

# The Methods of Measurement and Analysis of Risks in Businesses: A Case Study on the Jordan Valley Authority

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## Abstract

This research attempted to shed light on the different measures used to evaluate risk. The research examines the Jordan Valley Authority's risk measurements and explores the different procedures and techniques used to evaluate, or avoid (in some cases) risk. The research found that despite the existence of various quantitative methods to measure risk, the standard methodology used by Jordan Valley Authority is based on experience and intuition. Most managers, in this study relied heavily on the manager's experience to handle risk. There are two ways to manage risk. The first is to avoid scenarios that could lead to a risky situation, causing the organization to divert from achieving its goals, and the second deals with reducing the effect of danger (or harm) caused by risk.

**Keywords:** Risk measurement, risk assessment, Entrepreneurship, leadership, entrepreneurial dimension properties, and chances of survival.

## 1. Introduction

The increasing diversity of risks is considered one of the most important challenges facing several organizations, impacting operations and their ability to achieve their objectives. Risks are due to factors, some of which are listed below:

- The rapid change of environmental components (technological, economic, social, and political) where the only constant in business is change (Nonaka, 1991). Furthermore, the faster the change, the riskier it is and the faster the change happens, the higher the risk of failure becomes (Cole, 2002; Condamin, Louisot, & Naïm, 2006).
- Globalization increased competition, forcing companies to take more risks including getting into uncertain markets (like the Internet; Aureli & Salvatori, 2012; Pennathur, 2001; R. Williams et al., 2006).
- Diversity of external and internal sources of risk (environmental, technological, political, legal, financial, etc.; Tchankova, 2002).
- The growing importance of knowledge causing an increase in investment in knowledge resources (Andersen, 2008, p. 162); companies must focus on resolving issues such as lack of knowledge, inadequate knowledge, knowledge obsolescence, theft and counterfeiting knowledge, etc. (Marks, Colemanb, & Michael, 2003).
- The increase in impact of moral obligation as a result of the nonworking employees, especially in business ethics departments (bribes, not disclosing facts, fraud and forgery of documents, etc.).
- Random unexpected factors, such as unknown viruses (software or natural) that are sometimes most influential in the emergence of risk compared to other factors (Dester & Blockly, 2003).

Due to these factors and others, risks threaten almost every organization, forcing them to spend effort, time, and money to better manage it (Gates, Nicolas, & Walker, 2012; Letens, 2008). Risk management helps to provide a range of tools enabling organizations to identify, measure, and address hazards that could have a negative impact on the organization.

The importance of the study of risk analysis emerged due to the high losses organizations experienced. In the year 2005, the United States lost over \$400 billion in the industrial sector around the world (Van Staveren, 2006). In financial markets and banking, experts estimate thousands of billions of dollars incurred by world markets and banks in 2008 as well as 2009 amounting to over \$50 trillion (Asian Development Bank, 2009). In the food industry, the dangers of Chinese milk tainted with melamine led to more than a quarter million children getting poisoned and was the cause of death of dozens in late 2008. Due to this, several organizations, in the early 1990s, emerged to work on establishing standards in risk-management practices in Europe, the United States, Canada, and Australia (Letens, 2008). These organizations also contribute to developing standards that help organizations diagnose and confront risky situations before they happen.

## 2. Research Framework

Business organizations face continuous risks, threatening their survival and growth. Due to risk, companies work to build and develop means to measure, understand, and analyze risks, and thus take proper precautions. Risk can be addressed by answering the following questions:

1. How can we understand and diagnose risks and identify their sources?
2. What are ways to measure and evaluate risks?
3. What are the methods to deal with risks?

## 3. Research Objectives

This research tries to achieve the following objectives:

1. Present and analyze the different concepts related to risk and risk management.
2. Demonstrate the methods used to measure risks, and the advantages and disadvantages of each method.
3. Identify the most important ways to address threats.
4. Research and explore how risk management is conducted by the Jordan Valley Authority as a case study.

