Boehm, 1991).

RE = Pr(UO) x L(UO),
Where RE is the risk exposure,
Pr(UO) the probability of an undesirable outcome and,
L(UO) the magnitude of loss due to the undesirable outcome.

Considering the variables in the equation above, if the probability (of loss) values were held constant then the risk exposure would be proportional to loss, and vice versa. Practically, however, neither variable (the magnitude of loss or the probability of loss) is constant over a period of time. So, the total risk exposure for the ITO exercise over time is dynamic (i.e. it changes over time). At any point in time, however, it is the sum of all the risk exposure (RE) values for all the risk elements experienced in the project. Over time, the total risk exposure is represented by the following equation.

Total risk exposure = Total (Probability of loss x Magnitude of loss)

$$\sum_{x=0}^{x\to\infty} RiskExposure = \sum_{x=0}^{x\to\infty} \Pr(UO).L(OU)$$

where Pr(UO).L(UO) are the individual risk exposure elements.

## GROUPING RISKS AND THE RISK PROFILE

Estimates of the cost and subsequent price of total risk exposure from estimates of magnitude and probability of risk are typically made through the use of past experience, coupled with projections of future trends, for groups with similar risk characteristics (Earl, 1996). Grouping of risks with similar risk characteristics works to build and maintain an equitable system with prices that determine insurance premiums. This concept of grouping of risks to determine averages and the application of these averages is also used to classify risks in the determination of risks for the outsourcing of the IT function. In Figure 1, these groups of risks are called risk categories or risk dimensions.

A difficulty in grouping risks into categories or dimensions comes from trying to handle issues of "fairness" and "similar risk characteristics". The assumption, based on experience, is that every outsourcing activity, individual, business (even within one industry group), and outsourcing contract is unique and different. This method of grouping risk would be to observe the probability of losses of groups of individual risks with similar risk characteristics. While any individual risk in a given class is no more predictable than it was before the transferring or pooling of the risk occurred, a reasonable price may be established by observing the losses of the group of risks and relating the price to the average experience of the group. Perfect conditions are seldom achieved. The risk characteristics defined here hence reflect both observed fact and informed judgment.

A complementary way to estimate a price for the magnitude of loss is to rely exclusively on heuristics, i.e. experience, insight and judgment concerning the nature of the particular hazard involved and the exposure to loss. This method is not optimal. By defining the uncertainty of an occurrence, its timing and the magnitude of a particular event, albeit in this process with a price peg, it does not make the uncertain known, or needed. By outsourcing the IT function, the organisation assumes the financial uncertainty. It is not able to fix the occurrence or, the magnitude of a specific risk merely because it assumes that risk.

The pricing of risk exposure categories or dimensions removes the limits of individual risks and imposes a generalised price tag on a risk category. With a price tag on risk, it would be easier to make decisions during the process of evaluating options in the outsourcing exercise.

If the various risk groups were to be collected and risk exposure values mathematically summed, it is possible then to illustrate the risk profile of the ITO exercise in the organisation at any one point in time (i.e. at the time when the risk values were obtained) as illustrated in Figure 2 below. The shape of the graphs or risk profiles are a result of the collection of risk exposure values along the eight (8) risk categories are illustrated in this example. Full details of the development of the Risk Dimension Signature are in Tho (2005).

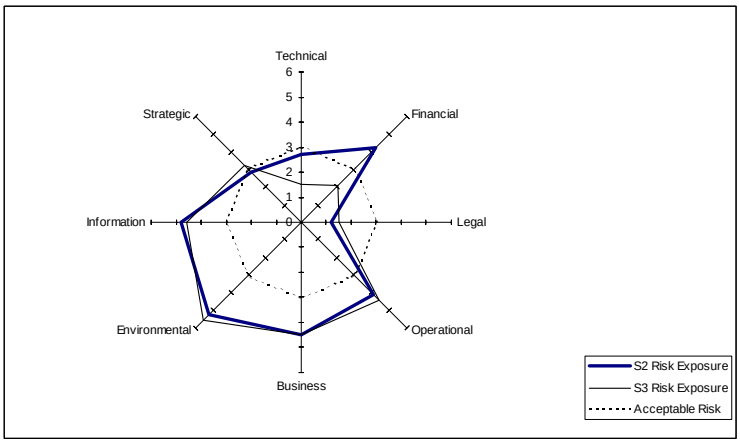


**Figure 2:** Example of the Risk Dimension Signature (Tho, 2005) in an ITO exercise

In this illustration (Figure 2), both the risk profile buyer and supplier organisations have been plotted. The circular dotted line is the level of acceptable risk, arbitrarily measured. Many conclusions can then be derived from the Risk Dimension Signature (RDS) of both contracting organisations. For example, the risk exposure of one exemplar S2 is greater than that of another exemplar S3 along the technical, financial and informational risk dimensions whilst it is lower along the other five (5) dimensions. This allows the contract between the organisations to be constructed taking this into account. It produces a viable basis for price setting for the ITO exercise. Also, it is clear from the RDS that only the risk exposure for the strategic, technical, legal risk dimensions are within limits of 'acceptable risk'. Both organisations will need a plan to mitigate risks along the other dimensions.

