Fayoum University
Faculty of Tourism & Hotels

ECONOMICS OF SUSTAINABLE TOURISM DEVELOPMENT
(THE CASE OF AIR TRANSPORT IN EGYPT)

By

Farouk Abdel-Naby Hassanein Atta-Allah

2008

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Dedication

To my parents, may they live forever.

To my brothers and sisters, the best support for me.

To my wife, my partner in life.

To Norhan, Mohamed, and Abdel Hameed,

the morning breeze of my life.

May God bless them all.

To my faculty which I'm honored to belong to.

To the science of Tourism Industry.

To these all, I dedicate this modest work.

Curriculum Vita

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- **Domestic Tourism in Egypt: Evaluating Study Applied on Fayoum Governorate**, Ministry of Tourism, Cairo, Egypt, 2007.
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CHAPTER ONE

INTRODUCTION

1-1 Introduction to the Problem of Study

Tourism is an economic and social activity which has been accompanied by dramatic events since the end of the 20th century. The extension of tourism activities has been changed and its technologies have resulted in social and environmental impacts, particularly after the Industrial Revolution (smith and Eadington, 1992, P: preface).

Natural environment conservation has become one of the priorities for almost all tourism basic destinations. Managing the environment is a key issue for the quality of human life and economic activities, such as tourism sector. This matter requires improving compatibility with desirable environmental standards and public sensitivity to environmental issues. Also, taking into consideration the concept of environmental friendly projects (Al-Rafei, 2003, p: 43; WWW.WTTC.org, 2006).

In addition, a major problem of social and environmental policy making is the evaluation of negative effects of economic activities on the community and natural environment. Environmental and social impacts could be measured in a variety of ways. For the former: particles per million for air pollution, tons-weight for erosion, decibels for noise pollution, and salination for water. Examples for the later are: costs of medical care for employees; and costs related to citizenship and the relationship with communities, governments, and others. But when it comes to overall appraisal at the decision- making stage, these different impacts can not be directly compared, since they are measured in different units for each of them (Faber *et al.*, 1998, P: 263; George and lee, 2000, P: 111).

Meanwhile business has three issues to face: what it takes, what it makes, and what it wastes. What it takes refers to the material and energy resources that are removed from the earth's ecosystems through mining, extracting, cutting, growing, hunting, and other means. What it makes represents the products of commerce; goods and services that are derived from those resources. What it wastes refers to eco-costs which include: costs to businesses, to customers, and to societies; pollution; and the ongoing destruction of natural systems. The environmental disceconomies are the consequences of taking and making processes. Ignoring the ramifications of taking, making, and wasting leads to unacceptable outcomes (fuller, 1999, pp: 1-2).

So, sustainable development concept is the best economic approach to involve environment (nature, community) and to confront negative impacts of development. Also, it is the concept that will pursue along the 21st century; as being the pioneer approach for all sorts of development including tourism (Holden, 2000, p; 161).

Further more, the water pollution in the 1960s, the air pollution in the 1970s, the forest death and the waste problem in the 1980s, and the depletion of the Ozone layer and climate change in the 1990s, all have lead to creation of environmental economics. Environmental economics as a new field within economics science provides the framework in which economists have added to the economic methods of evaluation for environmental problems. In traditional economics, if a commodity is not traded (has not a market value) it has zero value. Unlike, the environmental economics that is the science of ascribing non-market values and goods can be valuable but have no market value (Faber *et al.*, 1998, PP: 263-264; Bush, 2000 , P: 442).

It has been known that, there is a strong relationship between tourism and transportation. Air transport has been prospected to be one of the most important means of tourism transport in the world (National Specialized Councils,2000,P: 1).

Also, air transport has been characterized by three points: (1) continuing growth; (2) hectic competition; and (3) more affected by political economic, security and environmental problems (Ibid). Future anticipating developments in the air transport operating environment were: (1) open skies, (2) airline alliances and ownership, (3) fare level and airline yields, (4) cost reduction, and (6)environmental issues(Doganis,2002,PP: 11-16).

However, airport activities are one of the main sources for environmental pollution. The increasing of pollution levels was attributed to the high growth of air navigation and the operating of big numbers of huge aircrafts, which create many quantities of fuel emissions. It was said, that these emissions have negative effects on air, Ozone layer, and public health (Eraqi *et al.*, 2002, PP: 308-309).

In spite of technological, operational, and other mitigation measures to minimize the environmental impacts, the growth rates being predicted for air transport, if allowed to take place, will mean that the environmental impacts will increase. This situation resulted in a challenge concerning how to maintain economic and social benefits from air transport and encourage economic development through mobility and yet respond to the increasing environmental pressures (Anne, 2002, P: 229).

The World Travel and Tourism Council reiterated the four propositions set out in its third millennium vision, on how to secure the full economic benefits from development of travel and tourism, as follows (WTTC, 1999, P:15):

1- Make travel and tourism a strategic economic and employment priority.

2- Move towards open and competitive markets.
3- Promoting sustainable development.
4- Eliminating barriers to growth.

In 1999, the WTTC said that air services, both international and domestic are vital to Egyptian tourism, since a approximately two – thirds of all international tourists come to Egypt by air transport (WTTC, 1999, P: 5).

Eraqi *et al.* (2002, PP: 208-325), stated that the challenges confronting air transport in Egypt will be: (1) regional economic agreements and alliances, (2) the GATS and its impacts on air transport, (3) technological changes, and (4) environmental pollution. According to these challenges, Egyptian air transport must be restructured in its public strategies and operating policies for airlines; both national and private.

It was mentioned that the strategy for modernalization of Egyptian Airports, is based on four pillars (Tourism and Aviation Magazine, 2004, P: 10):

1- Modernalization of Cairo International Airport (CIA) No.1 costing 425 Egyptian million pounds divided into two stages: the first was opened 7 June 2003 and the second was opened January 2005. This process included: electricity, sewage, water, and air condition system all over the airport's connected parts.

2- The establishing of terminal building three (TB3) and a new runway at CIA. The costs were determined to be 350 million dollar, and it was expected to be inaugurated in February 2007.

3- Modernalization of other Egyptian Airports, particularly in sharm El-Sheikh Airport, El-Gamil Airport, Asuit Airport, and Hurghada Airport.

4- Establishing the aviation technology and information company.

From the previous argument one can say that there is a necessity for studying the economics of sustainability in the Egyptian Air transport sector.

1-2 Problem of the Study

Shortage in adoption, effectiveness, integration and application of environmental economics to minimize adverse impacts, to make savings, to raise and enhance efficiency of resources, and to capitalize opportunities available for the Egyptian Air Transport Services, to be compatible with the environmental and social challenges, and to survive in the tourism international markets.

1-3 Rationales and Importance of the Study

1-3-1 The study sheds light on one of the most dynamic sectors in Egyptian Tourism Industry; air transport.

1-3-2 The thesis discusses the dimensions of environmental economics, and possibilities for implication of its principles in aviation sector; as a new trend in economics.

1-3-3 The dissertation handles the Cairo International Airport (TB3) and Egypt Air Holding Company. These institutions have the crux importance in the Egyptian Aviation industry.

1-4 Study's Objectives

1-4-1 Analyzing the concept of the total environmental value, its components, and how it could be measured applied to the aviation industry.

1-4-2 Exploring the aspects of economics attributed to sustainability in the performance of the air transport industry.

1-4-3 Evaluating the Egyptian aviation sector using the economics of sustainability standards.

1-5 Hypotheses of Study

1-5-1 There is no adequate estimation of the total environmental value in the feasibility study connected with the TB3 at the Cairo International Airport.

1-5-2 There is negligence for the economics criteria of sustainability in Egypt Air Holding Company.

1-6 Sources of Data

1-6-1 Primary sources

Questionnaires and interviews.

1-6-2 Secondary sources

Books, periodicals, reports, conferences ... etc.

1-7 Limitations of Study

1-7-1 Place Limitations

To measure the total environmental value the study concentrated on the TB3 at the Cairo International Airport. In addition, to measure the criteria and standards of sustainability during operating processes in aviation business, the choice was the Egypt Air Holding Company.

1-7-2 Time Limitation

1-7-2-1 Preparatory phase (Pilot study)

It began in February 2004 and finished in September 2004.

1-7-2-2 Final phase (Formal research)

From October 2004 to January 2007.

1-8 Methodology of Research

The methodology includes qualitative and quantitative methods as follows:

1-8-1 Descriptive and Analytical approach.

1-8-2 Case study method.

1-8-3 Deductive reasoning.

1-8-4 Survey Method.

1-8-5 SPSS program for analyzing data.

1-9 The Study's Structure

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Chapter Two: Review of Literature

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CHAPTER TWO

REVIEW OF LITERATURE

Introduction

Sustainable mobility can be defined in this context "as the ability to meet society's need to move freely, gain access, communicate, trade and establish relationships without sacrificing other essential human or ecological values, today and in the future" (www.atag.org,2006). For airports, integrated environmental design requires early consideration of environmental aspects using computational modeling tools and other assessment methods (www.wspgroup.com, 2006).

Moreover, when terminals and runways are built, their layout is influenced by many factors such as aviation regulations, noise level impacts, terrain and soil considerations, natural and man-mad obstructions, annual weather patterns, the size and performance characteristics of airplanes that will use the runways,...etc(www.airport design, 2004).

This chapter consists of nine sections and broad functional areas: (1) historical background and the anticipated challenges to the aviation in the third millennium, a discussion for an introduction to air transport sector, and the historical origins and the role of air transport in tourism development are displayed; (2) challenges that have been anticipated to confront the aviation sector in the third millennium; (3) airport development; (4) importance of economic valuation for social and environmental issues; (5) components of total environmental value; (6) techniques for measuring economic value of externalities; (7) environmental issues in aviation industry, (8) social issues in aviation industry; and (9) some experiences of sustainability in aviation industry.

2-1 Historical Background on Air Transport and its Importance on Tourism

Air transport is now a big industry. Its origins can be traced back so for as the year 1903. By then the wright Brothers operated the first successful try of aviation in the North Carolina state, USA. The real promotion of the aviation industry was in 1919 just after the First World War (Hanlon, 1999, P: 1; Heider, 1999, PP: 6, 16).

Moreover, the role of air transport in the development of tourism is -likely to be that- providing competitively priced mass transport to both nearby and distant destination and pioneering new destinations, particularly those which the air transport represents the main access to them (Sahulata, 1993, PP: 48, 52). For example, Hawaii Islands in U.S.A; the tourism is the Core economic activity and the number of tourists transported by air is 5-6 million in average and 750 thousand by sea yearly (Eraqi *et al.*, 2002, p: 316).

Besides, the principal roles of scheduled carriers in tourism development are providing regular services and flexibility to bring tourists to a country, contributing to airport development costs, educating and developing the tourism market, and putting new areas of destinations on the map. For instance, tourism development to the Mediterranean resorts of Southern Europe and North Africa coasts, owes to air transport both charters and national carriers, specially to charter flights from Northern European countries (Shireen, 1993, pp: 60-61).

Also, air transport industry for many years achieved more growth than other economic industries and sectors. Like during the period 1960s- mid 1990s, where there was a multiplication of the air transport's revenues by 23 rates with comparison to 3.8 rates for the international revenues then. The fortunes of the world's tourism industry have been based heavily upon those of the transport industry especially commercial aviation (Sahulata, 1993, PP: 48, 52; ICAO, 1997, P: 5).

It was said that the constituent elements of the air transport industry are (Sherman, 1992, P: 7; Mohamed, 2000, PP: 68-69; Kosber, 2004, P: 16):

- The international organizations; such as IATA and ICAO.
- The aircraft; including the two stages of its manufacture and operation.
- The airport; local and international.
- The government regulatory departments or authorities affiliated with civil aviation.
- Air traffic services / control (ATS/ATC).
- Aerospace information technology including: computers, software, and satellite contacts.
- Others entities : suppliers, travel agents and tour operators, cargo companies, customs, and insurance companies

Since the International Civil Aviation Organization (ICAO) had been found according to the Chicago Treaty in 1944, its headquarters is located in Montreal; Canada. ICAO is the United Nations International Agency which is responsible for determination of standards, regulations, and best practices related to aviation business (Sleim and Khir-Eldein, 2001, P: 8). So, the researcher mainly based his study on the ICAO's principles and those of others, particularly the items connected with environmental and social issues.

Literature said that, passenger transportation has been a vital component of tourism system. It provides the critical linkage between origins and destinations. Also between cities and attractions within urban areas and attraction completes (Gunn and Van, 2002, P: 52). However, a major question mark hanging over the aviation industry at the start of the third millennium has been whether the early years will be marked by a cyclical downturn of the industry's fortunes or not. (Doganis, 2002, P: 210).

2-2 Challenges of Aviation Business in the Third Millennium

The market environment for air transport during the first decade of the third millennium was prospective characterized by significant changes both in the regulatory regime and in market structures (Doganis,2002, PP: 10-11).

2-2-1 Liberalization in the World Aviation Business

The most noticeable trend/challenge since the early 1980s has been the gradual liberalization of international air transport. According to Sahulata (1993, pp: 52-53), the far reaching changes are coming about as a result of deregulation and liberalization. Many governments around the world; such as the United States of America, Western Europe and Australia; were removing the strict regulatory regimes for the operations of air carriers, especially government-owned flag ones. Also, many governments have established separate companies, either state owned or private, to run airports and associated aviation infrastructure activities instead of operating them directly as government departments.

Experiences in some countries as the United States of America, France, Singapore and United Kingdom; have showed that the airlines can make profits in the case of absence of monopoly and if there is an obligatory implementing of Hard Rights and Soft Rights existed in GATT's Air Transport Annex. This is the rationale point to adapt procedures towards more liberty in aviation business (Eraqi, 2004, P: 93).

Also, Semer-Purzychi (2001, P: 4), told that deregulation allowed airlines the opportunity to govern all aspects of their commercial dealings. They could establish their own routes and air fares to effectively compete for more passengers. Deregulation, furthermore, permitted hundreds of new airlines to start up the business of transporting passengers and cargo to just about anywhere they wanted to go and at any time.

Undeniably, deregulation and liberalization have brought benefits to passengers and the tourist industry. The most significant areas were: lower fares, more frequent services, more efficient booking and ticketing systems and greater coordination of airline, hotel and other ground arrangements. All of these changes made the task of travel agents easier and simple, and consumers have responded by traveling in greater numbers (Sahulata, 1993, P: 54).

It was mentioned that, the five most important areas of change in air transport attributed to liberalization, have been and continue to be: (1) regional liberalization and bilateral agreements; (2) privatization in air transport sector; (3) multinational airline alliances; (4) open skies agreements, and (5) the GATS (WTTC, 1999, P: 6; Fayed and Westlake, 2002, pp: 437-438; Doganis, 2002, P: 12).

2-2-1-1 Regional Liberalization and Bilateral Agreements

Major changes have taken place in the direction of liberal regional agreements. The most important called "region lateral" agreements, which means agreements between two or more liberalized regions (WTTC, 1999, P: 7).

The bilateral system has governed the international civil aviation since the Chicago convention in 1944. But it was suspected that the increasing pressure for sake of the bilateral system in the third millennium. However, it must be pointed out that for relatively small airlines, the bilateral system provides only protection at this time from being swamped by vastly bigger resources of the mega airlines (Sahulata, 1993, pp: 54-55).

The most principal example of bilateral agreements was in 1946. The two major aviation powers of that time, the USA and the UK, reached an agreement known as "Bermuda 1", which served as a model for all subsequent bilateral agreements at least until the early 1980s (Fayed and Westlake, 2002, P:438).

Furthermore, the ICAO identified six types of provisions that govern the commercial activities of companies within bilateral agreements (ICAO, 1998):

- The right to establish offices or personnel in the territory of the other party.
- The right of a designated company to sell transport services in the currency of the other party or a freely convertible currency.
- The right of a designated company to provide its own ground services in the territory of the other part, or to choose an agent to do so.
- The existence and conditions applicable to CRS services;
- The right to convert or transfer funds; and
- Residual categories.

2-2-1-2 Privatization in Air Transport Sector

There has been an increase in the relationship between air transport and competition rules. This was due to the progress in air transport's operational and organized environment, and the extension of liberated relationships in the air transport sector. The essence of aviation liberalization is the general acceptance principle for market forces that control market entry, fares, and capacity (ACAC, 2000, P: 17).

As a result, Arab League developed a study on legislations and policies of Arab aviation competition. The results pointed out that there have been monopolistic policies in Arab air transport market. The Arab Civil Aviation Council (ACAC) has established a program for liberalization of Arab aviation of air services restrictions and discrimination and the proper free competition (ACAC, 2000, P: 19).

Sahulata (1993, PP: 53-54), argued that privatization has become available strategy to pursue in this highly competitive environment and adopted by an increasing number of governments in the world. Generally, it allows carriers' access to the capital resources necessary to build up fleets, upgrade computer reservation systems and other services.

Additionally, most of countries have privatized their airlines. This has been by selling some of the national carriers' shares and admission to restructure their activities. The move from government to private ownership had been one of the most radical changes (El-Merghany, 1997, P: 47).

Also, Policies designed to protect the profitability of an airline have become less important when the government was no longer the sale or major shareholder (WTTC, 1999, P: 6). More than 70% of airline companies till 2002, had a majority of private capital. The classic model of the state owned carrier (flag carrier) has increasingly been rare (UNCTAD, 1998).

It can be argued that the advantages of a privatized airport are (Shearman, 1992, P: 165):

- It is likely to increase the degree of commercialism in its decision making.
- Avoiding government expenditure constraints.

The following are options on the ownership and management of airport (ICAO, 2000, P: 8-9):

- Government ownership, with either direct control over management or through an autonomous entity.
- Management contracts which are not a very popular method of private participation.
- Leases, including build, operate and transfer (BOT), and its derivatives. Leases or concessions are quite common in Australia, Canada, Central and South America, and West Africa.
- Private sector minority participation in equity. This has taken place through either the sale of shares to a strategic partner or flotation of shares. Examples are at Kansai Airport in Japan, Kachi Airport in India, Beijing Airport in China, South African Airports, and European Airports.
- Private sector ownership and control, including majority or full ownership in equity and outright sale. This category included seven airports managed by BAA plc in the United Kingdom, smaller airports in Canada, the main airports at Auckland and Wellington in New Zealand, and Macav airport in China.

It was suspected that, the first decade of the third millennium will see the complete transformation in the airline industry from a protected, nationally owned industry into a true multinational business operating freely a cross frontiers (Doganis, 2002, P:12).

2-2-1-3 Multinational Airline Alliances

Fierce competition in aviation business has led airline to join into multilateral alliances in marketing and operation fields (Eraqi, 2001, PP: 124-125). Alliances are a way of circumventing restrictive national regulations. Also the effective competition between the major alliances will play an important role in aviation liberalization (WTTC, 1999, P: 7).

The advantages or objectives of alliances are: having benefits from size and scope's economics; reducing of the operation's costs by using of shared information technologies; overcoming critical functional constraints; legitimizing new products; obtaining a reliable source of funding; and stabilizing the competitive landscape (Allio and Dekar, 1994, P:59 ; Eraqi, 2001, PP:124-125).

There are three cases of alliances in aviation industry (shearman, 1992, P: 119; Doganis, 2002, P: 12; Fayed and Westlake, 2002, PP: 441-442):

- Horizontal Alliances

Horizontal alliances are those between firms that sell the same product or service. Such as pooling agreements, whereby the revenue earned by carriers operating a particular route is shared in accordance with a specific formula.

- Vertical Alliances

Vertical alliances are those with suppliers, distributors or buyers. Like collaborative arrangements between carriers and hotels, cars hire firms, travel agents and other companies involved in travel and tourism.

- External Alliances (Diversification Alliances)

External alliances are drawn up with potential entrants or with the procedures of substitutes or complements in other industries. Instances are joint ventures on marketing promotion such as special offers on fares, relationship marketing and telephone calling cards.

It was said that the most paramount airline alliances in the world have been Star Alliance, One World Alliance, Qualiflyer Alliance, Sky Team Alliance, Wings Alliance (Kotaite, 2002; www.travelmole.com).

2-2-1-4 Open Skies Agreement

In addition, the open skies policy bases on the principle of equality for aviation's freedoms on all over airways; flexibility of air fares policies; cancellation for limits on operating aircraft's capacities, flights and passenger numbers, air cargo, and charter aviation and liberty of money and revenues' transfer. Such as the agreement between the |United States of America and Canada in 1994. The result was the increase in traffic movement rates by 30% and the decrease in air fares by 10% (Eraqi, 2001, P: 125).

The United States has produced a standard open skies agreement and offered it to all countries willing to accept its terms. The standard agreement gives free access to all cities in each country, with no restrictions on capacity or frequency of services, and it eliminates all controls on pricing, except those applicable to other industries (WTTC, 1999, P: 7). The analysis of open skies agreements clears the pioneer role of the USA, and its effect on worldwide countries.

2-2-1-5 The GATS and its Impact on Airline Industry

The air transport services are covered only in small part by the GATS. The World Bank (1998a) pointed out three issues that have been covered in the GATS as follows:

- Aircraft repair and maintenance services (but not line maintenance).
- The selling and marketing of air transport services.
- The computer reservation system (CRS).

Till 2002, 33 countries made commitments in maintenance and repair, 26 countries in sales and marketing, and 23 countries in computer reservation systems. For the application of the MFN (Most Favored Nation) principle, 28 countries took exemptions connecting with at least one of the three types of services proposed by the agreement. Most of these exemptions related to CRS and the sale and marketing services (Fayed and Westlake, 2002, P: 447).