## 4. Research Tools

Descriptive analytical research explores theoretical and applied dimensions of risk management as it is conducted through Arabic and foreign sources. This research is applied to a case study to demonstrate the reality of applying risk-management theory in the Jordan Valley Authority.

## 5. Research Limitations

Two research limitations have been identified: The first is the scarcity of Arabic resources to address risk management. I was able to access only one study in the area of financial risk conducted on Islamic banks. Second was a lack of data due to constraints imposed by the organization or the government.

## 6. Risk Concept

The concept of risk varies depending on the sector using it (Hester & Harrison, 1998), as well as the multiplicity of concepts to different components of risk and personal influence in determining the degree of perception of risk and its components (Jones, 2001; Tansey, 1999; S. Williams & Narendran, 1999). Researchers defined the concept of risk in different ways. Here are some definitions: The potential loss of funds between the beginning and the end of the investment period (Warwick, 2003), a collection of unwanted events (Hester & Harrison, 1998), a decline in an organization's total income (Gregoriou, 2006), risk of loss (Horcher, 2005), the possibility of failure of part or all of the system leading to undesirable results (Molak, 1997), the uncertainty of achieving desired results (Keegan, 2004), an event or circumstance that, if occurred, would affect the achievement of the project objectives (Chamban, 2003), and an unexpected loss (Condamine et al., 2006),

Through the various declarations above, it can be inferred that the common denominators have demonstrated that risk-averse event or events likely to occur in the future may lead to the failure of the organization in achieving its goals in part or in full. The difference between risk and problems is that a problem could be the result of risk, whereas risk is a term linked to unexpected events that happened or might happen in the future. Equally important is the extent of damage caused by both, where the damage caused by risk usually outweighs the damage caused by a problem in an organization.

## 7. Risk Types

The first step in creating an effective risk-management system is to understand the qualitative distinctions among the types of risks that organizations face (Kaplan & Mikes, 2012). Researchers classified risk in different ways, (Campbell, 2008) classified risk based on its effect type: Strategic risk, financial risk, operational risk and hazard risk, Malevergne and Sornette (2005) classified risk as measurable or random events, meanwhile, R. Williams et al. (2006) classified risk as measurable unmeasurable components. Regardless of the differences in classification, researchers agree that risk classification helps organizations understand and analyze risks and contributes to the design and implementation of preventive and remedial plans.

## 8. Risk-Management Concepts

Based on the literature, risk management can be defined as: Identifying, analyzing, and assessing the risks associated with the opportunities and threats facing the organization (Campbell, 2008), specific applications aimed at reducing the negative effects of risks caused by different factors such as price fluctuations, accidents, political events, economic events, and problems in the supply chain (Andersen, 2008), a way to deal with the risks in an organization and a tool to link between soft and hard systems (van Staveren, 2006), effective operations that include all activities of an organization to avoid failure (Rosta, 2008), a set of principles and models that help the organization achieve its objectives (Veysey, 2008), a methodology for assessing the risk of unwanted effects due to chemical and physical factors, industrial and technological processes, and natural processes (Molak, 1997),

collecting and documenting data and data interpretation, and communication of risk-management plan (Johnston, 2002, p. 48), and an ongoing process of decision-making that contributes to reducing the effects of risk to a level that preserves the organization through documented external and internal controls (Condamin et al., 2006). Incorporating the definitions above, the concept of risk management can be defined as a systematic approach containing a set of interrelated actions designed to enable organizations to prevent or reduce risk, as well as reduce its negative effects as much as possible.

### **9. Risk-Management Importance**

The importance of risk management lies in the benefits that can be measured, delineated below: Quality improvement and improving business revenues, improving decision-making, planning, and prioritization, increasing resource allocation efficiency, enhancing the organization's ability to predict and reduce potential of failure occurrence resulting in disasters and financial losses, improving the prospects of success for the organization in the implementation of business plans, setting an essential tool for any organization's governance to ensure control to achieve its goals toward optimal use of its resources, and providing preventive measures to address the threat, enabling the organization to design actions to address the threat before it happens (Andersen, 2008; Dickhart, 2008; Jutte, 2008; Saeidi, 2012).