**Economic perspective of risk in the ITO exercise**

To test the theoretical aspects of the Risk Dimension Signature, a detailed case study was undertaken in 2002 and 2003 on a major Asian Airline engaged in outsourcing their IT division and processes. The study involved interviews with all major managers at all levels of the company affected by IT systems. Each manager was interviewed on 3 separate occasions over the 2-year period. In each interview they were asked questions about the viability of outsourcing and were also asked to rank the risks that they saw as significant in the outsourcing process. The detailed analysis of this case study is in Tho (2004) and Tho 2005).

The Risk Dimension Signature (RDS) graphically illustrates the risk exposure along each of the risk dimensions at any one point in time. In a recent case study (Tho, 2004, 2005), of an Asian airline, the risk profiles developed indicate increases in risk along selected risk dimensions were balanced by proportional reduction in risk magnitude along the other risk dimensions being studied. For example data collected from the airline show that when there was increased financial and strategic risk from increased financial investment from the airline, approximately equal reduction in risks from the operations and environmental risk was observed. Changes were measured over time at significant points in the IT outsourcing cycle. Extrapolating the rises and falls in risk magnitude from the organisational perspective, the overall risk exposure is retained despite changes made as a result of increased financial investment.

The economic implications of the observations are significant. Given that the information is now known (and visible), risk mitigation along selected dimensions may be actively pursued through an active process of risk management. If the risk exposure along any of the risk dimensions is actively reduced, then the probability of loss and/or the magnitude of loss is lowered. The price is affected. The magnitude of loss is often most easily measured in terms of financial impact. If this lowering of the magnitude of loss may be mathematically illustrated using a simple, theoretical factor, n, then the total risk exposure will be illustrated as follows.

The change (i.e. increase/reduction) in total risk exposure = ***n*** x Total (Probability of loss x Magnitude of loss)

$$\Delta \sum_{x=0}^{x\to\infty} RiskExposure \quad = n \times \sum_{x=0}^{x\to\infty} \Pr(UO).L(OU)$$

where ***n*** is the variable which describes the change in risk exposure.

Increases in risk total risk exposure would mean that the value of ***n*** is positive. Correspondingly, a reduction in risk exposure implies a negative value of ***n***. The increase or reduction of risk exposure against the impact on total risk exposure of the IT outsourcing project, then can create a 'short' or 'long' view for the risk manager to anticipate the activities in the risk management exercise. This becomes a mechanism for prices setting, the fundamental form of exchange value in economics.

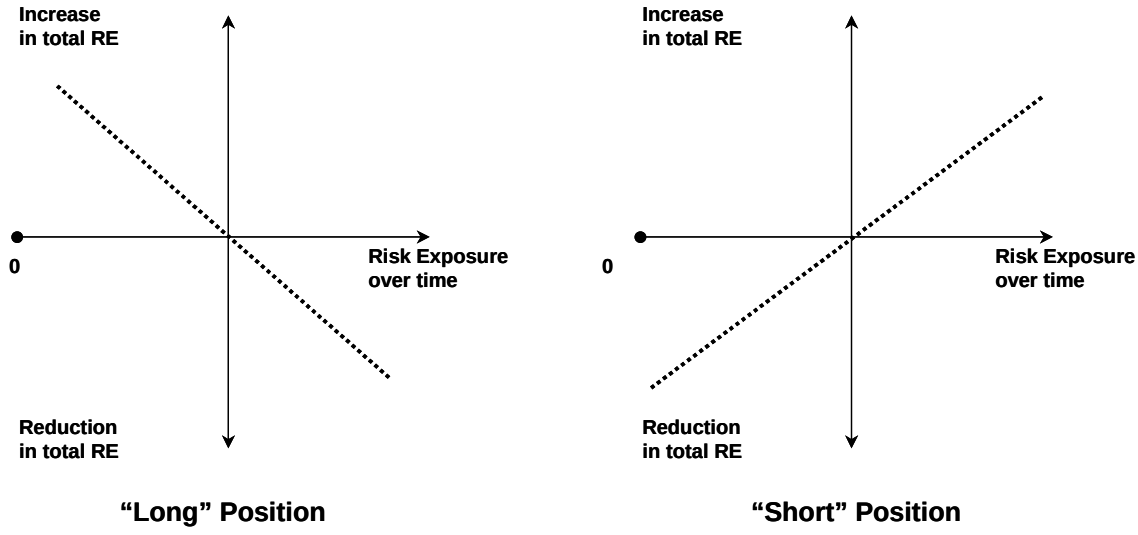


**Figure 3:** Effects of changes in Risk Exposure along a risk dimension providing the "short" and "long" risk management position

From Figure 3, for any value of ***n***, the cumulative value of an improving or deteriorating risk exposure position is observed. A decision on a future position, hence, is made by the managers of this portfolio of risks in this exercise using the combination of the RDS tool and recognition of the trends in the dynamic risk exposure values over time.