The literature on liberalization mentioned in the study illustrates the entire weakness affiliated to air transport system in the Arab countries concerning all forms of liberalization (regional or bilateral agreements, privatization, multinational alliances, open skies agreements, and the GATS agreement).

It was said that a combination of market imperfections and previous official policies in the transport sphere, including liberalization policies, have resulted in excessive environmental degradation. The reaction at both local and global levels has been a trend for increasingly tight controls; e.g. through regulations and use of economic instruments in the way transport impinges on the environment. Inevitably, this will have implications on the price of air transport. This will affect it directly as restrictions are imposed on aircraft operators and the aircraft design, and will also affect air transport through its impacts on competing and complementary modes of transport (OECD, 1997, P: 47).

Arguing about environmental issues and economies and diseconomies of air aviation, is the crux challenge facing air transport industry in the third millennium. In the following last part of this chapter, it will be impetuous or quick discussion of this challenge. In the rest chapters of the study will be more details; since the economics of sustainable tourism is the core of this current dissertation.

2-2-2 Good externalities and bad externalities in the Aviation Industry

Tourism is not only an important component of international commerce, but also an increasingly important aspect of the quality of life of the citizen (Belgian Euro Presidency, 2001, P: 1).

Also, the growth demand for air transport as a principal sector of tourism has had significant economic and environmental consequences for both the airline and airport industries (Anne, 2002, PP: 1, 6).

There are many sources of revenues for an airline: ticketing, catering on its flights and on flights of others, ground services for other airlines ... etc. The most implicit instance is airport gates. They are the airport spaces that are mostly leased to airlines by airport authorities for airlines to load and unload passengers. Gates can be available asset for an airline. Depending upon the airport owner, gates can be subleased to other airlines. Another basic implicit example is slot. The term referring to the space of time during which a plane lands, remains at a gate, and departs. Gates and slots can give an airline a predominant position at an airport (Lundberg *et al.* , 1995 , P: 108).

A critical trend in recent years, the last years of 20th century and the first years of 21st century, has been the gradual but steady decline in the real value of airline yields, which is measured by the average revenue produced per passenger-kilometer or tonne-kilometre. Several factors which have caused this result including (Doganis, 2002, P: 9):

- The liberalization which has spread over more routes reduced or removed both capacity and price controls.
- New airlines emerged to compete with established carriers, by reducing fares only to capture market shares and increased frequencies of flights.

- The ever-growing proportion of passengers which are traveling on reduced or discounted fares.

The previous speech referred to disadvantages of liberalization on airline business, however, the advantages it has had. Also negatives impacts of liberalization have been appeared in environmental externalities of aviation, which form main section in discussion of the thesis.

The cost reduction connected with airline operations has become a continuous and long-term necessity for financial success. These costs mainly include: fixed costs as depreciation, obsolescence, interest, insurance, engineering overheads (e.g. engineering base), flying crew administration, and all ground costs; and variable costs such as fuel and oil, direct engineering costs (e.g. overhauls), landing fees, passenger meals, and attendance (Burkart and Medlik, 1988, PP: 120-121).

A distinction may be made also between costs associated with cruising performance and those associated with landing and taking off. Such as the distinguishing between the short-haul operation and the long-haul, where the ratio of time on the ground (non-revenue –earning time) to flying time is higher in the first than in the second (Burkart and Medlik , 1988, PP : 120-121).

Direct operating costs (DOCs), such as landing fees or trip fuel can easily be saved, by canceling services. But indirect operating costs (IOCs), such as maintenance staff or pilots' salary costs may be difficult to shed due to conditions of employment; like long-term contracts or "no redundancy" agreements. Overhead costs such as head office management or owned property may take the company even longer to shed (Shearman, 1992, P: 116).

For airport revenues, there are a variety of sources which return monetary value at airports. The following items have been the most popular examples (Ragab, 2004, PP: 107-109):

1- Air Traffic or Movement Operations

- Landing charges; relating to utilization of tarmacs, taxiways, aprons including their lighting, and monitoring of the airplanes approach system.
- Passenger charges; they are mainly based on the passenger related services.
- Cargo charges; all fees that concern handling of cargo items.
- Security fees; for safety of passengers, employees, airplanes...etc.
- Noise charges; that are directed to the acoustic pollution at airports.
- Ground service charges; collected from airlines for using the airport facilities and utilities.

2- Subordinate Activities

- Franchise right fees of petroleum companies in return for their work at airports providing airplanes with fuel.
- Fees of commercial institutions and entities in exchange for operating restaurants, bar rooms, and cafeterias.

- Charges related to the right of operating free shops inside and outside the airports.
- Monetary sums paid for the right of operating car parks at airports.
- The value of lease to use places or entities owned by an airport.
- The revenues of airport deposits at banks and other money
- Handling companies.

The environmental issues have posed a further and potentially an even greater threat to the airline industry. If during the first decade of the third millennium the multinational agreements are reached on this issue, the consequences for airline costs will clearly be adverse (Doganis, 2002, P: 16).

So, there have been many advocators of taking environmental externalities into consideration, and adopting principles of sustainable tourism development in aviation industry.

Responses were and still many, but the Agenda 21 and its transport priorities areas is the most important or principal of all, with the interest in air transport sector.

Transport is a central part of Agenda 21's program to achieve sustainable patterns of consumption. To reduce or control harmful emissions into the atmosphere, and other environmental effects of transport, transport companies should (WTTC *et al*, 1997, PP: 63-64):

- Use well maintained and modern transport technology; particularly for airlines.
- Help developing countries to acquire relevant technological skills and equipment.
- Develop and manage car share, cycle, or walk to work schemes for employees.
- Provide information to customers to help them use public transport, cycle ways or footpaths.
- Work with planning authorities to ensure that coach stops and other drop off points are well located.
- Work with suppliers to ensure that purchases are not delivered at peak times, congestion does not contribute to emissions and that deliveries are fully loaded.
- Work with local businesses to purchase supplies locally whenever possible.
- Work with governments to implement measures to reduce congestion and hence pollution; particularly to air transport sector.
- Work with governments to integrate transport modes.
- Operate demand management to reduce the need for polluting modes of transport.

Concerning to air transport as an outstanding sector of transport, there have been much of efforts attributed to environmental and social issues. The study points out two of them as expressed in the following lines.

The International Air Transport Association delineated five principles of air transport in its position paper "wings for the future", that were expressed in the following elements (Kotaite, 2000, P:8):

- The first principle is related to safety and security oversight, which is endorsed by ICAO in its worldwide Air Transport Conference in year 1994.
- The second goes to adequate infrastructure available on a non-discriminatory basis to meet the public's demand for services.
- The third concerned to continued availability of the multinational interline system.
- The fourth is attributed to environmental protection issues, such as aircraft noise and emissions.
- The fifth call for industry mechanisms is to improve business efficiency. For example, developing guiding material on such issues as code sharing and CRS.

The environmental and social issues, and security and safety ones, were two main pillars of the conference above mentioned. But for the recommendations of OECD in 1997 cited in the following lines, these issues were the core of them.

The two of the OECD recommendations for international air transport have been summarized as follows (OECD, 1997, P: 22):

- Effective policies should be developed to foster environmental protection to the extent that the resulting benefits outweigh any adverse implications for airline operations.

- International harmonization of environmental and safety standards in the field of air transport should be further encouraged, in particular under the auspices of ICAO.

2-3 Airport Development

Airports are an essential part of the air transport system. They provide all the infrastructure needed to enable passengers and freight to transfer from surface to air modes of transport and to allow airplanes to take off and land (Anne, 2002, p: 1). Besides, the airports represent a crux sector in progress of a society and achievement of goals attributed to economic, social, cultural, and tourist developments (Kosber, 2004, p: 16).

For the investment of an airport development, it is usually made (Lawson and Baud-Bovy, 1998, p: 274):

- By public authorities.
- By the private sector with subsidized infrastructure and other development gains to offset costs.
- By individual airlines in terminal buildings.

Also, the basic airport infrastructure includes three main parts (Anne, 2002, p: 6; kosber, 2004, p: 16):

- Airside area

The part of the airport that is used by aircrafts during their movement and standing on ground. This section consists of the runways; taxiways; direct ground service areas such as maintenance workshops, fuel provision station; cargo loading ... etc.

- Terminal area

This department provides a variety of services such as tickets counters, tourist companies' bureaus, passports, customs, health treatment, banks, post offices, and commercial activities.

- Landside area

This part consists of parks for different types of vehicles, airport entrances and gates, hotels and so on.

Literature said, that there are many types of airports (www.cyberairport.com):

- The large international airports with planes flying to all parts of the world.
- The commuter airport with flights to regional destinations.
- The general aviation airports that are primarily for private pilots with small planes who fly for business or fun.

Ez-Eldin (2001, pp: 406–411), provided another classification for airports, based on the aviation activity and need.. of countries. It is divided into four main types as the following display:

- Private aviation airports

This section includes airports and air harbors. Business men are the segment of customers that use this sort of airports.

- Industrial purposes aviation airports

The location of these airports often is near industrial zones, big factories, petroleum wells ...etc.

- Scheduled and charter flights airports

This type may be classified into three sub sections: airports for limited local flights, airports that serve quick domestic flights and have runways with 6000 to 10000 feet, and the third is airports for international flights that have runways not less than 10000 feet.

- Military airports

This segment is affiliated with military services. There is no specifically legal size for them.

Moreover, international airports require vast areas of land for the runway and terminal areas ranging from restricted sites, e.g. Heathrow Airport– 1100 ha and Schiphol Airport– 1700 ha , to purposely designed, e.g. Charles de Gaulle– 3000 ha and Dallan/ Fort Worth– 7000 ha (Lawson and Baud–Bovy, 1998 , p: 274).

From what has been mentioned above for types of airports, it may be said that there is a semi agreement about the distance of runways at the international airports.

In addition, public opposition and the high cost of land and infrastructure in suburban areas pointed to three main types of airport development, to meet future traffic demands (Lawson and Baud–Bovy, 1998, p: 274):

- Addition of new terminals, replacement and extension of existing airports.
- Investment in new regional airports servicing remote developing tourist regions.
- Creation of new coastal airports which may also be integrated with harbor developments.

Shedding light on suggestions for future airport developments, it could be seen that Egypt is nearly keeping in touch with them. Examples are the coastal airports such as Marsa Alam Airport, and Terminal Building Three (TB3) at Cairo International Airport; which is a model for airport extension and the case study of this dissertation as well.

Inevitably airports create wide – ranging and irreversible impacts such as (Lawson and Baud–Bovy, 1998, p: 275):

1- Economic

- Generation of revenue and employment.
- Stimulation of tourism development in regions.
- Facilitation of business travel, meetings and exhibitions through convenient access, and on – site hotel development.

2- Environment

- Large – scale changes in land use because of rapid development of terminals and associated buildings on and off site.
- Massive investment in infrastructure, plant, and services.
- Increased noise climates, pollution, and disturbance that may be ameliorated to some degree by regulating flight paths, night flights and aircraft emissions.
- Continuing pressure for progressive urbanization of surroundings.

Consequently, there is importance to consider reasonable alternatives to the new proposed airport developments, including "no action" alternative. Also the crux element related to evaluation of impacts resulting from these developments to human environment. The human environment includes the physical (e.g. geology and soil hydrology); the biological (e.g. vegetation, wetlands, wildlife, and fish); and the human (e.g. socioeconomics, land use, noise, visual, and subsistence) components (www.dot.state.ak.us).

The (IATA) International Air Transport Association's vision statement on airport development, is to take a leadership role in influencing airport planning and development worldwide in order to achieve safe and efficient, capacity balanced, cost–effective, functional, and user–friendly airports (www.IATA.org, 2005).

2-4 Importance of Economic Valuation for Social and Environmental Issues

This section provides details about introductory explanation for environmental economics; externalities concept, their prediction, the methodology of their internalizing in an institution's operation, challenges of their evaluation, and determination of benefits and importance of adding economic value on externalities.

2-4-1 Introductory Explanation for Environmental Economics

Distinction needs to be made between economic development; the improvement of the well – being of the population, and economic growth; the increase in the size of the country's economy. It was argued that development can be achieved through improved education, improved health care, and individual empowerment. Unlike, growth requires exploiting natural resources for industrial and agricultural expansion. By definition, economic growth will progressively leave fewer natural resources. Thus, while economic development can be sustainable, economic growth can not (Bush, 2000, pp: 438 – 439).

Production of goods often results in the creation of by–products or waste materials of no value to the producer. The by–products that have no value in the costs of production are termed externalities. These adverse products are particularly appeared in the governmental resources, which are rarely allocated through the market place (Smith, 1994, p: 245).

It was said that traditional economic theory deals only with commodities that have a price; which brings us to the concept of market value. Examples are: a house, an apple, etc. There are many goods that have no price, yet are prized. Instances for goods without a market price are religious and political freedom, happiness and others. Where a good has a worth but not a price, it represents a non-market value. Many environmental qualities such as, clean air, wilderness, and biodiversity need to be treated as non-market values (Bush, 2000, pp: 429–435).

Meanwhile, decentralized and profit-maximizing agents of free markets seldom appreciate the meaning and the value of sustainability. As a result, it has become essential to restructure the operational logic of market forces in line with requirements of sustainability, otherwise, it is impossible to escape from the somber omens of the dooms day model (Moon, 2000, p: 169).

Literature said that, sustainable development has become a popular and yet ambiguous term. It is used with meanings all the may from recycling waste and reduction of energy consumption, to the prevention of human impacts on natural and cultural resources. Sustainable development is not a fixed state of equilibrium, but rather a process undergoing continual change in which the use of resources, the type of investment, the direction of technological development, and the institutional change are in harmony with both today's needs and those of tomorrow (Aronsson, 2000, p: 16 ; Gunn and Van, 2002, p: 80).

McIntyre (1993, p: 10), pointed to three main principles of sustainable development and sustainable tourism being a model form of economic development. These are expressed as follows:

- Ecological sustainability; the development is compatible with the maintenance of essential ecological processes, biological diversity, and biological resources;
- Social and cultural sustainability; the development increases people's control over their lives, taking into consideration the culture and values of people affected by it, and maintains and strengthens community identity; and
- Economic sustainability; the development is economically efficient and resources are managed, so that they can support future generations.

According to the conference that was held in Vancouver; Canada, one of the main challenges that face sustainable development, has been incorporating environmental costs and benefiting from the environmental market (Gunn and Var, 2002, p: 84). If we are to establish the cost of damaging a wilderness or a beautiful scene, we need to determine how much it was worth in its pristine state, or in economic terms, what are the benefits of zero disturbances? (Bush, 2000, p: 430).

It was argued that, externalities should be included within the main economic model and economics becomes a more powerful predictive tool. The broader discipline that fuses ecology, environmental science, and economics has become known as environmental economics (Ibid, p: 427).

Dealing with externalities will be postponed to the sub-section 3-2-2. In the following lines, the study continues to provide more details a bout the concept of environmental economics.

Looking into relation between the economic activities and the environmental pollution, it has three dimensions (El–Sheikh, 2002, p: 38):

- The relation between these activities and their ruins.
- The significant environmental changes as a result of these ruins.
- The social cost related to the environmental through analysis.

In privatization, mergers, and acquisitions a through analysis of the financial risks involved, is vital at the success of these transactions. To this and, the assessment and management of risks associated with environmental costs and liabilities is of fundamental importance (Hassan, 2000, p: 5).

As a result, it is principal to demonstrate the economic value of environmental assets in their existing forms as accurately as possible. Cairn cross in 1991 stated that, "In a world where a money talk, the environment needs value to give it a voice ", (Holden, 2000, p: 119).

Faber *et al.* (1998, pp: 265–266), clarified the illusion of things, saying that the gap between economic and ecological evaluation may be bridged by the theory of joint production. From the ecological perspective, polluting wastes such as solid, liquid, or gases are necessary joint products of manufactured goods. This suggests that the ideal of "Surgical Intervention ", affecting only one section of the economy (e.g. environment system), is not possible

Undeniably, economics can help implement sustainability by classifying issues and, within limits, evaluating policy alternatives for goal implementation (Chapman, 2000, p: 394). During 1970s and 1980s, environmental and resource economists have been able to derive methods to enable sustainable development to be applied to the whole economy (Faber *et al.*, 1998, p: 81).

Moreover, many countries of Western Europe, Canada, and the United States of America, have started to develop an accounting procedure to produce a revised set of national accounts such as the Gross Domestic Product (GDP). These alternative estimates of national finances are called satellite accounts. One such set of accounts is the Index of Sustainable Economic Welfare (ISEW), which takes into account costs of pollution, depreciation of natural assets, loss of ecosystems, and other factors that contribute to or detract from our well–being (Bush, 2000, p: 440).

Regarding the operational level, there are two examples of economic policies that could create healthier environment for sustainable enterprise; as illustrated in following lines (Bassett *et al.*, 1998, p: 20):

- Subsidy reform

Redesign or eliminate federal subsidies that fail to incorporate the economic value of natural, environmental, and social resources into the market place and governmental policies.

- Revenue–neutral tax shift

It is important to shift taxes away from activities that promote economic progress (such as work, savings, and investment), towards activities that lead to excessive environmental damage.

Furthermore, economic valuations of travel and tourist choices are a useful mean of informing conservation and management of tourist destinations (Greiner, 2004, p: 319). Environmental economics reflects the right balance between sustainability, environmental resource use, environmental protection, and material living standards. It studies society and the natural environment as a single system. It treats both the short–term need for jobs and the long-term need to protect the environment, as goals of sustainable development (Chapman, 2000, p: 42; Schoch and Mckinney, 2003, p: 478).

Besides, environmental economics is a policy field that explores how the economy can be made consistent with natural laws, rules, and limitations. It involves policies such as tax reform, product stewardship, and incentives that encourage economic systems to behave more like ecological systems (Bassett *et al.*, 1998, p: 20).

Scanning the previous display connected with the concept of environmental economics, it could be said that this branch of economics, primarily, seeks to internalize the externalities of economic activities. Aspects and dimensions of externalities will be explained in the following sub-section.

2-4-2 Externalities (concept, prediction, methodology of internalizing, challenges of evaluation, and benefits of economic valuation)

There are many tries and efforts that have shed light on the concept of externalities. According to Eraqi (1992, p: 46), the investment in transport field may result in one of the following externalities:

- Economies

These are illustrated in some of profits gained by local citizens and welfare of the surrounding community. Examples are: increase in housing choices, flexible access to markets and recreation sites, and liberty in choosing the type of work and its place.

- Diseconomies

External diseconomies represent additional costs that the local society will bear as a result of a new investment in transport sector. Congestion, accidents, noise and pollution are popular types of diseconomies.

British Ministry of Transport (MOT, 1999), mentioned that externalities arise where activities of some firms or individuals affect welfare of others, without former consideration of these effects in their decisions. Typically, the lack of well-defined property rights is the underlying cause of the externality problem, because it prevents existence of a market value for external effects. Therefore, it is necessary to establish a price mechanism, to ensure that damage to society is taken into account.

Holden (2000, p: 113), stated that externalities arise because many environmental goods, such as clean air, water and landscapes, can be classified as public goods, sharing characteristics of collective consumption and non– exclusion. Collective consumption means that consumption of the good by one person does not diminish the amount consumed by another person. Non-exclusion means that one person could not exclude another from consuming the resource and no price can be charged for it.

Ismael *et al.* (2000, p: 388), defined external costs like "Harms and costs attributed to environmental pollution, which are measured by reduction in environmental quality perspectives, and they are resulted from the use of others for particular resources".

Schoch and Mckinney (2003, p: 481), pointed out that, externalities are some costs of production that are not included in the price of the product. With externalities, society, in general pays a cost that should be paid by the producer and consumer of the product.

To look into former concepts of externalities mentioned above, we can reach to the following remarks:

Some of definitions stated two types of external effects (positive and negative), while the others focused on the negative side expressed in environmental costs.

- All concepts or theoretical efforts of external effects discover existence of market failure in operating market economics.
- Positive external impacts of an investment participate in the total environmental and social prosperity. On the other hand, negative external effects pressure environmental and social welfare in a negative manner. The final impact of a prospective project should be, consequently, estimated through the operation of positive minus negative values.
- Importance of adding a price or value on damage or adverse impacts on society. This point represents the initiative to the current dissertation. In the case of aviation, such a mechanism would be used to ensure that air carriers and air passengers have taken an implicit account of costs to residents affected by aircraft noise and emissions. Also, environmental impacts related to airport capacity such as biodiversity, heritage, and water.

Prediction and evaluation of externalities should be based on a sound methodological framework. George and lee (2000, p: 86), stated its basic steps as follows:

1- Define the baseline environment in the current case.

2- Determine future changes to the baseline in absence of the action.

3- Define the action in sufficient details to understand its consequences.

4- Identify likely significant impacts of the action.

5- Predict magnitude of each impact, with sufficient precision to evaluate its significance.

6- Define mitigation measures to reduce significance.

7- Predict magnitude of residual impacts.

8- Evaluate significance of residual impacts.

Additionally, there are many types of prediction techniques: past experience, numerical calculations or models, experiments or tests, physical or visual simulations and maps, and professional judgment (Ibid, p: 88). The researcher depended on most of these prediction mechanisms in its current study, particularly past experiences and numerical calculations and models.