### **10. Reasons for Failure of Risk Management**

Even with the importance of risk management, many organizations still fail for many reasons (Borodzicz, 2005);( Jeynes, 2002). These include lack of expertise in the area of risk management, shortage in monitoring and control systems, unexpected failures in communication systems, failure by employees to recognize the importance of risk management, ignoring the historical development or risk management, and excessive optimism. The causes of failure are related to cognitive factors such as lack of experience or lack of awareness, as well as failure in factors related to communication and control systems. (Banks & Dunn, 2003) suggested that the mechanism of action includes a series of actions the organization should apply to minimize failures in risk management. (Banks & Dunn, 2003) suggested the following:

- Place risk factors in clearly distinguishable categories such as liquidity, market, and creditors.
- Choose a scenario to analyze each risk.
- Calculate the expected amount of profit and loss for each risk scenario.
- Compile the analysis results by sections (organization, department, etc.)
- Compare the results for each risk with the risk-management guide of the organization.
- On a daily basis, ensure the losses for each risk factor do not exceed the maximum.
- Regularly review to ensure risk limits conform to organization guidelines.

Using Banks and Dunn's pointers, it is important for organizations to create a risk-management guide to help train employees on the importance of risk management, as well as how to implement it. The organizational risk-management guide should include several elements:

- The effect of risk on hindering the organization's objectives.
- Ways to determine which risks should be the focus to avoid them or minimize their likelihood and reduce their negative impact on the organization.
- Ensures that the risks of the organization's focus are important for external actors to ensure that third party actors understand how these risks can affect the organization's performance (Banks & Dunn, 2003).

### **11. Measurement and Risk Assessment**

Risk measurement and assessment are the basis for building plans in the face of danger. The aim of this process is to identify and control risk to reduce its impact on the organization (Hester & Harrison, 1998). Measurement and risk assessment are of great importance to organizations as well as to investors and entrepreneurs who will guide decision making in determining the types and volume of investment and short-term and long-term goals (Resnick, 2008). Risk measurement also contributes to providing warning signs. Risk measurement and assessment build on linking between historical data and forecasting tools to formulate possible scenarios that might pose a threat to the organization. There are several quantitative and qualitative tools for measuring and assessing risk (Banks & Dunn, 2003):

### **12. Quantitative Measures**

#### **12.1 Quantitative Risk-Measurement Methods**

**12.1.1 Statistical methods.** Statistical methods contribute to understanding and following up on stages of the emergence of risk. They help in determining the reference point to alert the department of the decision maker early enough for preventive intervention and/or treatment. Each organization, according to the nature of its activities, determines the allowable risk or risk tolerance and the degree to which the risk becomes a threat. The most prominent methods used include statistical distribution of risk, probability, standard deviation, regression, and correlation. Many organizations rely on standard deviation from average past results as a measure of risk (Khan, 2003, p. 28);( Guikema,2008), Statistical standards used to assess the value of risk in the future period or periods depend on the statistical distribution of the historical events and the degree of confidence, which is usually 95% or



99%. To apply this method, a reliable database should be used to identify the points of danger. This database requires a system to record and monitor the risk by comparing a statistical distribution of historical events and the extent of the deviation (plus or minus). The risk-measurement methods and their impact can explain as follows:

**12.1.2 Analytical methods.** These methods do not depend on assumptions of what could happen in the future but focus on what could be gained or lost in a given situation. For example, this method can predict the increase (or decrease) in a certain amount of money in a given specific situation.

**12.1.3 Scenario.** This method uses more of an assumption about market behavior through a series of *what-if* questions, and as a result display every assumption on what will be won or lost based on the scenario. The scenario depth is determined in light of the required size of investment and return.