In a situation where the value of ***n*** has a set of negative values over time and the total risk exposure is reducing, a 'long' position is recognised. The risk manager will anticipate a favourable risk exposure position along that selected dimension and hence can hedge risks over extended periods. Conversely, where the value of ***n*** has a set of positive values over time and the total risk exposure is increasing, then a "short" position is recognised. In the case study, the airline was able to hedge its position using the Risk Dimension Signature (RDS) tool, along with the establishment of an overall economic position. In this

case, the airline negotiated a price for a short position against its IT outsourcing provider which took a long position for increased, contracted, financial returns.

The establishment of an economic position allows the risk manager to take active steps to manage the situation. One such situation is the economic impact of the risks as they manifest in the ITO exercise. The financial impact on the organisation appears also to be dependent on the duration of the ITO exercise or duration within which the portfolio of risks is held.

## DISCUSSION

The concepts of risks in the ITO exercise discussed above are not new. The notion of a collective risk exposure and a risk position with regards to the behaviour of risks within each dimension, however, may provide additional insight into managing risks in this environment.

Risks are almost always measured and managed by each department including Finance, Management, Personnel (Human Resource), Information Technology and Operations. As a result, there is seldom an organisational perspective of the position taken to hedge risks as an organisation. It has been demonstrated that the total risk exposure of the organisation[1] is constant for a selected ITO exercise over time (Tho, 2004). By implication, a collective view of the risk exposure for the organisation provides an appropriate measurement baseline for measurement of risk exposure. The ITO exercise effects all the departments in the organisation. Risks, it has been shown, also effects all departments in the organisation, albeit in different ways. If the organisational risk profile is measured via the RDS, then action to mitigate the organisational risks can be planned and sets of prices or a single price set. In the case of the airline, the operational risks were balanced with financial and strategic risks and a price equilibrium established.

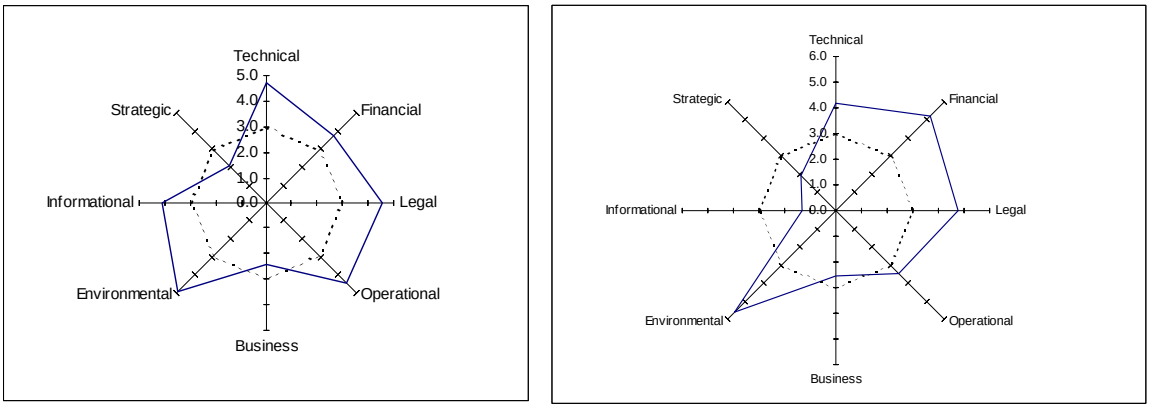


**Figure 4:** Changing risks profile from Point #1 on the left diagram (Prior to ITO) to Point #2 on the right diagram (Commencement of ITO) in the IT Outsourcing exercise

The risk exposure (rounded to the nearest decimal place for consistency with the input data) at Point #1 was computed as **$\Sigma$ Risk Exposure (Buyer @ Pt 1) , rw = 41.1**. The risk exposure computed at point #2 was **$\Sigma$ Risk (Buyer @ Pt 2) = 39.9.** The very similar risk exposure values between points #1 and #2 indicate similar total risk exposure by the airline (ITO buyer) despite changes in the character of the risk profile. For example, the increased financial risk (eg as a result of increased expenditure) has implications of reduced informational, operational risks and technical risks but legal and environmental risks appear to compensate for this difference. The overall economic impact as a result of this exercise therefore has been impacted along the selected dimensions depending on the strategic course or organisational bearing taken.

The RDS tool provides a framework to measure and understand a perspective of risk implications. The overall organisational risk position, that is whether it is 'long' or short', is then appropriately influenced.

[1] Sum of all the risk dimensions across all the departments

Appropriate activities and action items can then be planned to provide additional economic benefit as a result of the risk trends. The RDS tool and the notion of value of ***n*** for the risk exposure trends provide a framework within which this can now be done for the organisation collectively.

Changes in the risk profile of an organisation participating in an ITO exercise are measured using the RDS tool. The relationship between risk dimensions indicates the overall risk exposure reaches equilibrium and stays constant over a period within the ITO exercise (Tho, 2004). With this in mind, a risk position can be taken, a price set and further action can be planned based on a 'long' or 'short' position. This allows the organisation to derive further economic benefit through the appropriate governance measured, and ensuring that the initial agreements that are in place consider its unique deal and risk profile.

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