According to Fayed (1994, pp: 134–135), there are two stages to evaluate externalities belonged to transport, as it is illustrated in the following items:

First stage

It begins with determining losses and giving them monetary value and their preventative cost as well. This is because pollution costs are never is seen in basic costs of enterprises.

Second stage

In this stage, there is placement cost of externalities on polluter. There are two methods to do this. The first is obligation for polluter to use preventative and/or recovery procedures such as filters. This procedure creates a new cost; namely pollution costs. The second method is forcing compulsory taxes and charges on passengers. This action may lead to raise costs of transport and more burdens on passengers.

To internalize environmental costs, it should begin with determining what those costs are. Schock and Mckinney (2003, p: 483), specified four main costs which influence and complicate calculation of overall environmental costs of an activity. They are mentioned in the following items:

1- Intangible costs

These include destruction of scenery and other subjective costs that are very difficult to be measured, because people place different values on them. For example, the wilderness landscape.

2- Hidden costs

Which are environmental degradations that we are unaware of? For instance, effects of pesticides and other pollutants with chronic toxicity may not be evident for many years.

3- Future costs

Some impacts may have only future costs. They have no discernible cost now, but the cost will arise in the future. Most plants, e.g., have not been studied for their food and medicinal potential.

4- Unequally distributed costs

This type of costs occurs because environmental costs have never been distributed evenly throughout society. Poor people tend to pay relatively many environmental costs.

It was argued that mitigation measures consist of many alternative approaches as follows (George and lee, 2000, p: 90):

1- **Avoid**: such as, change of route or site details to avoid important ecological or archaeological features.

2- **Replace:** like regenerate similar habitat of equivalent ecological value in a different location.

3- **Reduce:** approaches are filters, precipitators, waste water treatment, noise barriers, dust enclosures, visual screening, wildlife corridors, and changed time of activities.

4- **Restore:** methods include site restoration after mineral extraction or building operation…etc.

5- **Compensate:** relocation of displaced communities, facilities for affected communities, financial compensation for affected individuals, recreational park or other compensating environmental benefits, are common instances.

Furthermore, economic valuation of environmental impacts may strengthen the environmental assessment process in the following ways (Clement, 2000, p: 134; George and lee, 2000, pp: 111- 112):

1- Allow the size of different environment impacts to be compared.

2- Allow different environment impacts to be aggregated into a single measure.

3- Allow total negative environmental impacts (environmental costs), to be compared with total positive environmental impacts (environmental benefits).

4- Provide the basis for clear accepting or rejecting a development proposal.

5- Promote consistency in environmental assessment and decision-making.

6- Allow comparisons and rankings of different proposals in terms of their environmental impacts.

7- Allow environmental impacts to be considered along with other economic benefits and costs of a development proposal.

According to Chapman (2000, pp: 4-5), importance of economic evaluation for externalities appears in the following areas:

- **Resource use**

How much of a natural resource will be used?

- **Resource depletion**

How long will natural resources lose, will we exhaust our natural endowments, or does economics provide a different perspective?

- **Technological innovation**

Commercial feasibility is a major factor affecting many new technologies that have environmental significance.

- **Environmental impact**

Does environmental quality decline or increase as a nation's income level rises?

- **Pollution prevention and control**

Since the level of pollution depends on technology in pollution prevention

- **Macroeconomics**

How are national and global levels of production and living standards affected by environmental policy?

- **Trade-offs and allocation**

Economic theory can be used to define and illustrate the best trade–offs between production, consumption, and environmental policy.

- **Efficiency**

Economic concepts arising from optimization and benefit–cost analysis approach help us to understand the trade-offs involved in efficient policies.

- **Incentives versus regulation**

Are there problems where regulation and market incentives work together?

Analyzing literature addressing advantages and crux roles of environmental economics, we can see that this new science of economics increases our recognizing and understanding of the real world. Also, it helps us to determine methods for empirical estimation of values placed upon environmental goods, resources, and policies.

However, there are many challenges to evaluate aviation externalities. George and Lee (2000, pp: 91–92); UKSDC (2000), Specified the most discerning challenges, in the following items:

- **Abnormal conditions**: including equipment failures, human errors, accidents, and other unusual operation.
- **Indirect effects**: Those are common in the case of ecological impacts and impacts on human beings.
- **Synergistic effects**: This may occur when impacts interact with each other.
- **Cumulative and multi–source impacts**: the impact of the action has to be added to those from other past, present, and future actions, before its significance can be evaluated. Like, in terms of global emissions, aviation is only one of a bundle of contributors to climate change.
- **Tran's boundary impacts**: costs which are created by aviation at the same time.

- **Uncertainty**: This arises in prediction from such sources as of complex systems ...etc.

Displaying and investigating challenges of evaluation to externalities, we can gather them up into three main assumptions: the first goes to aspects of time to occur this type of impacts; the second is affiliated with problems of complexity, ignorance, and uncertainty; and the third tends to difficulties of political implementation.

Although difficulties and stipulations connected with evaluation of challenges, there have been many tries to confront them. For example, an estimate technique of uncertainty. The estimate model is a mathematical equation suitable to transfer information based upon a set of variables (X inputs) into a quantative estimate (U outputs), through suitable identification parameters (α). This is represented in the figure 2-1.

$$\boxed{X \xrightarrow{\alpha} U}$$

Figure 2-1: Evaluation Uncertainty of Externalities

Source: Roseelli and Bellomo, 1997, p: 559

As Erwin and Van Kooten (2000, p: 100), said that given the inevitability of ongoing environmental and social change, humanity needs to evaluate decisions regarding environmental development and interactions with natural ecosystem. The specification of sorts of total environmental value is the core of the following section.

2-5 Components of Total Environmental Value

In order to answer the economist's favorite question: "what is the highest – valued resource use? ", we should run straight into the problem of distribution and the uncertainties of future supply (Bromely and Pavola, 2002, p: 180).

Regarding the natural resource policy, the methodology for performing project evaluations has four accounts which could be summarized as follows (Erwin and Van Kooten, 2000 , p: 158):

- National economic development (NED) account.
- Environmental quality (EQ) account.
- Regional economic development (RED) account.
- Other social effects (OSE) account.

It has been said that to calculate the total environmental value (TNV) of a project, we should disaggregate impacts into individual components of value. The reasoning behind this approach is that environmental impacts have different attributes, some of which can be more easily measured than others (George and Lee, 2000, pp: 113-114).

Literature said that economic definitions to components of total environmental value are as follows (Grillenzoni *et al.*, 1997, pp: 502-503; Chapman, 2000, p: 274; George and Lee, 2000, pp: 114-115; Bromely and Pavola, 2002, pp: 223-224):

2-5- 1 Direct Use Value (DUV)

Direct use value refers to benefits that occur from direct use of the environmental asset in question. It is the market value of consuming a biological resource, such as fish or lumber.

2-5-2 Indirect Use Value (IUV)

Indirect use value derives from services that the environment provides, in addition to and separately from; direct use value. Another meaning is the role which an environmental resource plays in the production of a market commodity.

2-5-3 Option Value (OV)

Option value is the value obtained from retaining an option on the future use of an asset. It is the value of opportunity to utilize a resource in the future.

2-5-4 Existence Value (EV)

Existence value is the value conferred by survival of an environmental resource. This value is derived from knowledge that something exists. Thus, people place a value on protection of rare animals from extinction, even if they do not expect to see them. Existence value represents an attempt by the respondents to channel flows of value to others, about whom they care.

2-5-5 Bequest Value (BV)

It is the value of preserving a resource for future generations. Bequest value is developed from knowledge that something is being passed on to one's descendants.

2-5-6 Discovery Value (DSV)

It is unknown value of presently undiscovered dimensions of an environmental resource.

2-5-7 Non Human Value (NHV)

The value of living biological species in their own right, distinct from their value to human society.

2-5-8 Altruism Value (AV)

The value which is based on providing stocks of species, in the belief those other individuals than you, are able to enjoy experiencing the species.

2-5-9 Private Opportunity Cost (POC)

The market value of opportunities foregone.

2-5-10 Social Opportunity Cost (SOC)

The total environmental value of opportunities foregone, including private, opportunity cost (POC).

2-5-11 Passive Nonuse Value (PNV)

The sum of bequest, existence, and altruism values

$$PNV = BV + EV + AV$$

2-5-12 Use Value (UV)

The sum of direct use value, indirect use value, option value, and discovery value.

$$UV = DUV + IUV + OV + DSV$$

2-5-13 Total Economic Value (TEV)

The sum of direct use value, indirect use value, option value, discovery value, bequest value, and existence values. It includes both use value and passive nonuse value.

$$TEV = DUV + IUV + OV + DSV + BV + EV$$

2-5-14 Total Environmental Value (TNV)

The sum of nonhuman value and total economic value.

$$TNV = NHV + TEV$$

Classification of components connected with total environmental value, leads us to the following remarks:

- The TNV is mainly affiliated with natural public resources.
- The TNV may be represented by a market value or a non market value. In absence of a market price, the task tends to find alternative methods of estimating consumers' willingness to pay for environmental assets and services they provide.
- The researcher will conduct a simulation in the Egyptian Air Transport Case Study in the current thesis. This by comparing the feasibility study of TB3 at Cairo International Airport according to components of total environmental value.

2-6 Techniques of Measuring Economic Value of the Environmental and Social Issues in New Projects

The use of economic valuation models is an important tool for policymakers who gauge the importance of quality of life (Clark, 1997, p: 396).

Besides, there are many monetary methods to evaluate environmental resources. The two figures (2-2 and 2-3) which are expressed below provide some examples. These approaches refer to the market mechanism and permit an evaluation of natural resources in terms of exchange values, use values, and non-use values.

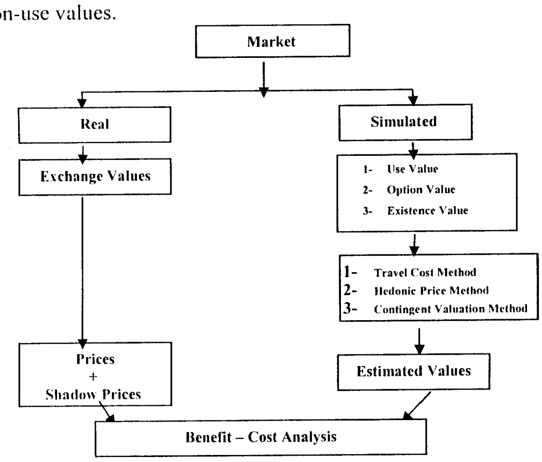


Figure 2-2: Monetary Valuation- Source: Grillenzoni *et al.*, 1997, p: 503

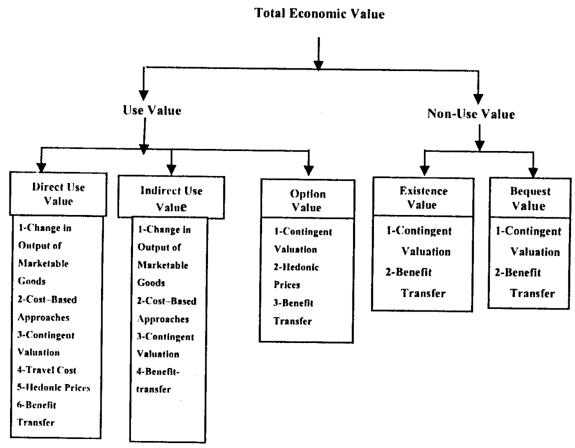


Figure 2-3: Total Economic Value
Source: World Bank, 1998b, No. 23

Analysis of Figures 2-2 and 2-3, conduct use to the opinion: As for exchange, reference has tended to prices and shadow prices. The remaining values are estimated by means such as Travel Cost, Hedonic Price, Contingent valuation, and Benefit Transfer. The overall economic analysis is the Benefit-Cost Analysis including economic, environmental, and social dimensions. In the remaining part of this section, the study presents more details about classification of measuring techniques.

2-6-1 Valuation Using Market Prices

2-6-1-1 Change in Productivity Method

This method estimates environmental change by observing physical changes in the environment and estimating what difference they will make to the value of market goods and services. This approach is applicable in calculating direct and indirect use value (George and Lee, 2000, p: 116).

Example (1): (Erwin and Van Kooten, 2000, p: 101).

Suppose a public good (G) which can be an input into production. This will depend, in part, on the effect that a change in (G) has on the output price of a private good (H).

Example (2): (Erwin and Van Kooten, 2000, pp: 108- 110).

There is an assumption that an individual's utility function includes the public good. In the summer of 1998, experts noted large-scale bleaching (coral appears white) of coral in the Indian Ocean, that is allegedly caused by El Nino. This affects the Maldives Economy, which is heavily dependent on diving tourism, divers visiting the Maldives, and will experience a loss in well-being.

To estimate welfare loss for divers, as a result of coral bleaching, one approach was, to construct a diving production function D (0) as follows:

$$\frac{dB}{dC} = \frac{P}{D_G} D_c$$

Where:

D = A diving experience.

C = The quality of coral.

G = Diving gear plus effort to get into the diving location.

P = The price of diving gear.

B = The bid amount.

From the diving production function, we can see that the welfare loss will be modest if: (1) Coral is not an important input in the diving experience (**Dc** is small), or (2) the incremental cost associated with the behavioral response is small (either because **P** is low, or because D_G is great).

2-6-1-2 Human Capital Cost Valuation Method

To apply the human capital cost method it is necessary to determine the relation between the hazard and human health. This by expressing the health impact in terms of premature death, sickness or absenteeism (George and Lee, 2000, p: 117; Nisreen, 2007). We can imagine the implicit value of health impact by the function below:

$$I = d\,(P + S + A)$$

Where:

I = A health impact.

P = Premature death rate.

S = Sickness rate.

A = Absenteeism rate.

With displaying the health impact function, we find that an increase in sum of variables **P**, **S**, or **A**, means the increase in the value of the variable **I** and vice versa.

2-6-2Valuation Using Information on Individuals' Preferences

It is not often possible to link the environmental impact to a change in marketable output. In these cases, the willingness to pay has to be estimated indirectly, using a range of other techniques such as, Replacement Cost or Preventive Expenditure Method, Contingent Valuation Method, and Surrogate Market Valuation Method.

2-6-2-1 Replacement Cost or Preventive Expenditure Method

The economic value that individuals attach to the environment can sometimes be inferred from the cost of preventing unwanted environmental impacts, or of restoring an asset to its original state after it has been damaged (George and Lee , 2000, p: 118; Nisreen, 2007).

Example: (Chapman, 2000, p: 40)

In the year 2000 the population of elephants throughout Africa was a bout 500.000. Supposed a worldwide study concluded that there was a global willingness to contribute to a fund to protect more elephants.

The survey showed that about $15 billion might be contributed to add a 20 percent increase of 100.000 elephants to the population level. But it also showed that if, instead, 500.000 more elephants were to be protected, doubling the population, the fund would raise only \$5 billion more, resulting in a total of \$20 billion. This indicates that the value of elephants to the global public was not increasing as rapidly as the growth in the elephant population level.

Unlike, considering a relative increase in the protected population, there was a proposal to reduce the level by 500.000 elephants down to 100.000; an 80 percent reduction. The global community would to pay \$ 100 billion to avert the proposed reduction.

The analyst for the African Elephants Study mentioned above, will find that the value of negative change was more important than the value of positive change.

2-6-2-2 Contingent Valuation Method (CVM)

Contingent valuation provides a stated preference framework, by asking respondents direct questions to determine their willingness to pay (WTP) or willingness to Accept (WTA), as compensation towards hypothetical changes (positive or negative), respectively in the provision of an amenity in a place. Typically, CVM employs either dichotomous choice or open–ended approaches (Smith, 1994, p: 246; Bush, 2000, P 431; Greiner, 2004, p: 20).

A-Open-Ended Model (Erwin and Van Kooten, 2000, p: 123)

$$W = F(g, m, s)$$

Where

W= the stated WTP or WTA.

g = the target of survey.

m = the income.

s= A vector of respondent's characteristics that might affect the answer (e.g., age, education, attributes).

B- Dichotomous Choice Model (Erwin and Van Kooten, 2000, p: 124).

In case of uncertainty, a dichotomous choice approach may be preferred. The compensating welfare measure can be either the Median (M*) or Mean (M_{μ}), as being mentioned in the following distribution:

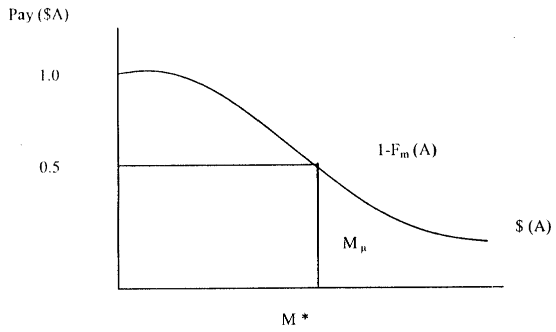


Figure 2-4: Welfare Measures in DC Model
Source: Erwin and Van Kooten, 2000, p: 124.

Where:

M = The respondent's maximum WTP for the environmental amenity.

F_m (0) = The cumulative density function of M.

The questionnaire form, usually Split up into three parts (Curto and Bravi, 1997, pp: 399–400):

1- Description of the good and hypothetical circumstances in which it may be used or appreciated (components of total value);

2- Questions on WTP/WTA, which imply consumer's orientation as to the minimum/maximum value (interview formats) and prefigure means of payment; and

3- Questions about socio-economic characteristics and the cultural orientation of the interviewee (age, sex, income…etc).

Example (1): (Bromely and pavola, 2002, pp: 227–233).

The study of measuring existence value, by examining the WTP of the UK population for conservation of the Black Rhinoceros in the country of Namibia.

The proposed conservation program in Namibia was entitled the Black Rhino Conservation Program (BRCP). Its aim was stated as follows: "to protect the existing population of 670 animals and to promote its increase to a minimum viable population of 2000 within duration of 25 years". The management options of Black Rhino were: entry fees live animal sales, sales of horns, de–horning, darting safaris, and trophy hunting.

On average, respondents were willing to pay £12.67 million for the full management of (BRCP) as a one–time contribution. Excluding trophy hunting as a possible option to raise funds for Rhino preservation, the Mean WTP was £15.18, which indicated that respondents were willing to pay an extra £2.51 million to avoid hunting of black Rhinos.

For commercial usage of the horn of the black Rhino; that was including de-horning operations, darting safaris, and trophy hunting; the Mean WTP for the BRCP without these options was £13.68 million referring to an increase of about £1 million over the full BRCP management option.

The previous display indicated that, in order to maximize the nonuse values from Rhinos, the most successful formula tended to the banning of options that involved an element of enjoyment in the use of Rhinos (Hunting and darting), while allowing all other uses of the animal such as the sale of stock piled horns.

Example (2): (Smith, 1994, p: 253).

Davis (1964), used the CVM to estimate the value of recreation and tourism use in the Maine Woods. A sample of 185 interviews provided information on the amount in individual house holds would be willing to pay (**W**) for an additional visit to the area they normally used.

The household characteristics were: years of acquaintance with Mean (**A**), income (**I**), and the average length of a trip to the woods (**L**). Multiple regressions produced the following equation:

$$W = -48.57 + 2.85\,(A) + 2.88\,(I) + 4.76\,(L)$$

A value of (W) estimated for the sample was then weighted to represent the general population of the state.

2-6-2-3 Surrogate Market Valuation Method

Whilst an environmental good or service may not be traded directly, it is possible to find a good or service, related to the non--marketed environmental item, that is sold in markets. There are two main techniques which have been used for applying the surrogate market method: travel cost method and property value (hedonic price) method (George and Lee, 2000, p: 119; Nisreen, 2007).

2-6-2-3-1 Travel Cost Method (TCM)

Many natural resources (e.g. a national park or a lake) are used for recreational purposes. Its valuation is based on money and time costs of visitors to such recreational attractions. The travel cost method originated in the 1960s, through efforts to value outdoor recreation at multipurpose reservoir projects. The travel cost method focuses on use values rather than non market values (Chapman, 2000, p: 45).

In addition, the travel cost method is an indirect method for determining the value of a tourism site. The technique is based on the development of a model for predicting site use from observed consumer behavior. Information for estimating the travel cost method includes: population of various origins, number of visits from each origin, per capita visits, and travel costs (Smith, 1994, pp: 253–256).

A theoretically model of travel cost method

This model can be illustrated in the following equation

R = d (P, K, m)

Where:

R = Demand curve

P = Entrance fees.

K = the travel cost and prices of complements and substitutes

m = Consumer income.

More details are pointed out in the figure 2-5, assuming that there is a single recreational site and that consumers have the option of staying home or traveling to the site and participating in recreational activities. The amount spent on all other goods and services ($) is plotted on the vertical axis and the number of days spent at the site (d) is plotted on the horizontal axis.

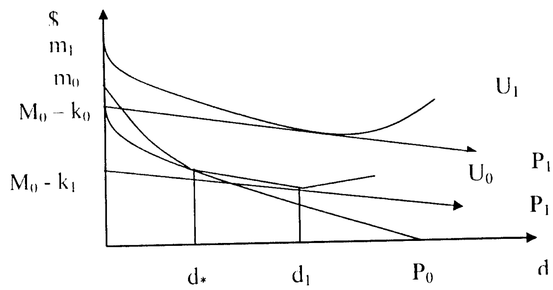


Figure 3-5: A Theoretical Recreation Demand Model Source: Erwin Van Kooten, 2000, pp: 113- 115

Assume that the individual starts with initial income (m_0) that is equal to an equivalent amount of goods whose price is (M); the cost of getting to the site, the travel cost, is (k_0), and the entry fee is initially (P_0).