**12.1.4 Value-At-Risk.** this method includes a set of operations:

1. Determine the stability operations for any type of organization’s assets (cash, bonds, etc).
2. Determine the link matrix (historical relations between liquidity and interest rates, exchange rates, etc.)
3. Determine the period of conversion to liquidity (a day, week, month or period for which the organization considers to be protected from risk)
4. Determine the level of statistical confidence (95% or 99%).
5. Determine the final outcome, e.g.: estimate the size of the portfolio under threat and indicate how much the organization will lose exercising their activities, for example, if the organization has chosen one day and confidence level (99%) (50) million dollars, this means that the organization will not face loss over 50 million dollars for 99 days, this standard is the most widely accepted and applied since the mid-1990s to determine the size of the funds to be put aside to cope with market risk (Rachev, Stoyanov, & Fabozzi, 2008, p. 203).

**12.1.5 The criterion of the greatest loss.** This method benefits low risk takers because it determines the expected loss on the assumption of the worst scenarios and excludes the best scenarios. This method expects losses greater than the value-at-risk method, which takes an average loss of more than one bad scenario.

In addition to these methods, operational-research models for decision making under risk can also be used. These operational-research models enable decision makers to analyze and evaluate alternatives to the resolution under different possibilities, to check environmental conditions surrounding the resolution.

**12.2 Personal Scales**

When the equations to estimate risk fail, organizations rely on experimentation, expertise and intuition. These methods (expertise, experimentation) can also be used in conjunction with quantitative metrics to form an integrated framework for measuring risk as demonstrated in Table 2. In light of the advantages and disadvantages of each method, the proper method is selected based on the risk type and size, as can be seen in Table 3.

**13 Encountering Risks: Risk Matrix**

The risk-control system enables the organization to determine the priorities it needs to emphasize, based on a scale of critical life-threatening risks, less risk embarrassment, or risks that do not pose a clear threat to the organization. A risk matrix, also called the probability and impact matrix (Schwalbe, 2005, p. 158), is an easy tool used to understand and contribute to the organization’s support in the classification of risks in light of the value of each risk and is calculated according to the following relationship:

$$value = danger (risk\ of) X (the\ degree\ of\ severity\ of\ the\ impact\ of\ risk)$$

Table 1: Risk Classification by Priority

Degree of risk assessment	Importance level	Category	Priority
Larger than 35	1	Red	High
35 to 18	2	Yellow	Average
Less than 18	3	Green	Low

Risk force and the impact of severity degree is determined using mathematical methods. In light of the value of risk, risk is categorized into three or five levels according to the scale of the organization to determine the “breaking point.” Evaluating and categorizing risk based on the national system of project management is performed as follows:

1. Select a scale that determines the danger priority in light of the value of each risk. This measure can be determined by each organization depending on the nature of its activities, risk-management policy, and the views of the organization’s stakeholders. A scale between 0 and 9 is used to determine the probability and strength of impact. Then risk is classified as shown in Table 1.

Table 2: Categorizing Risk Based on Chances of Occurrence

Definition	Degree	Priority
The likelihood of danger is greater than 70%	9 to 7	High
Likelihood of risk between 30%–70%	6 to 3	Average
Likelihood of risk is less than 30%	3 to–0	Low

2. A scale based on the possibility risk might occur, shown in Table 2.

Table 3: Impact Type Classification

Impact Type	Low (0–3)	Average (3–6)	High (7–9)
Budget	Less than 25000	100,000 - 25000	Deviation of more than 100,000
Time	Less than 1 month	1–5 months	Delay more than 6 months
Worker safety	Minor injuries	Average injuries	Deaths and serious injuries
System (information, manufacturing, etc.)	Simple failure	Large failure	Total failure

3. A risk rating in light of multiple indicators (financial, time, etc.) associated with the type of threat and the consequences, as described in Table 3.

Table 4: Risk Matrix

	Low probability	Average probability	High probability
Low probability	3 (Green)	2 (Yellow)	2 (Yellow)
Average probability	2 (Yellow)	2 (Yellow)	1 (Red)
High probability	2 (Yellow)	1 (Red)	1 (Red)

4. Configure matrix risk: the risk matrix shows three levels of risk either in degrees by level of importance set by the organization for each level or color as displayed in Table 4, or both. This style can be seen in Table 4.