If recreation takes place, the budget line begins at the point labeled (m_0-k_0). Given that the indifference curve through m_0 (U_0) is tangent to the budget line with slope determined by (P_0), the person is indifferent between staying home and going to the site and staying for (d_*) days.

If the entrance fees were greater than (P_0), then person would stop visiting the site altogether. If the entry price were reduced to (P_1) < (P_0), the individual would take (d_1) days, enabling to get on an indifference curve (U_1) that is higher than that going through (m_0). The equivalent amount of income to this level of utility is given by (m_1).

At a price of (P_0), an increase in the travel cost to (K_1) will prevent the person from going to the site for recreation. If the entry fee were reduced to (P_1), the individual can still attain (U_0), but one remains indifferent to staying home or visiting the site.

Example: (Chapman, 2000, P: 46)

A study of visitors to Hassayampa River Preserve in Arizona, operated by the Nature Conservancy. This is illustrated in the following figure.

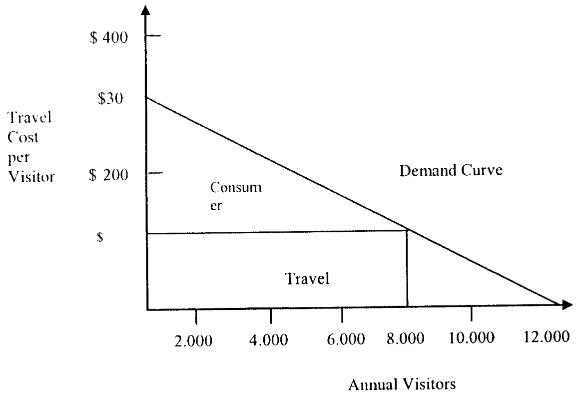


Figure 2-6: Travel Cost and Willingness to Pay at Hassayampa River Preserve.

Source: Chapman, 2000, P: 46.

The previous figure shows a demand curve where the number of visitors to this natural area is related to travel cost per visitor. The 8.000 visitors averaged $100 per person to visit the preserve. The valuation concept of willingness to pay to visit a site relates the demand curve to consumer value, cost, and consumer surplus. The consumer surplus of visitors to Hassoyampa is the area above travel cost and below the willingness to pay demand curve.

2-6-2-3-2 Property Value (Hedonic Price) Method

The basic assumption is that measuring the interaction of pollution with housing values, shows a behavioral willingness to pay as acted upon in actual markets. A property value study typically uses statistical analysis to relate housing values to pollution levels, or nearness to a polluted site. There are two types of hedonic technique: (1) the marginal value of an attribute, such as implicit values for distance from an incinerator in a community; and (2) the intercity hedonic model, which compares the variation in quality of life factors to the wags that are offered in different cities (Clark, 1997, p: 383; Chapman, 2000, p: 47; George and Lee, 2000, p: 120).

Moreover, Hedonic Pricing is a two–stage procedure, beginning by letting (**P**) as a composite consumption good with price equal (**1**), (**C**) a vector of housing characteristics, (**N**) a vector of neighborhood characteristics, and (**G**) a vector of environmental amenities. The following formula points out the previous explanation **P1= Ci, Ni, Gi** (Erwin and Van Kooten, 2000, P: 111).

The second step is to find the marginal WTP or bid function as follows (Erwin and Van Kooten, 2000, P: 111):

$$B_j = \frac{\partial P_i}{\partial G_j} = B_j\,(G_j,\ G^{*}{}_{i},\ C_i,\ N_i,\ U^{*})$$

Where:

B_j = the offer to pay.

G^{*} = A vector of environment amenities excluding G_j.

U^* = the reference level of utility.

U = the utility of the household living in house i

Example (1): (Chapman, 2000, p: 47)

Barry Field's review of studies for seven North American Cities found that, a $200.000 home would lose $5.000 - $6.000 in sale value, if air pollution was increased 20 percent.

Example (2): (Clark, 1997, pp: 384– 394)

The aim of this experience

The purpose was to estimate implicit valuations of amenities, fiscal goods, and noxious activity for minority and non minority workers, using data from the 1990 U.S. Census of population and housing.

The technique used

The intercity hedonic model depending on that, the compensating wage differentials have interpretation of an implicit price, or marginal willingness to pay far changes in the site attribute.

The empirical model

A semi–log specification is employed and the hedonic value was given by the following equation that is mentioned below:

Wage = Bo + B1*Value + B2* Human K + B3*Amenity + B4*Fiscal + B5*Noxious + B6 * Highgrth * Noxious + B7 * Regdiseq

Where:

1- Bo + B1*Value = the median housing value for the metropolitan.

2- B2*Human K = a vector of human capital and demographic characteristics, which the workers' educational attainment, on the job experience in linear and quadratic form, a dummy variable for the sex of the worker (Male), and the marital status of the worker (Married). A dummy variable for race (White) was included in the Hispanic regression, and a variable for ethnicity (Hispanic) was incorporated in the Black regression models.

3- B3*Amenity = the amenity category contains several measures of climate air quality, crime, and coastal amenities. Among the climate variables were the percent of the sunshine, annual inches of precipitation, a measure of summer versus winter temperature extremes, the number of heating degree days, and an interaction between the average annual maximum July temperature and the average afternoon July relative humidity level. Other variables in the amenity category were the attainment of U.S. EPA Ozone Standards, the violent crime rate, the average commuting time in the metropolitan area, and a coastal dummy variable.

4- B4*Fiscal = several variables such as measures of state and local taxation. State taxes incorporated in the model were sales taxes and income taxes. Local taxes included the per capita level of total tax revenues, and the percent of local tax revenues that are generated from property taxes. Local expenditure measures such as the per capita level of local expenditures, the fraction of spending on public welfare and hospital, the police, and the education.

(5+ 6) B5*Noxious+B6 Highgrth*Noxious = metropolitan areas were defined as either high or low growth, and a dummy variable for high growth was interacted with each of the variables in the noxious category.

7-B7*Regdiseq = this category contained regional dummy variables for the nine census divisions.

2-6-3 Valuation Using Benefit Transfer

Benefit transfer involves deriving estimates of economic value from one context for use in a different context, where the data required for the estimation is not readily available (George and Lee, 2000, p: 120). As figure 3-3 illustrated, the benefit transfer technique is suitable for measuring any type of total environmental value. However, it could be said that this technique will be rare in use, because of a substantial use of other techniques depending on plenty of information.

2-6-4 Social Cost–Benefit Analysis and Multi–Criteria Analysis Methods

2-6-4-1 Social Cost–Benefit Analysis

Jacobs (1991, p: 64), said that it is based on a simple premise, namely the rational way to make economic choices, is to compare costs and benefits of alternative actions.

The cost-benefit analysis method is one of the best approaches to evaluate environmental costs and benefits. It will frequently justify the exploitation of the environment, when an approach that features both environmental and developmental goals may lead to more balanced development (Bush, 2000, p: 435; Aly, 2004, p: 133).

The social cost-benefit analysis considers costs and benefits received by the community or the country as a whole; including future generations. In essence, it involves assessing and measuring (in a common monetary unit) consequences of proposed forms of development (Archer, 1998, pp: 25-26; Lawson and Baud-Bovy, 1998, p: 15).

According to Vanhove (1997, p: 72), the stages of social cost-benefit analysis are:

1- Identification of social costs and benefits items.

2- Quantification of the cost and benefit items.

3- Valuation or translating costs and benefits into monetary terms.

4- Calculation of the Net Present Value (NPV) and Internal Revenue Rate (IRR).

5- Risk analysis.

The following scheme, as being set out in table 3-1, distinguishes four levels of costs and benefits: project level (whatever it may be), unpaid level, under payment level, and side effects level.

Table 2-1: Identification of costs and benefits in a cost - benefit analysis

Level	Costs	Benefits
Project level	- Investment costs -Maintenance costs -Operation costs	-Gross receipts - Infrastructure -Specific taxes and fees
Unpaid level	- Life quality costs - Fiscal costs not retained at the project level - Inflation costs	- Improvement of international liquidity position - Positive demonstration effect (e.g. better health care) - Enhancement of a view - Increased value of land - Increased value of cultural heritage - Reduced loss from migration
Underpayment level	-Opportunity costs of labor (negative costs)	- Consumers' surplus
Side effects	-Impact on competitive institutions -Loss of value added in other projects due to diversion of demand	-Impact on complementary project - Value added with subcontracting firms/projects - Value added in restaurants, shops, etc

Source: Vanhove, 1997, p: 73.

2-6-4-2 Multi – Criteria Analysis (MCA) Methods

The main aim of these methods is to render the evaluation procedures more flexible and more harmony with actual perceptions of the value of environmental goods, which can not always be adequately evaluated in monetary terms. MCA methods can be separated into two main categories: (1) Multi-

Objective, and (2) Multi- attribute analyses (MOA, MAA). MOA method concentrates on identification of the best combination within on infinite set of feasible solutions identified by a system of constraints and pursuing a given number of objections; in this case (X) represents a continuous space. MAA method, instead guides selection within a finite and explicit set of alternatives in respect to a given number of attributes (decisional parameters). In this case (X) represents a discrete set of combinations within decisional variables/alternatives (Stellin and Rosato, 1997, p: 473).

2-6-4-2-1 Multi-Objective Analysis (MOA) Method

This method involves a substantial re-formulation of the utility function of the decision–maker. Unlike that used in classical cost–benefit analysis, based on more than one factor. The decision–making process can be expressed (Stellin and Rosato, 1997, p: 473)

$$\text{MAX } U = u\,[f_1\,(x), \ldots, f_k\,(x), \ldots, f_k\,(x)] \qquad (1)$$

$$\text{With} \quad x \quad X \qquad (2)$$

Where

U = Total utility of the decision–maker.

U [0] = Function expressing total utility with respect to the k decisional criteria.

f_k (x) = State of the k^{th} criterion, as a function of decision variables.

x = Vector of decision variables.

$x \lneqq X$ = The set of the x solutions, defined as acceptable solutions which satisfy the system of constraints of the problem, identifies the region X.

2-6-4-2-2 Multi – Attribute Analysis (MAA) Method

The most common technique of MAA is the theory of the Function of Value and Utility (UVF). In UVF method the choice is made by identifying the alternative that maximizes a multi- factorial utility function of type f(a), where (a) represents the vector of attributes.

The following equation provides the explicit details (Stellin and Rosato, 1997, pp: 475–476):

$$S_i = \lneqq_{k=1} Zik \qquad \text{with } i = 1, 2, \ldots n$$

Where

S_i = The decision maker estimation

Zik = The sum of weighted utilities

However, there are other techniques to estimate the TNV such as the Trial Experience Method and the Delphi Technique (Nisreen, 2007). In this current study, the researcher will examine the range of use for these techniques of measure in the feasibility study of Terminal Building Three (TB3) at Cairo International Airport.

2-7 Environmental Issues

There are many definitions of the environmental pollution. Such as in 1978, the World Bank defined pollution as follows "providing a strange substance to air, water, or earth atmosphere quantitatively, that results in negative impacts on resources and incompatibility with specific uses or purposes " (El. Sheikh, 2002, p: 49).

For the civil aviation, it was expected to be increased in the future with the worry about its negative impacts on the environment, particularly noise and emissions of aircraft. (ICAO, 1997, p: 17; Kholousi, 1998, p: 3 – 4; Economist Shop, 2001, p: 3; and Schell, 2001, p: 1).

Moreover, POST (2003) stated that environmental, social, and economic factors related to aviation may interact and can be combined in decision-making processes to achieve suitable and cost-effective environmental outcomes (Abdel Hakim, 2007, pp: 62-63).

However, in the late 1960s, ICAO got involved in environmental matters and established the Committee on Aviation Environmental Protection (CAEP), which is composed of experts from different countries, major sectors of the aviation industry, and environmental umbrella group (ICAO, 1999, p: 5).

Moreover, ICAO efforts to avoid air transport adverse impacts on environment are (WTTC *et al.*, 1997, p: 3; ECAA, 1999, p: 126; ICAO, 2000, pp: 15– 16; IATA year 2000 Project; Al-Sayed,, 2000, pp: 53– 54; ICAO, 2001, pp: 1– 2; Donia Al-Tyaran, 2005, p: 6; www.uk.airports.org, 2006):

1- Establishment of international standard criteria to protect environment. It issued the chapter number 16, where there is determination for noise and emissions acceptable levels. Also, the chapter number 18, which includes criteria for safety of dangerous cargo.

2- Create new types of fuel with low levels of pollution.

3- Permanent replacement for old styles of planes.

4- Improvements related to plane engines to reach the full level of fuel burning.

5- Provide air planes by many filters to minimize emissions of plane engines.

6- Adaptation of a statistical project for the aircraft incidents which are occurred by birds hitting.

7- Cut down - as possible as if – air navigation in the higher atmosphere flayers;

8- Establishment of greenbelts around airports.

9- Sound sheltering for houses near by airports.

10-Inform and increase public awareness of economic and social impacts attributed to air transport industry.

2-7-1 Conservation and Biodiversity

Planning system has a positive role to play in guiding appropriate development of airports to the right place, as well as preventing development of projects that are not taking into considerations the requirements of sustainability (www. aviation and the environment, 2005).

Also, land reclamation or reshaping in airports can have substantial ecological and amenity effects. Adaptation by flora and fauna to the urban landscape has been widely observed and loss of or damage to habitats, to sites of heritage or cultural value needs to be assessed (UK Royal Commission for Environmental Pollution, 1994).

2-7-2 Noise

A plane's noise is one of numerous elements that adversely affect the air transport industry. Moreover, noise from aircraft in the air and on the ground is the principal concern of communities near airports (UK Royal Commission for Environmental Pollution, 1994; Mohamed, 2000, p: 120; Ragab, 2004, p: 51).

Additionally, it was argued that the negative impacts of noise may include (Aronsson , 2000, p: 108 ; Connor , 2001, p: 3):

- Noise – induced hearing impairment.
- Cardiovascular and physiological effects, hypertension, and heart diseases.
- Mental health disorders – anxiety and emotional stress.
- Performance deficiency – such as inability to work or learn.
- Interference with speech communications.
- Sleep disturbance.
- Annoyance.
- Degradation affiliated with quality of life.

However, there are many efforts and approaches which provide solutions to the acoustic pollution resulted from air transport industry, the international Civil Aviation Organization (ICAO) and other literature have supposed four main themes / techniques to solve the problem of noise as they were expressed below.

2-7-2-1 Reducing Noise at Source

Reducing noise at source has long been the primary focus of the Committee on Aviation Environmental Protection's (CAEP) work. The International Civil Aviation Organization (ICAO) established noise certification standards in Annex 16. The initial standards for jets, air croft designed before 1977, were included in chapter two of Annex 16. Subsequently there were the stricter standards contained in chapter three of the annex. To restrict operations of aero planes that exceed chapter three noise level, ICAO gave permission to states with noise – sensitive airports to impose restrictions on operations of noisier aircraft if they so wished (ICAO, 1993, p: V; Mortimer, 1996, p: 5; ICAO, 1999, p: 6 ; ECAA, 2001, p: 87).

Additionally, the basic element in the noise certification criteria is the noise evaluation measure designated Effective Perceived Noise Level (EPNL), in units of EPNdB, which is a single number evaluation of the subjective effects of airplane noise on human beings (ICAO, 1993, p: 30).

Furthermore, the CAEP was expected to make use of the Model for Assessing the Global Exposure to the Noise of Transport Aircraft (MAGENTA). In other words, the extent and intensity of noise disturbance around an airport is calculated by a "Noise and Number Index"(NNI), at various points. Using this model, it may be possible to estimate the benefits of different options by calculating changes in the number of people who would be exposed to a given level of noise. For instance, at Heathrow Airport the 35 NNI contour was regarded as the onset of disturbance (Shearman, 1998 , pp : 158–159 ; ICAO , 1999 , p: 6).

2-7-2-2 Noise Abatement Operating Measures

Literature said that there are several methods of achieving noise decrease. Such as preferential runways and routes, and noise abatement procedures for take–off or for approach and landing (McIntyre, 1993, p: 107; Aronsson, 2000, p: 109; Conner, 2001, pp: 15- 20; Filho, 2001, p: 4; Aly, 2004, pp: 95– 96).

2-7-2-3 Land–Use Planning

Land–use planning has been considered one of effective means to ensure that activities nearby airports are compatible with aviation requirements. Its main goal is to minimize the population affected by aircraft noise by introducing land–use zoning around airports (ICAO, 1996, p: 25; ICAO, 1997, p: 17; ICAO, 1999, p: 6).

It was expected that further incremental reductions in noise will become more costly. Consequently, future progress in decreasing the impact of aircraft noise on society must depend more on improved land use planning around airports than in affordable technological breakthroughs (www.wttc.org, 2005).

2-7-2-4 Noise Pollution at Terminals

This element includes the following sub-sections (Stutts and Borsenik, 1987, pp: 405–411):

- Room Sound Treatment

Rooms can be designed to meet specific background noise levels. The room designs are frequently based on approaches namely Noise Criteria (NC), Noise Rating (NR), and Preferred Noise Criteria (PNC); which all are types of Occupational Safety and Health Act (OSHA) to protect workers from noise.

- Insolating Sound Sources

Common equipment isolation techniques and devices are springs; resilient materials, such as rubber and cork; and separate equipment (mounting platforms).

- Eliminating the Sound–Transmission Path

Mechanical–equipment rooms may be separated from the remainder of the building by placing sound absorbers between structural members.

2-7-3 Aircraft Emissions

There are many definitions of the environmental pollution. Such as in 1978, the World Bank defined pollution as follows "providing a strange substance to air, water, or earth atmosphere quantitatively, that results in negative impacts on resources and incompatibility with specific uses or purposes " (El. Sheikh, 2002, p: 49).

Regarding to the air transport industry, in the past, the fear was of the impact of airplanes' emissions on the air quality in areas surrounding airports. In recent years the worry has gone to the atmospheric problems connected with aviation's omissions. For example, evaluations in 1997 pointed out that the air transport sector emitted 3% of CO2; which is the main cause of the global warming phenomenon occurrence (ICAO , 1997 , p: 17).

Looking into the aircraft engine, there are two specific gases: Caron Dioxide (CO2), which is directly derived from fuel, and nitrogen oxides (NOx), that are formed nitrogen in the air passing through the combustion section of the engine. The economically most efficient way to reduce energy consumption as well as hazardous emissions is to optimize aircraft utilization in the air and on the ground (Shearman, 1992, p: 158; UK Royal Commission for Environmental pollution, 1994; Lundberg *et al.*, 1995, p: 100; ICAO, 1999, p: 7; and Schoch and Mckmney, 2003, p: 195).

The literature stated, from the perception of economics, that there are three main aspects of cost which are attributed to emissions (Adams, 1992, p: 115; Al- Sayed, 2000, p: 50; Hayes *et al.*, 2000, p: 190; Ismael *et al.*, 2000, pp: 388–389; Aly, 2004, pp: 132-133):

- **Harms costs**; they contain two–sub groups: harms which are measurable such as medical harms (increase of disease levels, reduction in employee productivity, increasing the death rate), and rising in costs of exploitation of nature and natural resources. The second is the harms with hardness or impossibility to be measured by quantitative mean or monetary value, including suffering both physical and psychological and distortion of natural scenes;

- **Prevention costs**; which are expenditures the government or the private sector should bear trying to avoid happening of pollution both partly and completely; and
- **Recovery costs**; that are illustrated in private and public costs to reduce somber omens of pollution and the increase of health costs.

However, there has been an arguing whether the expected growth in aircraft activity will be compatible with sustainable development targets or not. Concerns have led to call for application of the "polluter pays principle". It includes several market-based options which have been examined by Committee on Aviation Environmental Protection (CAEP/5). These options have been categorized in taxes, charges, offsets, emission trading, and voluntary mechanisms/regimes (ICAO, 1999, p: 8; Khan, 1999, p: 269; ICAO, 2000, p: 11; ICAO, 2001, p: 4; Kaul, 2001, p: 6; Pulles, 2001, p: 1; TTC, 2001, p: 4).

Example (1): (WTO, 1998, p: 42)

Emissions and noise taxes in France, introduced in 1993, which have been collected from each landing aircraft to aid near by residents.

Example (2): (Schell, 2001, p: 6)

A study done in the European Union (EU) has shown that if a small charge of 20 cents per liter would be applied, the aviation commissions will double rather than triple by 2025.

Moreover, Bush (2000, pp: 435–436), said that our pollution control is a function of how much we prepared to pay for a clean environment. The following figures express more details.

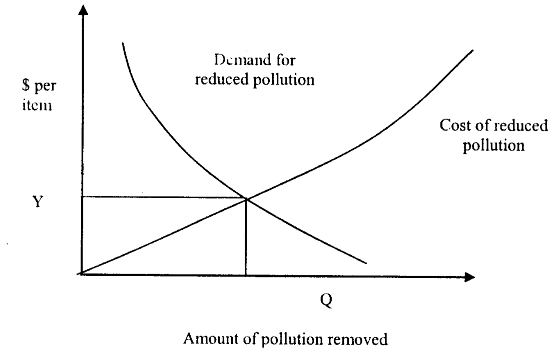


Figure 2-7: The Optimal Investment in Pollution Control.

Source: Bush, 2000, p: 435

Figure 2-7 illustrates that, as desire to protect the environment grows, so the interest of the two lines will shift to the right, indicating a willingness to spend more on pollution control.

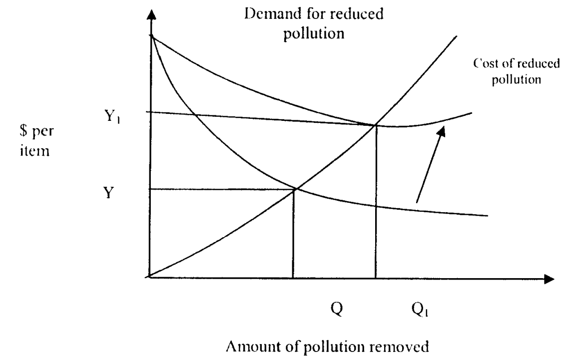


Figure 2-8: Willingness to Pay More for Pollution

Source: Bush, 2000, p: 435

Figure 2-9 identifies the shifting of the popular opinion toward wanting unfitted economic growth; the optimal spending will shift to the left.

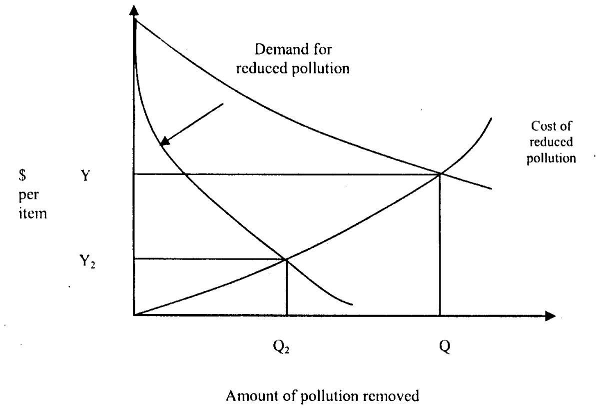


Figure 2-9: Reducing the Optimal Willingness to Pay

Source: Bush, 2000, p: 436

Figure 2-10 describes the situation as technologies change, it may come cheaper to clean up pollution or limit pollution emissions.

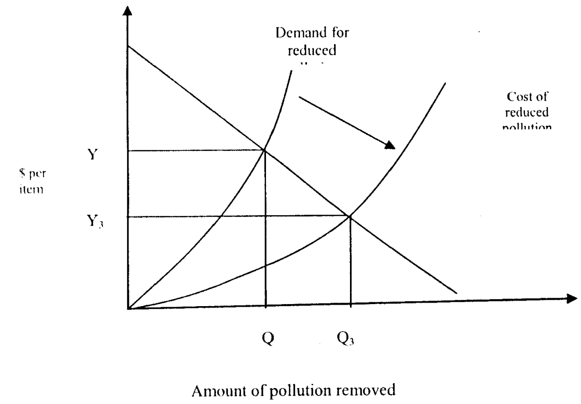


Figure 2-10: Willingness to Pay in Case of Technological Advance

Source: Bush, 2000, p: 436

To analyze the previous figures, it may be said that payment to support pollution control is a function of various variables such as popular attitude in society towards preservation of environment, advancing in technology…etc. Additionally, in all cases whether service or good, the cost of pollution control is passed on as higher prices to the consumer.

2-7-4 Waste (water and materials)

For the airline and airport operators, the reduction and control of waste can be more susceptible to company management. There are a number of areas of particular risk. The maintenance and engineering work at airports can involve a wide range of toxic substances. Losses to the atmosphere and/or to surface drains and storm water courses of detergents, Volatile Organic Compounds (VOC), chemicals, fuel and metals are popular examples. Also, there are airlines' in–flight and office wastes (UK Royal Commission for Environmental Pollution, 1994).

2-7-4-1 Sewage

An adequate and reliable supply of pure and wholesome drinking water must be provided to meet all the requirements. Where main supplies are inadequate, supplementary sources may be used such as desalination of sea water, under ground bore holes, and stored rainwater. Moreover, where the development is carried in phases, the site for the treatment plant must be planned to allow for the eventual total capacity (Lawson and Baud–Bovy, 1998, pp: 41, 43).

Literature pointed out that there are two main approaches to handle sewage discharges: a public sewage line and a private sewage–disposal system which must be installed if the first is not available or not capable of handling sewage. The private sewage disposal system includes four general types: cesspools and chemical toilets, septic–tank–cesspool combinations, septic–tank drain fields, and complete filter system. Furthermore, there is a need to define the different kinds of value (economic, health, etc.) and to identify the various types of costs associated with water and sewage development and treatment. These costs include direct costs, opportunity costs, and hard–to–quantify environmental costs (Stutts and Borsenik, 1987, pp: 470–471; Gleick, 2000, pp: 15–16; www.aviation and the environment–soil and water pollution index, 2005).

2-7-4-2 Solid Waste

Solid wastes are unwanted materials which may be divided into two broad categories depending on its origination: municipal solid waste (produced by various institution, businesses, and private homes), and industrial solid waste. Another useful distinction is between hazardous waste and non hazardous waste (Schoch and Mckinney, 2003, p: 443; Abdel Hakim, 2007, P: 67).

In general, the waste management hierarchy, and particularly in aviation industry, involves a list of options which are ordered from the most desirable to the least desirable along the following lines (stutts and Bersenik, 1987, pp: 462– 464; Lawson and Baud-Bovy, 1998, p: 43; Schoch and Mckinney, 2003, p: 443 ; and www.budget.gov.au, 2006):

1- Source reduction: reduce the generation of waste in the first place.

2- Reuse of products: for instance, washing and reusing beverage containers directly.

3- Recovery and recycling: using waste as the raw materials of industrial processes, such as collecting old aluminum cans, melting them down and using the recovered aluminum to manufacture new products.

4- Waste treatment and incineration: incinerators can reduce the volume of waste by 85 to 90 percent. This procedure may include recovering energy as the trash is burned.

5- Storage and disposal: the residual ash and solids of incineration or other waste treatment must ultimately go a landfill as a last resort.

2-7-5 Airport Congestion

Airport saturation means that all, or nearly all, of the take-off and/or landing slots which available on the runways of an airport are occupied by airlines, particularly airlines with grandfather rights. It can also concern the number of passengers that can pass through the terminal in any given period of time. It is often the case that both runway and terminal limits are reached at about the same time (Shearman, 1992, p: 150).

Moreover, airport congestion may impede the restructuring process. Because of indivisibilities, for instance in runway provision, growth in airport capacity is unlikely to be in step with carrier's demands for take–offs and landings. It may be said that congestion at airports is a result of the commercial advantages of scale, scope, and density of operations, especially at hubs (OECD, 1997, p: 108).

Literature said that, international civil aviation classified airports must have runways of at least 3300 m in length, to handle the Boeing 747 and other large aircraft. A single runway should allow 30–40 aircraft movements per hour; equivalent to 25 million passengers per year. Also, larger airports must have two parallel runways, which are separated by at least 1600 m. regarding international terminals, they are usually planned to process 1500 to 3000 passengers/hour each way at peak periods; including transfers to and form hub carriers. For aircraft parking constraints, they are severe at some airports. The example was the new Munich Airport, since it was close to peak hour parking while the terminal facilities are only at 73 per cent utilization (OECD, 1997, p: 108; Lawson and Baud-Bovy, 1998, p: 274).

Even so, airport slots are the most appropriate short term solutions to provide some relief for the shortage of capacity at airports. They are usually defined as an arrival or departure time at an airport (typically within a 15 or 30 minute period). This plus the stand, gate, and terminal capacity that is needed and the share of environment capacity which is used (Anne, 2002, pp: 110-111).

According to Shearman (1992, p: 151), when an airport becomes saturated airlines and passengers find that:

- Flights at popular times are full; discounting should not be necessary on such flights.
- Demand for increased frequencies can only be met by providing additional services at times which are commercially less attractive.
- Demand at certain times of day can only be satisfied by the provision of a larger aircraft.
- Expansion of facilities, such as check-in counters, not possible because all space is taken.
- The probability of delays, passengers get lost in the crowds, baggage is delivered late to the aircraft, and Air Traffic Control (ATC) has queues for take-off.
- Airport access roads are congested at peak times.

- Employees are overstretched and demand better conditions and more pay to compensate for the harder task they have.
- Increasing the costs of running the operators.

Example

The following table shows the European Slot Allocation Legislation which aims to encourage new entrants. New entrants have been defined as airlines with less than four per cent of daily slots at an airport or less than three per cent of slots in an airport system (Anne, 2002, p: 113).

Table 2-2: Key Features of the 1993 EU Slot Allocation Regulation

1-	Slots are allocated on basis of historical procedure (grandfather rights).
2-	Airlines must use slots of 80% of time (use it or loss it) rule.
3-	There is a slot pool for new or returned slots.
4-	50 % of slots in the pool are allocated to new entrants.
5-	Certain slots can be ring fenced if they are vital for social or economic reasons.
6-	Airports are none coordinated, coordinated, or fully coordinated.
7-	Co-ordination status is defined after capacity review and consultation.
8-	An independent co-coordinator supervises the allocation of slots.

Source: Anne, 2002, p: 113

The analyzing of table 4-1 leads us to the following facts: (1) the sale of slots in European Union Countries has been by auction practice, and (2) the enforced divestment of slots share by incumbent carriers in favor of new entrant carriers. This situation has resulted in airports' congestion and massive aeronautical operations (Anne, 2002, p: 113).

2-8 Social Issues in Aviation Industry

The social environment can be characterized in terms of human and social conditions. The first includes items such as fulfillment of basic needs, health and sanitary conditions and so on. The second consists of socio-economic conditions like unemployment levels, literacy and educational levels, patterns of communications, etc; and socio-cultural conditions, e.g., social cohesiveness, religious beliefs, and historical traditions (WTO, 1990, p: 10).

2-8-1 Employees Relationship

The literature said that, the social air services programs have been existed in operation by the United States of America, Australia, and Canada. The interest directed, particularly, towards policies and programmers to offer equal employment opportunities and achieve employee satisfaction (OECD, 1997, p: 103; WTTC *et al.* 1997, p: 42).

Example (1)

At America West Airlines, a corporate statement of commitment regarding equal employment opportunity and affirmative action was maintained and updated annually, in addition to a separate nondiscrimination in employment policy, that specifically touches upon harassment, including race, color, religion, national origin, age disability, veteran status, and sex (Henderson, 1995).

Example (2)

According to the International Society of Women Pilots, after carrying out a survey of 134 of its members, 55 percent (37 incidents) were categorized as gender discrimination and 45 percent as sexually oriented harassment (Fewster and Appelbaum, 2004, p: 9).

2-8-2 Dealing With Consumers

American Customer Satisfaction Index (ACSI) indicated that, compared to four other industries (bank, stores, hotels, and phone companies), between 1995 and 2000, airlines showed the sharpest deterioration in customer satisfaction (Love Lock and Wright, 2002, pp: 64–69). However, the information about safety and customer satisfaction can be obtained in a number of varied forms including: corporate audits, employee opinion surveys, focus groups and customer feed back (Fewster and Appelbaum, 2004, p: 9).

In addition, special requirements that passengers may have on the board of an airline may include: special meals for religious or health reasons, special seating arrangements for disabled or ill passengers; and pre-boarding for unaccompanied minors before the main group of passengers with special attention from cabin attendants (Beech, 1990, p: 11).

With regard to customer safety, it may be said that deregulation, in 1978, and the ensuing changes to the airline industry such as increased privatization; liberalization; competition; and the scramble to cooperate and form alliances, mergers and acquisions– all exert pressure on aviation's defenses against system failures. Pathological climates are typified by denial responses to those who report safety concerns (Fewster and Appelbaum, 2004, p: 4).

Looking into accidents and incidents of aviation, they include the following types: (1) abnormal runway contact; (2) abrupt maneuver; (3) cabin safety events; (4) controlled flight into or toward terrain; (5) evacuation; (6) fire; (7) smoke; (8) ground collision; (9) ground handling; (10) icing; (11) loss of control (on ground); (12) loss of control (in-Flight) as low altitude operations and air collision; (13) runway actions like runway excursion, runway incursion (Vehicle or aircraft); (14) birds strike at airports; (15) turbulence; (16) wind shear or thunderstorm; and (17) system component failure-power plant (AAIJ, 1999, p: 32; ECAA, 2001, p: 73; ICAO, 2001, pp: 21–22 ; ICAO, 2003, p: 5).

Example (1)

The Canadian airline losses affiliated with aircrafts hitting birds on its flights to North America, estimate a range from 500 million dollar to one billion dollar (ECAA,2001,p: 73).

Example (2)

Australia's Bureau of Air Safety Investigation (BASI), in 1993, carried out a landmark accident investigation of a fatal Monarch Airline Crash. The ensuing investigation led to the following discoveries in management, structural, communication and training and development deficiencies (Goeters, 1998, pp: 293–301):

- Management prioritized revenue operations ahead of safety.

- Inadequate resources were allocated to safety, because of the airline's financial difficulties.

- Structural deficiencies had an adverse impact on management, as a result of significant changes in the month prior to the accident.

- Communication was ineffective, particularly regarding safety.

- There was poor control over flight operations safety (the pilot had never been route checked into young and maintenance management (history of high turnover in staff).

- The flight crew was inadequately trained.

However, the previous stated information about social issues in air transport sector, there are other social issues that were not discussed. They may include business conduct, citizenship issues and etc. The plenty of details around this area will be expressed in the following section namely; some experiences of sustainability in aviation industry.

2-9 Some Experiences of Sustainability in Aviation Industry

This section has three sub-sections: the first is general experiences, the second contains experiences of airports, and the third is consisted of airline experiences.

2-9-1 General Experiences

In this part two experiences were expressed.

2-9-1-1 European Experience on Noise of Aviation

Te basic elements of this issue have been the following items (Skogö, 2001, pp: 1– 6):

1- Environmental context in Europe:

1-1 Population density.

1-2 Demands for air traffic and environmental protection.

1-3 Sustainable development of transport.

1-4 Action to tackle noise from all modes.

1-5 Measures on aircraft noise.

2- Current environmental policy at European Airports

2-1 European Civil Aviation Conference (ECAC) goal is to stabilize or reduce numbers of people affected by noise.

2-2 Measures from the "balanced program" already used:

A- Follow ICAO standards.

B- Noise abatement procedures widely applied.

C- Land–use planning measures highly developed.

D- Led to successfully negotiating agreement for chapter two operating restrictions.

2-3 Charging to provide additional incentives with common European framework developed based on certification data.

2-4 Achieved major reductions in size of noise contours and number of people affected.

2-5 Continuing demand for maintaining and improving environmental standards.

2-9-1-2 CAD's Environmental Policy – China

1- Its Vision

The civil Aviation Department (CAD) is committed to achieve safe and efficient air transport system. To materialize its vision, there were two points have been discussed (CAD, 2002, pp: 10 –11):

1-1 Noise policy for civil aviation activities:

A- Maintain dialogue with local communities and citizens affected by aircraft noise and handle complaints.

B- Monitor aircraft noise.

C- Consult stake holders (airlines and airports) on the feasibility of noise mitigating measures.

D- Develop and implement measures to minimize the impact of aircraft noise on local communities.

1-2 Green policy for CAD

A- Economize the use of energy and paper.

B- Apply principles of sustainable development to its purchases of equipment and tender process, and in planning and operation of its facilities.

C- Save, reuse, and recycle if possible.

D- Comply with environmental regulations as a minimum standard of performance.

E- Promote staff awareness to ensure that environmental actions are included in the balance of all its decision–making process.

2- Implementation of the Policy

CAD has two committees, which are the Aircraft Noise Technical Committee and Environmental Management Committee, to formulate and implement environmental measures (CAD, 2002, pp: 12 –13).

2-9-2 Airport Experiences

This sub-Section involves of seven case studies.

2-9-2-1 Sydney Airports–Australia

The Australian Commonwealth spent $ 69.9 million in 1998–1999 on the Kingsford–Smith Airport noise amelioration package, for insulation of noise– affected houses and other public buildings. Regarding the Environmental Impact Assessment (EIA) of the preferred site for the Second Sydney Airport at Badgerys Creeks, it was put before the community and the government had detailed analysis of the benefits and environmental costs of the three options for the construction of the airport. The Commonwealth allocated $ 100.000 for the completion of an independent of the EIA process (Anne, 2002).

2-9-2-2 Air quality at Scottish Airports–United Kingdom

The British Airports Authority (BAA) set out the Scottish Airports approaches to air quality management issues up to 2005. The air quality objectives were (BAA, Undated):

1- Understand and acknowledge the effects of growth in relation to the impact of airport emissions on communities.

2- Establish regular dialogue with stake holders, including airlines, aircraft and engine manufacturers, local communities, local authorities and regulators.

3- Monitor and review air quality performance.

4- To control, where possible, the generation of emissions.

Regarding emissions, air quality monitoring identified a number of hot spots at each airport, which included: (1) Air side stands, (2) Ends of the runways, (3) Fuel farms, (4) Cargo areas, (5) Taxi ranks, and (6) Terminal fore courts. Moreover, there was a periodic air quality monitoring at Scottish Airports. Also, establishment a profile of the types affiliated with emissions at each airport (BAA, Undated).

Besides, there was an encouragement to use fuel options such as electricity and low Sulphur diesel, and airlines and business partners to use fixed electrical ground power. In addition, public transport and surface access initiatives were promoted to minimize the number of vehicle movements (BAA, Undated).

2-9-2-3 Heathrow Airport Case study–United kingdom

2-9-2-3-1 Noise

The hedonic pricing and the Noise Sensitivity Depreciation Index (NSDI) concepts were used. These terms provide a measure of the percentage of change in house price associated with a unit change in noise quantity measured in (decibel A) leq (16 hour daytime). The figures of values for NSDI due to aircraft noise ranged between 0.5 % and 1 % per (decibel A). This means that a 1 (decibel A) rise in the quantity of noise, is likely to reduce house prices by 0.5–1 %. Also, there were estimates of the Marginal Willingness to Pay (MWTP) for an aircraft event (landing and take–off) for each aircraft type. The commencement was by adopting the NSDI value of around 0.6 % per dBA. By applying this NSDI value to the average house price within the Heathrow Airport 57 dBA daytime contour and by multiplying for the number of resident households, there was an ability to derive an estimate of overall MWTP for a 1 dBA leq reduction in the area (MOT, 1999).

The table 2-3 below shows the resulting estimated noise marginal damage costs per an aircraft event for selected aircraft types.

Table 2-3: Marginal Damage Costs per Aircraft an Event

Type of aircraft	Cost per £	Type of aircraft	Cost per £
A 310	64	B 757	44
A 340	77	B 767– 300	53
B 737 - 400	34	B 777	33
B 747– 400	168	MD 82	50
A 320	31		

Source: MOT, 1999

2-9-2-3-2 Air Quality and Climate Change

There was a determination joined with the nature of the relationship between concentrations of each pollutant and the associated health and environmental impacts, the population exposed to the pollution or the stock at risk, and the values which the public places on each of the relevant impacts. One approach was to use the death rates ($DETR_S$) value, for the prevention of a road accident fatality as a base line to value acute mortality effects. Those affected by air pollution have been mostly over 65 and may already be in a poor state of health with a reduced life expectancy. There was a very wide range of willingness to pay value of statistical life between £ 2600 and £ 1.4 million (MOT, 1999).

Regarding climate change, there was a rough estimate of £ 50 per tone of carbon and estimate of £ 1500 per tone of NO_X at altitude; depending on the DETR baseline. Also, the results on emissions at altitude by aircraft type have been revised by the

DETR and are presented in the following table using the central estimates and the upper and lower bounds of the range (MOT, 1999).

Table 2-4: Marginal Damage Costs – Climate Change

Short–haul operations				Long–haul operations			
Aircraft type	Central	Low	High	Aircraft type	Central	Low	High
B 737 400	211	106	422	A 340	3536	1768	7072
A 320	254	127	508	B 747–400	4972	2486	9944
MD 82	300	150	600	B 767–300	2446	1223	4890
B 757	368	184	736	B 777	3771	1886	7542
A 310	331	166	662				

Source: MOT, 1999

2-9-2-3-3 Overall Environmental Costs at Heathrow Airport

Table 2-5 brings together the estimates of noise and climate change marginal damage costs by aircraft type for short haul and long haul operations, excluding damage costs from local air pollution. The figures also have been normalized to derive estimates on per passenger and per 1000 passenger kilometer basis (MOT, 1999).

Table 2-5: Estimated Environmental Costs per Passenger and Passenger kilometer (Central Estimates)

Aircraft type	Total (£)	Short – haul operations (£) per passenger	(£) per 1000 passenger Km
B 737 - 400	245	2.50	2.75
A 320	285	2.18	3.23
MD 82	350	3.30	3.60
B 757	412	3.01	3.27
A 310	395	2.90	3.17
		Mean = 3.00	
Aircraft type	**Total (£)**	**Long-haul operations (£) per passenger**	**(£) per 1000 passenger Km**
A 340	3613	20.24	3.21
B 767-300	2499	18.45	2.89
B 747-400	5140	18.49	2.88
B 777	3804	18.05	2.78
		Mean = 20.00	

Source: MOT, 1999

2-9-2-4 EIA for the New Oslo Airport at Gardermoen – Norway

Since 1939 Oslo has been served by Fornebu Airport. However, by the 1980, this airport situated close to Oslo city centre was beginning to reach capacity but not be expanded. This critical situation was resulted, because of physical constraints and environmental pressures. A number of new airport sites were assessed and, in 1991, the existing military airport sit of Gardermoen was chosen (Anne, 2002, p: 219).