The risk matrix is used to identify ways to address each risk and prioritize the allocation of resources to meet each risk in the risk-management plan preparation. The matrix determines the most important 5 or 10 threats on which the organization should focus (Banks & Dunn, 2003, p. 86). This matrix is not fixed, and should be reviewed periodically by the interested parties; each risk should be continuously evaluated to ensure that the company is focusing on the most serious ones.

#### 14 Dealing With Risks

Organizations try to use all administrative and technical methods to reduce or prevent any possible negative impacts. These methods vary in quality and quantity, depending on the nature of the organization’s activity as well as the sector in which it operates in. The European Institute proposed a quality management model called 4Ts that defines four entries to address threats (R. Williams et al., 2006,) (Culp, 2004). The 4Ts model included: Terminate risk: Avoid all risk-related activities to avoid the negative effects and reduce the likelihood of occurrence. For example, avoid smoking to prevent smoking-related diseases. Transfer risk: Avoid risk by moving it to a third party to perform the associated activity or use. Tolerate risk: Define the limits of the acceptable risk the organization can sustain by analyzing the historical record and the organization’s policies and standards. Treat risk: Either by preventing risk or placing procedures and therapeutic systems to deal with risks as they occur.



## **15. The Reality of Risk Management in the Jordan Valley Authority**

### **15.1 Jordan Valley Authority Background**

Jordan Valley Authority was founded in 1977 in accordance with Jordan Valley Development Act No. 18 of 1977 and subsequently replaced by Law No. 11 of 1988, bestowing the authority with wide powers to carry out acts of integrated economic and social development in the Jordan Valley area, then designated the area from the northern border of the Kingdom in the north to the northern tip of the Dead Sea to the south and the Jordan River in the west to Yarmouk and AlZarqaa basin areas under the level of 300 m above sea level. The authority's main tasks include the following:

1. Developing and exploiting Valley water resources for irrigated agriculture, household and municipal affairs, industry, power generation, and other useful purposes.
2. Protecting and preserving the area as well as supervising any work related to the development and exploitation of its sources.
3. Performing the proper studies needed to assess water sources including hydrological studies and supervising any geological surveys.
4. Performing any needed drilling to provide new wells and setting up monitoring stations.
5. Studying, designing, implementing, operating, and maintaining irrigation projects.
6. Performing scanning and classifying to identify land for irrigated agriculture and reclamation and dividing it into agricultural units.
7. Developing tourism in the Valley as well as setting aside regions tourists can enjoy.

The Authority enjoys many diverse functions, giving it high importance. Due to its importance, the organization needs to have a proper risk-management plan as a result of the multiple sources of risk affecting the execution of its tasks. Jordan Valley Authority has given attention to risk management in response to the demands of the King Abdullah Award for excellence as a risk-management assessment for organizations in Jordan.

### **15.2 Analysis of the Risk-Management Plan of the Jordan Valley Authority**

Through study and analysis of the risk-management plan described on the website of the Authority (see supplement 1), as well as interviews conducted by paper researchers with the Director of the King Abdullah Award for excellence and a number of functional units, managers note the following:

1. No scale is used to prioritize risk. There is no indication used to categorize risk based on importance or effect.
2. No relationships have been established between risk and its effect on organization objectives.
3. The degree of risk is identified based on meetings conducted by managers without consensus support of quantitative indicators to show the accuracy and objectivity of the risks.
4. Most of the risks described by a formula reflect problems rather than actual risks. Following are two examples:
  - a. Risk Plan 13—corruption and nepotism—a problem becomes a risk if a certain percentage of staff become corrupted or perform nepotism, resulting in a negative effect on organization objectives. This observation can be generalized to most risks.
  - b. Risk Plan 8—increasing demand for water—a problem turns into risk if demand for water reaches a certain level determined by the Water and Electricity Authority's management.
5. Most risk indicators were formulated in a way that does not help in detecting risk, mainly because the indicators are descriptive and too general.
6. Most risk indicators do not show the effect applied to reduce the level of risk or process when it occurs.
7. Responsibility for funding is a risk that is not clearly defined because it involves external and internal actors with no standard specifying the size of the risk.
8. The lack of funding and budgeting for risk management.