The EIA for Gardermoen Airport considered the following impacts (Anne, 2002, p: 219):

- Pollution factors; such as noise, air pollution, and climate.
- Impact on natural resources and natural conditions which included: land and forest resources, water resources, outdoor recreational areas, landscape, minerals, and flora and fauna.
- Impact on cultural heritage. This matter consisted of two cases: pre- reformation heritage and post- reformation heritage.
- Social factors like impacts on the employment market, impacts on municipal economy, and impacts on land.

While the Civil Aviation Authority (CAA), which has operated airports in Norway, was responsible for assessing the environmental impact of the airport itself, the Public Roads Administration and Norwegian State Railways analyzed the impact of the access system. Besides, the Department of Environment and Department of Agriculture were involved in the investigation of the regional and social impacts. The decision to build the new airport was made in 1992 and it was opened in 1998 (Anne, 2002, p: 219).

2-9-2-5 Environmental Issues and a New Runway at Manchester Airport– United Kingdom

Manchester Airport, which is owned by Manchester Airport plc (MA), handled 17 million passengers, 112000 tones of freight and 170900 Air Transport Movements (ATM_S) in 1999. Its runway had a declared hourly capacity of forty–seven movements. By the early 1990, this runway was becoming full at peak hours and so, the draft development strategy published in 1991 identifying the need for a second runway (Anne, 2002, p: 220).

For this reason, sixteen groups of environmental experts were appointed to look at the whole range of possible impacts associated with the second runway scheme and to provide input into the environmental impact assessment. Specialist engineering consultants were also appointed at this time. The airport operator, the environmental team, and the engineering design team worked together in developing the runway scheme. Public consultation also took place at this time. This ranged from private meetings with individuals to large scale public gatherings. Further consultation and assessment of the impacts took place until a final development option was selected in 1993. The proposals were subsequently developed into a planning application which was subject to a planning inquiry which lasted from June 1994 to March 1995. Planning permission was granted in January 1997((Anne, 2002, p: 221).

The package of proposed environmental mitigation measures contained over 100 different measures of targets and guarantees covering noise control and night flaying, environmental works, highway improvements and public transport, community relations and social policy, and the ultimate capacity of the airport. This approach to the environmental effects was costly; amounting to over £ 20 millions, but MA viewed it as a fundamental investment to gaining permission to build the additional runway. The following table summarizes the details of the project (Anne, 2002, p: 221).

Table 2-6: Manchester Airport's "Green Charter"

Environment topic	Main measures
(1) Noise control	1-1 The noise will be controlled up to at least 2011 and will be no worse than in 1992. 1-2 A noise and aircraft track monitoring system will be maintained. 1-3 Monthly monitoring will be produced and an annual external audit under taken. 1-4 92 % of total scheduled operations to be by chapter 3 aircraft by 1998 and 96% by 2000. 1-5 100% of scheduled night movements to be by the quieter chapter 3 aircraft. 1-6 A preferential charging system for quieter aircraft will be developed. 1-7 MA will continue to seek powers to penalize aircraft that deviate from the set departure routes. 1-8 A ground noise policy will limit night ground engine tests to 20 per year; require the use of the engine test bay; and encourage use of fixed electrical power
(2) Night flying	2-1 The night noise level will be controlled up at least 2011 and will be no worse than in 1992. 2-2 Night movements will not exceed 740 of total movements. 2-3 Chapter 2 aircraft will not operate at night. 2-4 Financial noise penalties will apply at night. 2-5 The use of reverse thrust will be restricted at night. 2-6 The second runway will not normally be used at night.

Table 2-6: Continued

(3) Environmental works	3-1 More than twice as many ponds will be created or restored than those lost. 3-2 Landscape and ecological mitigation works proposal will be submitted to the total authority for agreement. 3-3 A fifteen-year landscape and management plan will be developed. 3-4 Ecologists and landscape architects will oversee and implement the environmental works. 3-5 MA, local authorities, statutory bodies, and local wildlife groups will form a nature conservation steering group. 3-6 The MA will financially support the Bollin valley project and upgrade the River Bollin Channel to encourage the migration of fish. 3-7 Where possible, permission will be sought to relocate two of the four affected listed buildings. 3-8 The aviation viewing park will be relocated
(4) Highway improvements	4-1 MA will fund a number of road improvements. 4-2 Restrictions will be placed on operation times and routes taken on construction traffic, and construction material is to be brought by rail.
(5) Public transport	5-1 25 % of all trips to the airport will be made by public transport. 5-2 MA will promote the extension of Metro link and development of heavy rail services. 5-3 A ground transport group will promote and develop enhanced public transport services and aground transport strategy will be introduced. 5-4 10% of the annual marketing budget will be used to promote public transport services.
(6) Community relations	6-1 The sound insulation grant scheme will be maintained. 6-2 Local environmental projects will be supported by a community trust fund with an annual budget of at least £ 100000.
(7) Social policy	MA's recruitment policy will offer a fair and equal opportunity to applicants by advertising jobs in the airport job centre and local media, by operating a crèche; and by striving to achieve a representative ethnic mix of employees.
(8) Ultimate Capacity	8-1 There will be no consideration of a third runway until at least 2011. 8-2 MA will oppose inappropriate development in the area other than that related to the airport's technical efficiency.

Source: Anne, 2002, p: 223

2-9-2-6 Environmental Practice at Copenhagen Airport - Germany

Copenhagen Airport A/S (CPH) is a good example of an airport operator which has developed a comprehensive policy. This company manages the two Copenhagen Airports namely; kastrup and Roskilde. In 1999, these two airports handled 17.3 million passenger number, 389000 tones of freight and 295000 air transport movements (Anne, 2002, p: 224).

The stated aims of the environmental policy were as follows (Anne, 2002, p: 225):

1- To protect the environment through initiatives to prevent negative impacts and improve conditions.

2- To safeguard the working environment of employees.

3- To use cleaner technology in the operation and expansion of CPH's airport.

4- To increase environmental awareness among CPH's employees and other users of the airport.

5- To provide information on CPH's environmental performance.

The following table summarizes the main environmental indicators used, how the data is collected and the indicator value for 1999.

Table 2-7: Main Environmental Indicators Used by Copenhagen Airports

Impact	Means of data collection	Main measures	1999 indication value
(1) Traffic and noise	Traffic statistics system: ATMs by aircraft type, off weight, use of runway and time.	Total-day-evening-night level (TDENL) method (decibel dB)	150
(2) Night time noise	Noise monitoring system	Infringement of 85 dB (A) noise limit (number)	16
(3) Engine testing	Engine test monitoring	Infringement of engine testing rules (number)	31
(4) Waste water	- Discharged volume by means of meters. - Water quality assessed by monthly water samples made by third party laboratory.	- Waste water discharged per 1000 passengers (liters). - Discharged waste quality: substances (000kgs) and Heavy metal (kgs).	18000 Biological oxygen 130, nitrogen 20, zinc 90, copper 12.
(5) Surface water	- Discharged volume on the basis of the pumb effect of CPH^S pumps or volume of participation reported by Damish Meteorological Institute. - Water quality assessed by monthly water samples mode by third party laboratory.	- Discharged surface water quality: substances (000kgs) and Heavy metal (kgs).	Biological oxygen 142, nitrogen 11, zinc 90, copper 24.
(6) Oil and fuel spills	Reports field by CPH^S safety services, fire services, and other in-house and third party sources.	- Number of spills - Volume of spills (liters)	272 15652

Table 2-7: Continued

(7) De-icing	- Volume of glycol used calculated by companies handling de-icing. - Contents of collected glycol are registered for each truck load moved away	-Consumption of glycol (cubic meters). - Collection of glycol (cubic meters).	390 330
8) Resources and energy	- Consumption based on volume purchased less quantities sold to other companies at the airport.	- Electricity consumption (Tera joule, Tj). - heating consumption (Tera Joule). - Fuel consumption (000litres) -Water consumption (cubic meters).	170 110 730 150
(9) Weed control	- Consumption of herbicides based on volumes purchased.	- Consumption of herbicides (litres)	80
(10) waste	Weighting slips or monthly statements from recipients of the waste.	- Waste per 1000 passenger (kg)	160
(11) working environment	- Reported number of industrial accidents.	Industrial accidents per 1 million worsening hours.	18

Source: Anne, 2002, p: 226

2-9-2-7 Environmental Capacity Considerations at Amsterdam Airport– Netherlands

Amsterdam Airport, which is owned by the Schiphol Group, handled 36 million passengers, 1181000 tones of freight, and 393600 aircraft movements in 1999. Through the early 1990, traffic was forecasted to grow steadily. So, in 1995 a decision was made by the government about the future development of the airport. It gave approval for a fifth runway which was aimed, not at increasing capacity, but instead at diverting traffic to a less noise-sensitive approach. A number of environmental limits were also established as follows (Anne, 2002, p: 228):

1- The acceptable noise contour was to be no larger than 15000 houses until completion of the fifth runway in 2003, and then no larger than 10000 houses.

2- Passenger numbers could not exceed 44 million in any year.

3- Cargo tones could not exceed 3.3 million in any year.

At the end of 1999, the options for the optimization of the future capacity connected with the airport have been considered. The choices included: a regulatory limit on passenger numbers, a Seven-European Surcharge of all passengers, a noise surcharge related to different levels of noise, and slot trading to achieve a maximum of 600000 annual movements. These alternatives were assessed by analyzing their impact on traffic and noise in terms of houses affected, airline cost or passenger fare, and the impact on jobs. These details could be shown in the following table (Anne, 2002, p: 229).

Table 2-8: Impacts of Different Options for Optimizing Noise Capacity at Amsterdam Airport.

	Unconstrained growth	Impact of option (% change through 1996– 2010)			
		44 million passenger limit	7 European passenger levy	1-4 European noise surcharge	Slot trading with 600000 movements limit
Movements	128	-31	-15	-8	-18
Passengers	141	- 32	- 11	- 3	- 10
Fares	5	+ 20	+ 7	+ 2	+ 6
Noise	43	- 35	- 39	- 32	- 40
Jobs	43	- 18	- 24	- 18	- 21

Source: Anne, 2002, p: 229

The results of the analysis affiliated with the table mentioned above show that, the economic costs were high compared with the Environmental benefits in general. Meanwhile, the noise surcharge provided a more optimal balance between economic costs and Environmental benefits.

2-9-3 Airline Experiences

This sub-section involves three outstanding airline case studies.

2-9-3-1 Singapore Airline – Singapore (SIA)

In compiling the Environmental performance of the operations, Singapore Airlines' activities have been divided into three main areas: flight operations, cabin services, and ground operations, as expressed below (www. SIA Group.com, 2005).

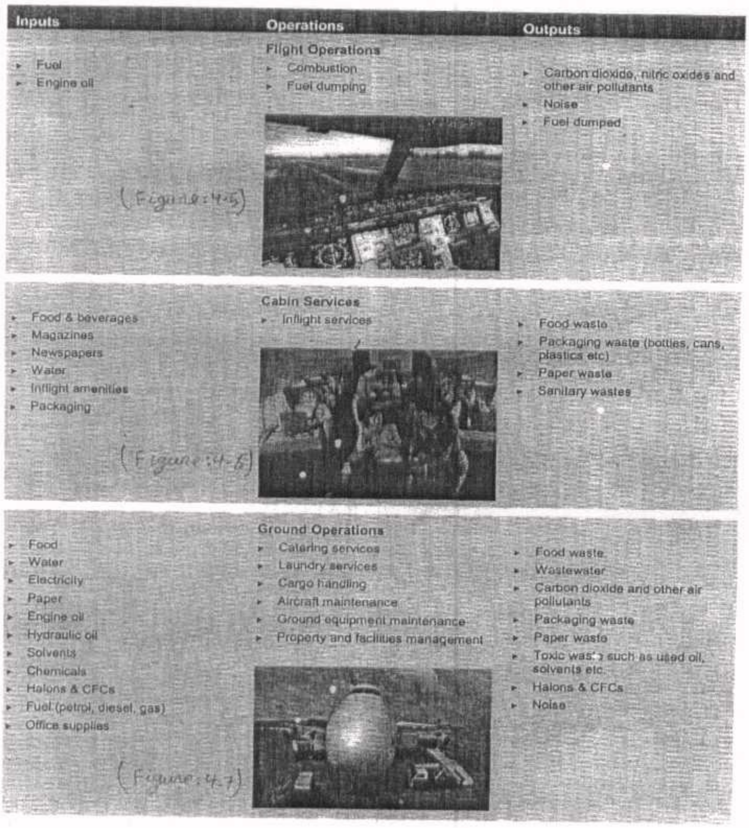


Figure 2-11: Environmental Performance in SIA - Source: www. SIA Group.com, 2005.

2-9-3-2 Lufthansa Case Study–Germany

Lufthansa airline is one of the world's ten- largest airlines. A key tenet of its environmental policy has been to continuously improve processes that have an impact on the environment. This policy is redefined every year by setting annual goals. To begin with the company's most fuel–efficient aircraft which have been found at Group Subsidiary Condor. At 3.3 liters per 100 passenger–kilometers performed, Concor's B757–200 and Airbus320 have established new benchmarks in terms of saving fuel. Lufthansa is also shipping cargo in a more environmental friendly method. By using state–of–the–art Boeing MD–11 since mid 1998, Lufthansa cargo has achieved its lowest rate in fuel consumption (0.299 liters per (TKP) Tone kilometer performed (Walle, 1991, pp: 18–19).

Moreover, Lufthansa's increasing use of hub and spoke systems and involvement in the Star Alliance is creating opportunities for controlling fuel consumption as well. This occurs by combining two half–empty flights into a single flight. The result is reduced costs and many– saved tones of kerosene.

Regarding the Ozone Layer, Lufthansa technique has eliminated the use of halogenated hydrocarbons in its maintenance and overhaul work, by introducing a complex recycling procedure. Also, the environment-damaging perchloroethylene, which was used as a cleaning and crack testing agent in the company's engine workshop, has been replaced by ultrasound and water–based alkaline cleaners. Looking into water consumption, a new water conservation program has been implemented in Hamburg. It led to the use of about 13000 cubic meters of rainwater in 1998 (Walle, 1991, p:29).

At Lufthansa Service/Sky Chefs, energy use has been in decline since 1993 and consumption of water has been reduced to 10.7 liters from 13.2 liters. In addition, Lufthansa managed to reduce its electricity consumption per transaction unit by 7.8 percent in 1998. Another achievement directed to recycling of a high proportion of waste material, with almost 50 percent at Lufthansa technique and LSG/Sky Chefs and nearly 90 percent at Lufthansa cargo centre. Finally, on short–haul routes flights are replaced by rail service wherever this makes sense. The approach used was by connecting Frankfurt Airport, the main hub of Lufthansa, with Deutche Bahn's network of high speed trains, by a cooperation agreement in 1998(Walle, 1991, p:29).

2-9-3-3 British Airways Case Study–United Kingdom

2-9-3-3-1 Social Performance

This involves ensuring that British Airways (BA) safeguards and seeks to enhance the welfare of its employees, its customers, and its communities in which it operates (BA, 2003, p: 1).

1- Its people

- **Training**

British Airways, target was to deliver 33 percent of all training online by march 2005 up from the 20 percent that it achieved in 2003 (BA, 2003, p: 2).

- **Pensions**

In May 2002, British Airways announced changes to the pensions provision it made for future new employees, moving from a defined benefit final salary basis to a defined contribution basis (BA, 2003, P: 2).

- **Tribunal claims**

During the 2002, 27 claims were concerned with the employment tribunals against companies in the British Airways Group. The majority of the claims were unfair dismissal applications and 11 claims included a discrimination element. BA successfully defended the five cases that went to hearing, seven were withdrawn, five were settled for a low commercial payment before hearing, and ten complaints were ongoing (BA, 2003, p: 4).

- **Safety and Health**

The following table shows the number of incidents reported in each category over period of 12 months, by which the year 2001 - 2002 was compared to the year 2002 – 2003.

Table 2-9: Number of Incidents by Severity in British Airway Group

Year	Minor	Serious	Major	Fatal
2001 - 2002	5608	643	19	0
2002 - 2003	6271	454	40	0

Source: BA, 2003, p: 4.

British Airways has committed to reduce the number of major injuries by 10 percent and to reduce the number of working days lost by 30 percent by 2010. Working days lost can be gotten from injury and ill health indicators.

- **Security**

British Airway installed reinforced cockpit doors across its fleets and the provision of 100 percent hold baggage screening at all departure points on its network (BA, 2003, p: 5).

- **Future Size and Shape (FSAS) Program**

It includes a voluntary approach to workforce reduction. The Business Response Schemes (BRS) offered voluntary unpaid leave, temporary part time working, and pre-retirement part time working. Also, career link was established with the aim of offering practical support to individuals affected by changes within the business (BA, 2003, p: 6).

2- Its Customers

- **Customer Satisfaction**

A complaints page has been included in the monthly board report. The following table points out the top five customer complaints in 2002 – 2003.

Table 4–9: Major Customer Complaints in BA Group (2002 – 2003)

Complaints	Percentage of Total
1- Baggage mishandled	14.0
2- Disruption of services	10.9
3- Delays	7.4
4- Cancellation / consolidation	4.6
5- Ticketing / Booking	4.0

Source: BA, 2003, p: 8

- **Customer Care**

British Airways set up an operations emergency group, to determine the appropriate action and ensuring the health and safety of passengers and crew (BA, 2003, p: 9).

3- The Community

- **British Airways' Direct Charitable Donations**

Cash donations to charity for the year to 31 March 2003 were £ 237804 (BA, 2003, p: 10).

- **The "British Airways Communities and Conservation" Program**

Over 800 travel awards were made during the year to charities and other "not for profit" organizations working in these areas (BA, 2003, p: 10).

- **Community Volunteering Awards**

More than 70 British Airways employees received grants ranging from £ 100 to £ 9000 in support of their volunteering endeavors (BA, 2003, p: 10).

- **"Give As You Earn" Program**

This enabled employees to donate over £631779 to charities of their choices (BA, 2003, p: 11)

- **"Change for Good" Program**

Since 1994 to 2003, the partnership between British Airways and UNICEF has collected over £16.6 million in unused foreign currency from British Airways' customers. This money has been used to fund various projects in countries such as Nigeria, where a school for 3000 children was rebuilt and in Zambia, where 1.2 million children were immunized against police (BA, 2003, p: 11).

*** British Airways' Social Performance at Heathrow Airport**

1- The Community Learning Centre

The British Airways Community Learning Centre was opened in October 1999. Over 20000 young people and adult learners from the Heathrow Community have participated in educational programs since its opening. 100 persons have accessed full time employment in the Heathrow area (BA, 2003, p: 12).

2- Chicken Shed at waterside

100 local children aged seven to sixteen attend weekly theatre workshops. British Airways volunteers will lead the performing arts program in the future (BA, 2003, p: 12).

3- Race for Life

£55.000 was raised for Cancer Research in UK, through sponsorship of British Airways' employees, raffles and an on-line auction (BA, 2003, p: 13).

4- Employment Diversity

In January 2003, British Airways' in partnership with Hilling don Race Equality Council supported an initiative to offer work placements to people from ethnic minorities who were trying to find permanent work (BA, 2003, p: 13).

5- Local Transport Initiatives

British Airways supports the H 30 public bus service at Heathrow and funds a substantial network of shuttle buses available to employees and visitors (BA, 2003, p: 13).

2-9-3-3-2 Environmental Performance

British Airways is interested in two key issues: the local environmental impact of aircraft noise and emissions around airports and the global climate change effect of carbon dioxide and other aircraft emissions (BA, 2003, p: 14).

1- Aircraft Noise

Source Noise Reduction

British Airways now operates one of the quietest aircraft fleets in the world. Its fleet meets the standards of the ICAO's Chapter 3 and Chapter 4 with the percentage of 97.9 and 78.3 respectively (BA, 2003, p: 14).

Land Use Planning

British Airways supports the establishment of palming zones for areas exposed to high aircraft noise to prohibit further incompatible development such as residential properties, schools and hospitals. Also, providing financial support for various forms of mitigation including relocation and sound insulation (BA, 2003, p: 15).

- Operational Procedures and Restrictions

They include the following items (BA, 2003, p: 15).

A. Optimization of Continuous Decent Approaches (CDAs) by improving flight track planning information.

B. Use of new navigational equipment and air traffic control systems.

C. Runway threshold displacements, so that arriving aircraft is higher at locations under the approach and generates less noise.

***British Airways' Noise and Emissions at Heathrow Airport**

The information about these two areas is as follows (BA, 2003, p: 16):

A. Its CDA at Heathrow have averaged 87 percent during the day and 85.7 percent during the night.

B. British Airways overall track–keeping performance (Noise Preferential Routes) in 2002 continued to be very good at 95.2 per cent.

C. British Airways has recorded only 19 departure noise violations in 2002 / 2003, a reduction of over 70 per cent from the previous year. Improved punctuality and the phase – out of the Boeing 747 – 200 fleet have both contributed to this.

D. After 10:51 pm local time, it is the British Airways policy for B747-200 departures to use full take–off power to minimize noise at the 6.5 km noise monitoring points, whilst minimizing the impact of increased NO_x emission incurred.

E. The use of fixed electrical ground power and reduce Auxiliary Power Unit (APU) running times.

2- Local Air Quality

This area includes the following items (BA, 2003, P; 16):

A. British Airways has modified the combustors in 30 of its 56 Boeing 747.400 aircraft, which reduced emissions of NO_x at airports and during the flight. This is compliant with the latest ICAO manufacturing standard in the fourth meeting of Committee for Aviation Environmental protection (CAEP/4).

B. Reducing take -off thrust.

3- Climate Change

British Airways is participating in the pioneering UK Emissions Trading Scheme. In 2002, it was reported a total of 850448 tones of CO_2 for domestic flights and UK properties, representing a 16 percent reduction on British Airways' baseline. This triggered a government incentive payment of £1.3 million (BA, 2003, p: 17).

4- Waste Management and Resource Use

Key indications for the performance during 2002 / 2003 were as follows (BA, 2003, p: 18):

A. A four per cent reduction in total water consumption.

B. A 61 per cent reduction in fuel spills.

The main waste management practices were landfill, treated liquid waste, incineration and recycling, with estimates of 68%, 26%, 2% and 4% respectively.

The examination of economics of sustainability in the aviation mentioned case studies, points out the following induced facts:

1- The implementation range of aviation economics connected with sustainability issues may be a regional policy as European Experience, a country policy like China Experience, an airport experience (Heathrow Airport), or an airline experience (British Airways).

2- There was variety of procedures to implement sustainability principles. They included: legislation, technical, economic, and administrative actions. Moreover, the clarified case studies in this current dissertation enable us to decide which procedure or action will be suitable to be used. The example was in Amsterdam Airport Experience, since the noise surcharge provided a more optimal balance between economic costs and environmental benefits.

3- The researcher will mainly depend on there case studies, while describing the current status of Egyptian Air Transport Sector (Terminal Building Three and Egypt Air Holding Company).

Summary

In this chapter there was a discussion for an introduction to air transport sector. It included details a bout the historical origins and the role of air transport in tourism development. Moreover there was shedding light on challenges that have been anticipated to confront the aviation sector in the third millennium.

The challenges included two main sections: liberalization and disceconomics and environmental and social issues. There was a consensus about cases or aspects of liberalization which were regional and bilateral agreements, and the GATS agreement. The review of literature pointed out advantages and disadvantages of liberalization in aviation business. Furthermore, it cleared the pioneer role of developed countries particularly the Untied States of America in application for principles of liberalization.

Through the chapter the environmental, social, and safety issues were dealt with in brief. There were few words attributed to the effect of these issues on real revenues of airports and airlines. Also the speech affiliated with Agenda 21 as being the popular and the most important worldwide response towards environmental, social, and safety issues, especially in aviation industry.

Chapter Two discussed the aspect considered airport development. In this area, the study handled the basic airport infrastructure, different kinds of airports, and the multifarious impacts of an airport development.

Moreover, there was a display for the failure of economic theory, and the importance of economic valuation of externalities. Also, the rudimentary role of environmental economics in quantifying, internalizing of negative impacts and by-products, and adding a price or value on damage to society. In aviation it means that air carriers and air passengers should have an implicit account of costs to residents affected by aircraft noise and emissions, as an example.

In this chapter, the study tended to talk over components of the total environmental value concept, which have fundamentally been connected with natural public resources. It may be expressed by a market value or a non-market value. In absence of a market price, the task tends to estimate consumers' willingness to pay for environmental assets and services based on them. In addition, techniques or approaches to measure the total environmental value were examined. There were three main categories: (1) valuation using market prices, (2) valuation using information on individuals' preferences, and (3) valuation using benefit transfer. The overall techniques of measure were social cost- benefit analysis and multi-criteria analysis methods. There are two types of multi-criteria analysis: (1) multi-objective analysis and (2) multi-attribute analysis. The first concentrates on feasible solutions identified by a system of constraints and pursuing a given number of objectives. The second enables decision-makers to select within a finite and explicit set of alternatives in respect to some of determined attributes.

Finally, review of literature involved three outstanding criteria or issues to be discussed in air transport sector performance, in the profile of sustainability. The first pertains to environmental aspects. The second is affiliated with social aspects. The third was an explanation for famous experiences in this field that contained two general case studies, seven airport experiences, and three airline regimes. Details in this area resulted in implicit fact, meaning that the payment (willingness to pay) to support pollution and externalities control is a function of many variables like popular attitude in society towards preservation of environment, advancing in technology... etc. The experiences provided environmental and social bounds that we can, from the researcher point of view, benefit from them in the Egyptian efforts to promote the environmental performance of Egyptian Air Transport Industry.

CHAPTER THREE

METHODOLOGY

Introduction

In Egypt, airports and resorts have the crux importance to Egyptian economy, since they have provided numerous employment opportunities (Donia Al-tyaran, 2004, P: 29). According to Ragab (2004, P: 149), most airports in Arab countries have been situated border on population settlements and, in many cases, have a bad planning. Further more, the Egyptian aviation policies affiliated with protection of the Egypt Air (the national airline in Egypt), reduced the contributions that aviation could make to national income and employment.

Methodology may be ranged from 10 to 20 of the size of thesis (Finn *et al.*, 2000, p: 81). In this chapter, the study sheds light on two main areas: (1) the structure of methodology, and (2) the Egyptian case study.

3-1 The Structure of Methodology

Descriptive Approach handles the current phenomena as they are in the real field, whether by quantative or qualitative methods. The principal purpose of the descriptive method is to evaluate things and conditions in their natural cases. (Attia, 1994, p:33; Tawfik and Mohammad, 2003, p: *105*). Regarding the case study method, it has the crux importance in data collection and analysis in Descriptive Approach (Tawfik and Mohammad, 2003, p: 184).

For techniques of analysis, statistics models that are suitable for measuring and analyzing attitudes and opinions towards a phenomenon are the Frequency, the Mean, the

Standard Deviation, and the Correlation. Furthermore, the Likert Scale is the preferable scale to measure attitudes and points of view (Abdel Razek *et al.*, 1993, pp: 497,554).

The current thesis depends on the survey method for data collection. The survey includes the Permanent Higher Committee for Environmental Affairs in the Egypt Air Holding Company (6 forms), The Public Administration of Environmental Operations (7 forms), The Egyptian Environmental Affairs Agency (3 forms), and the Public Administration for Environment in the Ministry of Civil Aviation (10 forms).

3-2 The Egyptian Case Study

According the case study method, from a theoretical point of view, the emphasis is on understanding processes alongside their contexts. Case studies approach can provide a richness and uniqueness in data. Case studies tend generally to be inductive by exploring issues in depth and in context to generate or replicate theory. The aim of this method is not only to understand the particular and unique features but also to draw out analysis that has a wider applicability (Finn *et al* ., 2000 , p: 81).

In this section, the study sheds light on three main areas of aviation in Egypt: (1) Egyptian Aviation and sustainability, (2) Cairo international Airport (TB3 and the Third Runway), and (3) the Egypt Air Holding Company.

3-2-1 Egyptian Aviation and Sustainability

This sub-section includes two parts, which are history of Egyptian civil Aviation and aviation and environment in Egypt.

3-2-1-1 History of Egyptian Civil Aviation

The beginning was the invitation of prince Emban for the super stars of international aviation to conduct an air race between New Egypt District and Giza pyramids. This action was in the Third International Festival of Aviation in 1910, which lasted a period of week, and was the commencement to pay attention to the civil aviation in Egypt. During the First Global War, Great Britain established three airports in Egypt to serve military operations. With the end of this war, Europe began its commercial air transport to Egypt. Also, by then, a department of civil aviation at Ministry of Transport was established (Tourism and Aviation Magazine, 2003, P: 8).

Now, the system of Egyptian civil aviation involves the following parts (MCA, 2006):

1- Egypt Air Holding Company

1-1 Egypt Air Company for Airways.

1-2 Egypt Air Company for Maintenance and Technical Affairs.

1-3 Egypt Air Company for Ground Services.

1-4 Egypt Air Company for Air Cargo.

1-5 Egypt Air Company for Air Services.

1-6 Egypt Air Company for Medical Care.

1-7 Egypt Air Company for Tourism and Free Shops.

1-8 Egypt Air Company for Supplementary Industries

1-9 Egypt Air Express Company

2- Egyptian Holding Company for Airports and Air Navigation

2-1 National Company for Air Navigation.

2-2 Aviation Information Technology Company.

2-3 Cairo International Airport Company.

2-4 Egyptian Airports Company, which operates: Sharm El-Sheikh Airport, El- Tour Airport, Aswan Airport, Abu Simple Airport, Asuit Airport, Dakhla Airport, Taba Airport, Hurghada Airport, El-Arish Airport, Marsa Alam Airport, East El-Owinat Airport, Luxor Airport, St-katrin Airport, and New valley (Kharga) Airport.

3- The National Institution of Aviation Training Affairs.

4- The Public Authority for Weather Measurement Affairs.

Literature told that the international changes in the aviation business mainly liberalization and GATS, will have constraints on the Egyptian air transport industry (WTTC, 1999, P: 11). Moreover, open skies will have negative impacts on the Egypt Air Company and the small carries operating in Egypt (El-Merghany, 1997, P: 47). In addition, the Minister of Tourism declared that the "Open Skies" policies will be implemented in Egypt by year 2007. It was expected that by this date the TB3 at

Cairo International Airport and the new airport of Sharm El-sheikh will be finished, and the ability of all airlines to land or take off at Cairo International Airport (Tourism and Aviation Magazine, 2005, P: 4).

Eraqi (2001, pp;127-128) explained that the Hard Rights of GATT's Annex mean no limits on aviation's movements, aircraft's capacities, operation's hours and airplane's styles, may cause adverse impacts on aviation sector in Egypt. The outstanding example is Egyptian Airports, whenever the need to increase the number of airports, provided possibilities of ground services, facilities of customs and migration, and surface access from and to the airports.

As a response for the previous challenges in international aviation mentioned above, the Ministry of Civil Aviation has enhanced the performance and capacity of its airports, to be suitable for landing of different types of airplanes and big numbers of passengers. Also, providing the airports with new equipment for their safety, fire fighting and secure and survival operations. These equipment include, for instance, Air Bags, Glue Engine, Directing cars, Ambulances, Runway Sweeping Vehicles, etc (ECAA, 1999, PP: 24-25).

3-2-1-2 Aviation and Environment in Egypt

According to El-Mobyed *et al.* (2004, P: 1030), the increase of aviation's operations has resulted in environmental externalities, which include the fallowing items:

- Pollution attributed to aircraft noise, aircraft emissions, power plants emissions, etc.

- Pollution connected with food and beverage, sewage, etc.
- Pollution occurred by natural phenomena such as dust bellowing.

Additionally, it was said that 64% of employees at Egyptian Airports are affected by noise pollution, and 60% of them are suffered from aircraft emissions (Ibid). For a study which was conducted by Ain Shams University 2001, the noise derived from aircraft at some Egyptian Airports over passed the permitted Egyptian environmental standards. The levels of noise caused by airlines at these airports were as follows (Aly, 2004, P: 95):

1- At preparation to take off, it was 130 decibel.

2- With the jet engine, it reached 140 decibel.

3- Pending operation of taking off, it was reading 150 decibel.

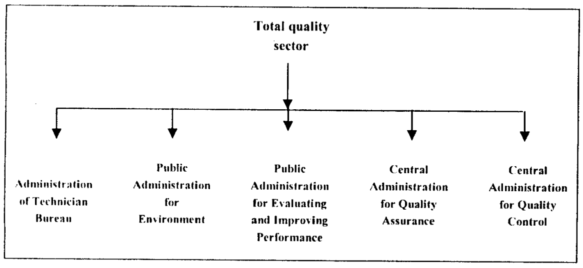
The interest in reducing negative impacts caused by aviation was to begin with resolution for Minister of Transport no. 310 for year 1998, concerning aircraft waste management and collecting and disposal of wastes at Egyptian Airports (ECAA, 1999, P: 128). In the same year, the ECAA's Head of Board has issued the decree no., 115, to establish the Public Administration for Environment. This decision compromised the following Subjects (ECAA, 1999, pp; 128-129):

1- Establishment an administration named "Public Administration for Aviation and Environment Affairs". It was directly supervised by the Minister of Civil Aviation. Now it is a department of the Total Quality Sector, as it is illustrated in figure 3-1.

2- The administration is responsible for making policies and setting plans, to protect civil aviation environment in corporation with concerned authorities.

3- The administration's field of research involves: environmental impact assessments, environmental record, environmental disasters, greening affairs at airports,and environmental training and awareness.

Figure 3-1: The Structure of Total Quality Sector at MCA



Source: MCA, 2006

Literature explained that the Egyptian Environmental Affairs Authority (EEAA), as a responsible agency to implement the environment law no. 4 for year 1994, has determined the method of environmental impact assessment at airports as follows (ECAA, 1999, pp: 129-130):

1- The airports that their main runways are longer than 1500 meters require complete environmental impact assessments.

2- Project description and its related sites; services provided; the general planning for equipment in site; and maps with suitable scales, contour maps, surround places near roads and cities, managerial limits, and surface water.

3- Description of the vicinity environment, including the current environmental condition and prospective changes, with the consideration of geology weather, air quality, water resources, floods and surface water monitoring plan, mitigation plan and alternatives to supposed project.

In addition to the mentioned efforts to protect environment, the Public Administration for Environment set an environmental audit check list for Egyptian Airports (Appendix No.1).

3-2-2 Cairo International Airport (TB3 and the new runway)

The Cairo International Airport has been passed though main three phases. Details are provided in the following pages of this section.

Phase One

The beginning was in the first part of 1960s. The airport was as an alternative for El-Highkstep Airport. The terminal Building 1 (TB1) at the Cairo International Airport was inaugurated in March 1963 with cost of three million Egyptian pounds (Shalaby, 2003, P: 66).

Phase Two

It was supposed that TB1 will be capable of matching passenger movements for at least forward fifty years. But after just 10 years, the carrying capacity of the airport was overloaded. The response was the establishment of the Terminal Building 2 (TB2) after 17 years of the first airport (TB1). The costs of TB2 were 150 million Egyptian pounds. However, the TB2 did not solve the problem of air movement congestion, particularly when two airplanes arrive to its runway at the same time (Ibid).

Phase Three

Increasing the air traffic operations at TB1 and TB2, their maximum capacity is 9.5 million passenger per year, has led to think of establishment TB3. The commencement of setting the TB3 was in August 2003. Its capacity was supposed to be 11 million passengers per year and will be finished through four or five years, and will be finished through four or five years (2007 or 2008). The costs of TB3 and its supplementaries have been estimated to be more than two billion Egyptian pound (Tourism and Aviation Magazine, 2005, P: 17).

The TB3 project stretches over an area of 164 thousand meter square. The TB3 is nearby TB2 and they will be connected by a sky way. The TB3 includes arrival and departure salls both international and domestic which have been proposed to be equipped with modern technology. Also, there are 15 leading up bridges for airplanes and 56 aprons, beside to 122 aprons for

TB1 and TB2. Unlike TB1 and TB2, the 15 fingers (gates) enable passengers to walk from the terminal to the airplane and vice versa (tourism and Aviation Magazine, 2006, PP: 12, 14).

According to Eraqi (2001, PP: 115-117) and Ministry of Civil Aviation (2002), it is possible to summarize the status of air transport in CIA as the following mentioned items:

1- The Percentage of modern airplanes operating at the CIA was 31.7 from the total of aircraft number. This type of airplanes includes airbus and Boeing 767, which are less noisy than others. Meanwhile, the percentage of supersonic air craft, such as concord, was 1.1 from this estimate. Boeing aircraft came in the first rank with estimate of 45.1% and Airbus type in the second rank representing 24.6%.

2- The concentration of air traffic at the CIA is through 6.00 a.m to 12.00 at noon. The daily aircraft movement's rate was 270 airplane / day, and in peak days it was 337 airplane / day. Also aircraft movements per hour were 11.25 airplane / hour and in peak times were 14 airplane / hour which means that there is nearly one airplane every five minutes and every four minutes for the former and for the later consequently. Furthermore, Egypt Air fleet represented 25% from the total air traffic movements and occupied the first rank.

3- The old air jets and propeller airplanes represented 68.3% of airplane movements at the CIA. The B 707 and DC8 styles represented 11.1% from this number and they resulted in more noise levels at the CIA.

4- The night aircraft movements were 42.2% with increased noise problems affecting on local vicinity. Styles B747-300 and B 747-400 had the first position among airplanes with characteristics including weight (371 tones), charge of landing ($ 1110.95 in the day and $ 1388.69 in the night), parking ($ 60.58 in the day and $ 75.72 in the night), and aerospace navigational services ($604.8).

5- Sunday and Thursday together have most of aircraft environments, while these days are the period of the weekly rest for the overwhelming percentage of Cairo citizens. This means more of noise stress on them.

6- The daily noise percentage at the CIA was approximately 85.189 decibel, the weekly noise percentage was 596.323 decibel, and the monthly noise percentage was 2555.67 decibel. The noise rate of the aircraft per hour was 3650 db/hour and nearly 60 db / minute.

The following pages provide more details on TB3 at Cairo International Airport (The case study of this dissertation) particularly environmental and social assessment.

3-2-2-1 Objectives of the TB3 Project

The key development objectives of the airport development project are to foster more rapid economic growth, capitalize on Cairo International Airport's potential as a regional Hub for passengers and freight, and augment Egypt's foreign exchange earning capacity (World Bank, 2004b, P:1).

3-2-2-2 Description of the TB3 Project

Complement to details which are mentioned in phase three of the CIA's history, there is a concise explanation of the TB3.

The proposed Airport Development Project (ADP) would consist of the following elements (World Bank , 2004b , P: 1):

1- Civil works (construction of TB3 and CV2 and a third runway).

2- Equipment for TB3, as well as transfer and storage equipment for CV2.

3- Technical assistance (e.g. assistance in tendering of new airport concessions and supervise works).

The overall cost of the TB3 project was estimated to be $350 million, divided into $ 280 million as a loan of the World Bank and $ 70 Million from the Egyptian side (www.Civiaviation.gov).

The TB3 project would consist of the following principal components (Horus Magazine, 2005(3), P: 56):

1- One new terminal building that was estimated to include a ground floor, three main floors, and two administrative floors. The main floors are classified as: the first and the second for arrival and departure of international flights respectively, whereas the third is affiliated with arrival and departure of domestic flights.

2- One concourse.

3- Three skyways; two connecting the concourse with fingers and one connecting TB3 with TB2.

4- Fingers conducting passengers to airplanes.

5- Electromechanical equipment.

The runway would be four kilometers in length, 65 meters wide, and will accommodate the future generation of aircraft that will land at CIA and will carry between 600 and 800 passengers. The evaluated cost to build the new runway was $ 50 million (World Bank, 2004b, P: 2).

The Cargo Village Two (CV2) should provide a 14.000m^2 covered storage facility during phase one, and an additional 8.000m^2 during phase two; by 2010. With finishing of the building of CV2, it would contain up to 135.000 tons per year. It was estimated that the cost of phase one to be $ 25 million, of which 35 percent would be for cooling equipment and refrigeration storage (World Bank, 2004b, P: 2).

3-2-2-3 The Environmental and Social Assessment of TB3 and the Runway 05RR-23LL

The headlines of the TB3 and the new runway project at Cairo International Airport are outlined as follows (Donia Al-Tyaran Magazine, 2004, P: 30):

1- The study of noise impact attributed to both aircraft engines and ground vehicles engines.

2- The expected movement of vehicles on main roads leading to the airport and their impacts on the site area.

3- The social and economic impacts study related to the airport employees and residents nearby it.

4- The air quality study concerning the airports employees, the local people surrounding the airport, and the atmosphere and Ozone Layer.

5- The energy, biological livings, surface and ground water build environment, wastes (solid – liquid), infrastructure, and safety and security studies.

The Environmental Management Plan (EMP) of the TB3 and runway 05RR-23LL includes a set of mitigation, monitoring and institutional measures to be taken during the construction and operation phases. (EHCAAN *et al.*, 2003, P: 197). More details in the following pages.

3-2-2-3-1 Construction Environmental Management Plan (CEMP)

A- Mitigation

As a minimum, mitigatory measures will be required in the following areas (EHCAAN *et al.*, 2003, P: 198):

1- Reduction in construction waste.

2- Minimizing hazards to workforce and resident populations during construction process.

- **Noise**

The formulation of a construction noise mitigation strategy is outlined in the following table.

Table 3-1: Construction Noise Mitigation Strategy of TB3

Mitigation	Description	Noise Attenuation dB(A)
Level One	Use of good site practices to limit noise emissions at the source.	Not quantified
Level Two	Selection of quiet plant and working methods.	3
Level Three	Construction of temporary noise barriers.	5-10
Level Four	Relocation of equipment and/or reduction of number of plant items.	3-5
Level Five	Limiting equipment operating time.	3

Source: EHCAAN *et al.*, 2003, P: 200

Level one's measures

This includes practices that reduce noise levels emitted from construction site activities on nearly Noise Sensitive Receivers (NSRs). These approaches are cleared in the following elements (EHCAAN *et al.*, 2003, P: 201):

1- Use of wall- maintained plant equipment.

2- Avoiding prolonged operation noisy equipment close to NSRs. Machines and plant (such as trucks and cranes) that are used intermittently should be shut down or throttled down during periods of inactivity.

3- Correct orientation of plant known to emit noise in one direction.

4- Ensuring silencers or mufflers on construction are properly fitted.

5- Mobile plant should be sited as far away from NSRs.

6- Screening by material stockpiles, mobile container site office and other structures should be utilized.