### **15.3 Obstacles and Difficulties**

Through the analysis of the risk-management plan and group interviews with the directors of the main power units, researchers were able to highlight the difficulties and constraints faced by risk management in the Jordan Valley Authority:

1. Lack of understanding of risk and its measurement tools, and the inadequate application of some of the risk-management tools in operation.
2. No database for risk to date. There is no fixed database that holds information about possible risks, problems that the organization encountered, or how they were resolved (if they were).
3. Lack of clarity in understanding how to apply the methods needed to address a threat. The small amount of knowledge the organization had about facing threats was implicit in the minds of managers where there is no documentation of these experiences.
4. No clear philosophy for how to deal with risk in Authority departments.



5. Lack of procedural plans to translate the general risk-management plan to describe the roles and responsibilities of each individual before, during, and after the risk became a problem.
6. No section or group responsible for managing risk in preventing and treating plans, and no way to monitor risk-management implementation.

#### 15.4 Discussion

Conceptually, although there are several definitions of risk, they all share the same point: risk is an unexpected and uncertain event that might happen in the future and is counterproductive to the goals of the organization. Risk management is a continuous integrated process of operations aimed at identifying the risk sources and managing them to reduce the risk effect (the negative effects) or eliminate risk all at once. There are various methods of measuring risk depending on the type of risk. Each method has strengths and weaknesses. Because of this, the most effective method to predict risk should be selected, enabling decision makers to identify the sources and help manage or prevent risky transactions.

Despite the existence of various quantitative methods to measure risk, the standard methodology used is based on experience and intuition. The study showed that most managers relied heavily on their experience to handle risk by either trying to avoid scenarios that could lead to a risky situation, causing the organization to divert from achieving its goals.

On the application side, the study provided the following information: Lack of expertise in methods of measuring and evaluating risk were reflected in the inability to prioritize risks and use ambiguous indicators. Risk measurement and assessment were based on personal criteria, either for lack of historical data or inexperience in using quantitative methods. The nonexistence of hierarchy, ownership, or responsibility made it impossible to determine who to warn about risk or who to blame if the organization made the wrong decision, causing it to choose a risky path (or transaction). The organization lacks a procedural plan that describes how to manage risk before, during, and after an event.

#### 15.6 Recommendations

Some of the recommendations made by the study include increasing the interest and support for organizations that manage risk. Mostly due to the fact that avoiding the negative effects of risk may be harmful not only to the organization itself, but to the citizens it services. Increasing interest or awareness can be accomplished through support programs as well as training workshops designed to give employees the knowledge and skills necessary to identify and manage risk. Organizations must build and develop an organizational database that tracks, monitors, and evaluates each process to enable managers to identify and control risk, and to help the organization address any negative effects caused by it.

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Supplement 1

#	Description	Reasons	Possibility	Effect	Degree	Indicators	Preventative measures	Responsibility	
								External	Internal
1	Water-side states not meeting their obligations under signed agreements	Political climate	High	High	High	Water crisis (water shortage)	Sustained follow-up with the water-side States	-Prime minister -The Ministry of foreign affairs -The Ministry of water and irrigation	Joint committees
2	Reduced funding from donor countries	Significant costs for new projects	Average	Average	Average	Non-implementation of new projects	Studies on different projects for funding	-The Ministry of planning -The Ministry of water and irrigation	Planning Department Financial management
3	Reduced financial allocation	Reduce the annual budget	Average	Average	Average	Lack of allocations	Monitoring allocations	The Ministry of finance	Financial management
4	Increased water demand	Increase in population  High frequency investment	Average	Average	Average	Increased demand for irrigation water  Increased allocation of drinking water and industry	Search for new water sources-to run	Prime Minister	Maintenance and Dams



5	Attacks on water sources	Water pollution Water shortage	Average	Average	Average	Increased abuse of water resources	The application of laws and regulations  Increase and intensify control over water sources	-The Ministry of the Interior  -The Ministry of Justice	Operation and maintenance
6	The increase in the rate of infiltration capacity	Low salaries compared with the market  The work environment	High	High	High	Low efficiency	Support the machine efficient expertise  Transparent recruitment policy	The Civil Service Bureau	The Secretary-General
7	Deterioration of relationship with farmers and reluctance to participate in irrigation water management	Reduced staffing  Water quality degradation  The slowness of the procedures for the participation of farmers and water management	High	High	High	Water abuse  The length of preparation of management contracts	Involve farmers in water management effectively  Accelerate the signing of contracts administration	The Ministry of water and irrigation	-Secretary General  -Operation and maintenance
8	Increased demand for drinking water and irrigation water account industry	Increase the volume of investments  Increase in population  (Forced migration)	High	Average	Average	Increase of pumping allocation for drinking quantities of irrigation water allocation	Marginal water quality improvement  And raising the efficiency of purification plants  Finding projects for desalination	Ministry of water and irrigation  Water Authority	Operation and maintenance



9	Natural disasters	Nature	Low	Low	Low	Floods Earthquakes Drought	Putting together a plan in coordination with civil defense and stakeholders	The Ministry of the Interior Civil Defense	Managing Authority Ministry of water and irrigation
10	Separation of the investment unit of Jordan Valley Authority	Water sector restructuring	High	High	High			Prime Ministry of water and irrigation	Power management
11	Upgrading conditions on investors	Laws & regulations Discussion of investment from neighboring States The high cost of development	Average	Average	Average	Review of investment projects	Amending laws and regulations commensurate with the market Finding a mechanism for marketing investment management authority	Ministry of water and irrigation	Prime Ministry
12	Weakness in information technology	Slow in updating software and hardware Slow archive information and competencies	Average	Average	Average	Lack of information Lack of competencies	Set the appropriate competencies Strengthening the infrastructure and increase and update the software and hardware	The Ministry of information technology Central information management	Department of planning
13	Corruption and nepotism	Lack of effective training and development programs and coverage The lack of commitment and transparency in justice sworn and assessment incentives Employment policies	Average	Average	Average	Low rate indicators of employee satisfaction Decrease in indicators of client satisfaction	Audit plan as actual reserves A transparent mechanism to evaluate employees and providing incentives Reduction of interference in the Affairs of the authority	Prime Ministry of public sector development The Civil Service Bureau The anti-corruption Department	Prime Ministry



		cannot be applied due to social factors  Difficulty getting rid of bureaucracy							
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This case study is for a small network solutions company. The company has an annual turnover of \$4.8m and 22 employees. A typical IT employees salary is \$31,000, which is 80% of the turnover. Using the same method the company can calculate the ROI and NPV of another anti-virus solution, and see which of the two is better. Another point to note is that the new protocols expected from ventures that have been probably undertaken, thanks to the countermeasure, are not taken into account in the ROI and NPV calculations.

**Risk Issues.** Table 4: Case study 2: Countermeasure effectiveness (All amounts in thousands of dollars.) Note the disproportionate SPVs obtained which indicate that the loss numbers reported by the organization are overly pessimistic. Case studies are a popular research method in business area. Case studies aim to analyze specific issues within the boundaries of a specific environment, situation or organization. According to its design, case studies in business research can be divided into three categories: explanatory, descriptive and exploratory. Explanatory case studies aim to answer "how" or "why" questions with little control on behalf of researcher over occurrence of events. Advantages of case study method include data collection and analysis within the context of phenomenon, integration of qualitative and quantitative data in data analysis, and the ability to capture complexities of real-life situations so that the phenomenon can be studied in greater levels of depth.