7- Noisy activities can be scheduled at midday, or at times coinciding with periods of high noise, such as during peak aircraft movements.

Level two's measures

It may be considered reasonable to set plant noise performance specifications for specific plant equipment so that some flexibility in selection of plant is allowed (EHCAAN *et al.*, 2003, P: 202).

Level three's measures

It is assumed that movable noise barriers can achieve a 10-dB (A) noise reduction for stationary plant and a 5-dB (A) noise reduction for mobile plant. Moreover, generators and compressors can be partially or completely enclosed to give a total reduction in the order of 15-25 dB (A) (EHCAAN *et al.*, 2003, P: 202).

Level four's measures

Relocation for plant items or avoiding operating all equipment at the same site location will reduce the noise impact from construction activities. Examples are parked trucks, dispersed use of equipment, and separation of excavators by 200m, or more (EHCAAN *et al.*, 2003, P: 203)

Level five's measures

It is necessary to restrict the operation of mechanical equipment to only 50 percent of any given time period (Typically a 30-minute period). This can achieve a further reduction of up to a 3-dB (A) noise reduction (EHCAAN *et al.*, 2003, P: 203).

• **Air Quality (Dust)**

The generation of nuisance from related dust may be significant at a number of locations, but these effects can be managed by implementing procedures and requirements to control dust at its source. All staff operating in dusty areas should be provided with masks and goggles, while a respirator is required in unmoral circumstances. Dust suppression measures were expected to include the following items (EHCAAN *et al.*, 2003, PP: 204-205):

(1) The regular watering of exposed areas

1-1 A minimum application rate of three times per day on all exposed surfaces will be required.

1-2 Areas where there is a regular movement of vehicles shall be monitored and watered as required.

(2) Site access and control

Wheel washing facilities shall be installed and used by all vehicles leaving the site. Such wheel washing facility shall be available for use prior to any earthworks or excavating activity on the site. No earth, mud, debris, dust and the like will be deposited on public roads.

(3) Development of a haulage pavement

The contractor shall be required to identify a route from the site to the waste disposal areas.

(4) Vehicle speed and Exhausts

Motorized vehicles within the site should be restricted to a maximum speed of 15 k/h. All site machinery exhausts shall be directed vertically upwards away from the ground.

(5) Stockpiles and plants

Position all dust generating plant and stockpiles far from NSRs.

- **Water Quality (Surface Water Runoff)**

Water quality control includes measures as follows (EHCAAN *et al.*, 2003, PP: 206-207):

(1) Management of surface Run off

1-1 All channels permanent and temporary and any temporary evaporation ponds utilized in the site drainage are maintained to prevent flooding, overflowing, and erosion.

1-2 All temporary hard/ compacted areas, exposed surfaces, or storage areas will be designed to discharge to evaporation ponds.

(2) Chemical contamination

2-1 Fuel/oil tanks and chemical storage tanks/areas should be provided with locks and placed on compacted areas within bunds that have a capacity equal to 110 percent of the storage capacity of the longest tank.

2-2 Oil interceptors should be provided in any drainage system downstream of possible oil/fuel pollution sources.

(3) Sewage

Portable toilets and sewage holding tanks should be placed on the site.

(4) Spills

Ensure that there can be no direct discharge to the water courses, to the drainage system, or off the site. The wash down waters are collected and directed to an evaporation pond.

- **Waste**

(1) Excavated waste, construction waste, and general refuse waste management plans are based on the following priority principles (EHCAAN *et al.*, 2003, P: 207):

1-1 Avoidance and minimization of waste generation.

1-2 Good site management. This is particularly for bulky materials such as concrete, mortar and cement grouts, and panels.

1-3 On-site reuse of materials to avoid unnecessary transport and disposal requirements.

1-4 Off-site recycling. Concrete and masonry can be used as general fill and steel reinforcement bars can be utilized in steel mills.

1-5 Treatment and disposal acuing to relevant regulations, guidelines, and good practice.

(2) Chemical wastes

Table 3-2 highlights the classes of chemical waste, which may be generated as a result of construction activities.

Table 3-2: The Classes of Chemical Wastes of TB3

Waste Class	Source	Acceptable Disposal Route	Comments
Paint, Resins, etc	Buildings	Secure landfill	
Metal finishing waste	Workshops	Secure landfill	
Oils, oily waste, oily sludge	Maintenance facilities	Waste oil or sludge treatment	Secure landfill in small quantities if contamination precludes pre-treatment
Alkali	Maintenance facilities	Secure landfill	
Acid	Maintenance facilities	Secure landfill	
Organic solvents	Maintenance facilities	Solvent reclamation	Special disposal

Source: EHCAAN *et al.*, 2003, P: 75.

In specific terms, the plan must (EHCAAN *et al.*, 2003, P: 209):

(1) Ensure that use of appropriate containers for the storage of wastes which will:

- Be suitable for the substance they are holding.
- Have a capacity of less than 450 liters unless otherwise approved by Cairo Airport Authority (CAA).
- Display a label in English and Arabic.

(2) Ensure that the storage area for chemical wastes is clearly signed and enclosed on at least three sides, has an impervious floor, is adequately ventilated, and is covered to prevent rainfall entering.

(3) Ensure that chemical waste is disposed of:

- By a licensed waste collector and transported to a licensed facility.
- To a waste re-user approved by CAA.

- **Natural Environment (Fauna and Flora)**

A list of ecological components of the project site and adjacent areas and their attributes has been constructed on the relative importance as it is mentioned in table 3-3. The relative importance score is based upon the resilience and uniqueness of the ecological attribute and the severity and reversibility of the potential impact that might affect it as a result of the project. A relative importance score is ranging form "0" for ecologically insignificant attributes, to "3" for the highly significant attributes.

Table 3-3: Ecological Impact Assessment of TB3

Ecological Attributes	Relative Importance
TB3 Site	
Eco- system integrity	0
Primary productivity	0
Natural habitats	0
Flora	0
Fauna	3
Threatened biodiversity	0
Natural drainage	0
Surface features	0
Airport Undeveloped Land	
Eco-system integrity	1
Primary productivity	1
Natural habitats	1
Flora	1
Fauna	1
Threatened biodiversity	0

Table 3-3: Continued

Natural drainage	1
Surface features	0
Desert Habitat	
Eco-system integrity	2
Primary productivity	1
Natural habitats	1
Flora	1
Fauna	3
Threatened biodiversity	3
Natural drainage	1
Surface features	1
Protected Areas	
Wadi Digla Nature Protectorate	3
Petrified Forest Nature Protectorate	3

Source: EHCAAN *et al.*, 2003, p: 78

The analysis of table 3-3 indicates that the natural ecology of the TB3 site has been radically altered or eliminated altogether as a result of urban development. Whereas, the desert country to the east of the airport still supports some significant biodiversity.

- **Cultural and Archaeological Sites**

There are no known archaeological or cultural sites that will be affected by the construction or operation of TB3 or runway 05RR-23LL. (EHCAAN *et al.*, 2003, p: 79).

- **Construction Economic Impacts**

It is estimated that the total direct monetary benefits of construction phase (2004-2006) will be more than EGP 5 billion, moreover the generation of no less than 5 thousand new direct job opportunities. For indirect and induced monetary benefits impacts, they were supposed to range from EGP 8 to 12 billion and creation of 15 thousand induced opportunities (EHCAAN *et al.*, 2003, p: 80-81).

B- Monitoring

This will be achieved through a program of site inspections and a more limited program of audits.

- **Site Inspections**

The proposed site inspections must be carried out on a regular basis. As a minimum, the obligatory program outlined in table 3-4 should be concerned.

Table 3-4: Suggested Site Inspections during the Construction Phase

Project phase	Inspections
Construction	2 visits to each primary site per quarter 1 visit to each of other sites per quarter
Post Construction	1 visits to each remediation site during remediation 2 visit to each remediation site 12-18 months after remediation

Source: EHCAAN *et al.*, 2003, p: 214

- **Site Audits**

It was prospective that the CAA will supervise all activities related to the CEMP. It is possible that some activities will require technical or physical inputs beyond the CAA's normal scope of activities. These will be the responsibility of contractors, supervised by the CAA (Source: EHCAAN *et al.*, 2003, p: 216).

The analysis of the construction environmental management plan shows the following deductions:

1- The plan only stated mitigation measures regarding nuisance resulted from dust and ignored other adverse impacts in terms of air quality such as exhaust emissions from plant and construction traffic.

2- The ecological impact assessment stated the relative importance of ecological components, which will be affected by the project. However it couldn't quantify negative impacts, which will eventually be manifested because of replacing the natural ecosystems with a man-made environment (fauna and flora) and cultural and archaeological sites.

3- However, the mitigation measures of the construction noise were clear and determined. Besides, waste management plan has been based on priority principles or choices.

3-2-2-3-2 Operational Environmental Management Plan (OEMP)

A- Mitigation Measures

This sub-section discusses the mitigation methods connected with unavoidable environmental impacts due to the nature of airport operations.

- **Noise**

The noise impacts from the operation of the TB3 facility are likely to be the following Sources (EHCAAN *et al.*, 2003, p: 223):

1- Aircraft taxiing to and from TB3.

2- Aircraft powering up a long side TB3 on the aircraft apron.

3- The servicing of aircraft on the apron between aircraft arrival and departure.

4- Vehicle traffic arriving and departing TB3.

Airport related noise can be broadly mitigated and managed as follows (EHCAAN *et al.*, 2003, p: 225):

1- The aircraft noise:

a. The sound power of the aircraft as a source.

b. Community impact management (land use planning).

c. Operational restrictions.

2- The TB3 complex, which will be designed and constructed using materials that should limit external noise being received inside the terminal building.

- **Air Quality**

The activities that could potentially affect air quality as a result of TB3 operations include the outlined items below (EHCAAN *et al.*, 2003, p: 229):

1- Increases in aircraft numbers arriving at Cairo International Airport on account of the increase in TB3 capacity over the long term.

2- Aircraft taxiing to and from TB3.

3- Aircraft engines idling or powering up on the apron outside TB3.

4- The exposure of fuels, oil, lubricant ,etc to the atmosphere.

5- The use of back-up diesel generators and boiler plants at TB3, or within the airport complex to serve TB3.

6- Potential odor from the collection, storage, transportation of sewage / waste water and solid waste.

7- Increased vehicles arriving / departing TB3 and idling outside the terminal building.

Strategies to achieve the best practice in air quality management should be as follows (EHCAAN *et al.*, 2003, p: 230):

1- Implement programs for emission measurement and action plans.

2- Support and promote emission abatement technologies, i.e. for vehicles operating at the airport.

3- Evaluate, through trials and peer-review, the opportunities of new operational procedures for aircraft.

4- Ensure ground power and pre-conditioned air is provided to all aircraft parked at the terminal gates to reduce the need for aircraft to use Auxiliary Power Units (APUs).

5- Encourage airport users, staff and employees to use alternative means of transport to and from the airport, such as public transport.

6- Support and promote the use of the Ring Road as an alternative route to the main arterial road (Orouba Street).

7- Development and implementation of spill management plans for refueling operations and storage areas, to minimize evaporation into atmosphere.

8- TB3 authority should undertake energy consumption audits of the operation of the terminal building and associated facilities.

- **Social and Economic Effects**

To mitigate the socio-economic effects of the TB3 development, the CAA should endeavor to the following methods (EHCAAN *et al.*, 2003, p: 235):

1- Measures for the enforcement of existing laws pertaining to construction in the airport must be devised.

2- Running of management / staff seminars on the expansion plans (3 months prior to construction), placing of internal memorandum/notice in halls, and organizing of onsite visits for employee by the Public Relations Sector.

3- A portion of redundant airport labor should be absorbed by TB3. This can be achieved through a capacity building program that will upgrade the skills and knowledge of current airport employees to suit private sector requirements.

4- Services and employee benefits at TB2 should be upgraded such as the quality of the medical coverage and health services offered by Egypt Air Hospital.

5- Airport staff working in areas where the noise and air pollution levels are high, especially the runway technicians, should be provided with protective gear.

- **Water Quality**

The following are measures to ensure surface water quality is maintained at acceptable levels as a result of the TB3 and runway operation (EHCAAN *et al.*, 2003, p: 237):

1- New or existing storm water collection drains should be connected to the combined storm water / sewerage system.

2- If any area can not be connected to the combined storm water or sewerage system, the storm water should be discharged into an evaporation pond / trench.

3- Storm water drain inlets should be fitted with oil filters and litter traps to collect course sediment and oil.

4- Hard stand areas where maintenance is carried out ought to be regularly swept to collect particulate matter.

5- Spill management procedures must be carried out.

6- Storage containers must have airtight lids and be monitored for corrosion and leakages.

- **Solid Waste Management**

(1) Aircraft Waste

Air craft solid waste will arrive at TB3 in two forms (EHCAAN *et al.*, 2003, p: 238):

a- Cabin waste; consisting of papers, magazines,etc.

b- Food stiffs / food wastes; remains of in flight meals.

Cabin waste must remain separated and transported for offsite recycling. Food waste should be disposed of to landfill as soon as possible (EHCAAN *et al.*, 2003, p: 238).

(2) TB3 Waste

The waste management plan of TB3 was supposed to be based on the following priority principles (EHCAAN *et al.*, 2003, p: 238):

a- Avoidance and minimization of waste generation.

b- On site reuse of materials.

c- Recycling, by removing all recyclable material to an appropriate off site recycling station.

d- Off site disposal in accordance with the relevant guidelines or regulations of the city.

- **Sewerage and Waste Water Management**

(1)- TB3 waste water and sewerage system will be connected to the Naser city sewer system. Several measures will be employed at the source to improve the quality of the waste discharging as follows (EHCAAN *et al.*, 2003, p: 240):

a- Waste water from kitchens ought to pass through grease traps before discharging into the disposal system.

b- Oil and course sediment traps should be installed on all storm water drain inlets.

c- Bunding and spill management response systems to avoid spills from entering the sewerage system.

(2)- Aircraft waste arriving at TB3 was expected to be collected and transported by service truck to the existing chlorination station at TB2 till year 2010. After chlorination, the treated product must be discharged into the existing city sewerage system (EHCAAN *et al.*, 2003, p: 240).

- **Landscape and Ecology**

The ecological impact assessment stated that there would be little impact as a result of TB3 development, owing to the limited flora and Fauna found on the already modified site. However, the finished TB3 will be fully landscaped to make the facility aesthetically pleasing. This can occur by designs that require a minimal watering regime and be in keeping with the flora native to the area (EHCAAN *et al.*, 2003, p: 240).

- **Institutional Structures and Human Resources**

In May 2003, an environmental Department was established within the organizational structure of CAA. This department is under the control of the General Department for Public Relations and was joined with the Translation Section. In terms of the environment, its primary function is to monitor the execution of new projects, as well as assessing CAA's operational adherence to environmental guidelines. A staff training program could include the following syllabuses (EHCAAN *et al.*, 2003, p: 242):

1- Environmental impact assessment of airport operations.

2- Environmental management and mitigation of airport operations.

3- Specialized technical training in projects and activities that have an environmental impact (e.g. air pollution, noise pollution, etc.).

B- Monitoring

Monitoring will be undertaken as part of the TB3 and Runway OEMP for several reasons as follows (EHCAAN *et al.*, 2003, p: 248):

a- To ensure that mitigation measures are copied with and are achieving the desired outcome.

b- To identify problems as they arise, so they can be resolved quickly.

c- To allow informed decision making in relation to future airport facilities and development surrounding the airport by providing information on the environmental impacts of the airport operations.

C- Institutional Arrangements

The parties that should need to be involved in the framework of the OEMP are (EHCAAN *et al.*, 2003, p: 260):

A- The contractors responsible for the setting up of the monitoring programs.

B- The environmental department at CAA.

C- The chairman of CAA.

D- The Egyptian Environmental Affairs Agency.

E- The Ministry of Civil Aviation.

F- The local and central government planning bodies.

The display of the OEMP for the TB3 and its annexes leads us to the same results which have been stated in the CEMP. Furthermore, the researcher will depend on the entities that have been mentioned in the institutional arrangements of the OEMP, as possible as, to distribute his questionnaire and conduct interviews of the current dissertation.

3-2-3 Egypt Air Holding Company

Egypt Air Holding Company has had a relative importance to the Egyptian Economy. This importance can be measured by several ways like (1) Contribution to employment, (2) The financial turnover of Egypt Air compared to the rest of the travel and tourism industry, and (3) The relative contribution to foreign exchange earnings (WTTC, 1999, P: 9). This section is divided into three branches. The first is the historical background on Egypt Air, the second is affiliated with companies of the Egypt Air Holding Company, and the third addresses the Permanent Higher Committee for Environmental Affairs.

3-2-3-1 The History of Egypt Air

Egypt Air is one of the oldest airlines in the Arab Area and in the world as a whole. Talat Harb established it in accordance to the Royal Resolution on 7 may 1932, and the first head of board was the pilot Kamal Alwy. This was is association with Air Work Company, under the name of Misr Air Work. Its main objectives were to promote the spirit of aviation and air mindset among Egyptian youth, and to provide an example of the combination between the techniques of aviation and the superior touches of Egyptian Hospitality (Tourism and Aviation Magazine, 2003, PP: 8-9; Horus Magazine, 2005 (3,4), PP: 60.50).

Using Gypsy Moth airplanes, the company tought the art and science of flight and aeronautical engineering. In august of 1933 Misr Air Work commenced the commercial operation with a Spartan cruiser from Cairo to Alexandria. By1935, a total of 12 De-Haviland aircraft were added to its fleet (www.egyptair.egypt guide.net, 2005).

During the Second World War, the Egyptian Government took over the airline and its name was changed to Misr Airlines. In 1946, the name was changed again to Misr Air and 10 Beach Craft were purchased. These aircraft were the first

American Planes in the fleet. By 1949, Misr bought 10 Vickers Vikings and in the following year it put into service the French Aircraft named the Languedoc (www.Egyptair.egyptguide.net ,2005). Moreover in 1956, Misr Air became one of the airlines that flew the Turboprop Vickers Viscount Airplanes. In 1958, it purchased five Mc-Donnell Douglas DC-3 Dakotas to serve domestic routes. Also, during the political union between Egypt and Syria, Misr Air was amalgamated with Syrian airlines and became known as the United Arab airlines (UAA). By year 1961, the two companies were disconnected. In year 1962, the Presidential Resolution was issued to form the Arab Institution of Aviation. By year 1964, the issuing of Presidential Resolution to set the Arab Public Institution of Air Transport, which included: (1) The United Arab Aviation Company; international airways, (2) The karnak Company for Travel and Tourism, (3) The Public Company of Aviation Services, and (4) The Egypt Air Company; domestic airways (Tourism and Aviation Magazine, 2003, PP: 8-9).

In 1971, there was the Presidential Resolution to establish Egypt Air Institution, so as to replace the Arab Public Institution of Air Transport. By 2002, the Presidential Resolution no. 137 to reform Egypt Air Institution to Egypt Air Holding Company, which has had eight companies as follows: (1) Egypt Air for Airways, (2) Egypt Air for Air Services, (3) Egypt Air for Medical Care, (4) Egypt Air for Tourism and Free Shops, (5) Egypt Air for Air Cargo, (6) Egypt Air for Ground Services and (7) Egypt Air for Maintenance and Technical Affairs (Tourism and Aviation Magazine, 2003, PP: 8-9).

Furthermore the following table points out the number of airplanes that are belonged to the Egypt Air Holding Company at present. Table 3-5: The Aeronautical Fleet of Egypt Air

Type	No. of planes
Boeing 777-200	Five
Airbus 320-200	Thirteen
Boeing 737-500	Four
Boeing 737-800	Two
Airbus 330-200	Seven
Airbus 300-B4	Two (Cargo)
Airbus 340-200	Three
Airbus 321-200	Four
Airbus A300-600F	One (Cargo)

Source: Horus Magazine, 2006(6), P: 50

3-2-3-2 The Companies of Egypt Air

The Egypt Air Holding Company has been divided into nine main companies.

3-2-3-2-1 Egypt Air Company for Air Cargo

The dimensions that compose the policy of this company are the following items (Tourism and Aviation Magazine, 2005, P; 65):

A- Air transport for commodities and mail.

B- Building and operating cargo settlements.

C- Complement the system of air transport with land and sea transport systems.

D- Meeting requirements of IATA, ICAO and MCA.

As being the crux air cargo agent in the Middle East Area, the company provides its services to more than 45 international airlines at CIA. Additionally, its activities have been extended to cover 67 international airports. Currently, it owns and operates some cargo colonies: Cairo Cargo Village, Alexandria cargo Village, 10th Ramadan Cargo Village, and Cargo Village in Luxor. Also, some foreign places for collection and distribution of cargo such as Ostand Airport in Belgum and Han Airport in Germany (Horus Magazine, 2005 (3, 4), PP: 60, 50; Tourism and Aviation Magazine, 2005, P: 65).

3-2-3-2-2 Egypt Air Company for Air Services

The company main activity is to provide meals and other navigational services to Egypt Air and foreign international airlines. For example, at the CIA it directs the services to Egypt Air and 110 international airlines. As a result of increasing rates of air traffic movements and desire to increase activities of the company there was the opening of the headquarters at the CIA with an area of $5200m^2$. Also, the company has promoted the size of services to include Hurghada Airport with capacity of 3000 meals per day (Horus Magazine, 2005, (3, 4), PP: 60, 50).

Moreover, the company does supplementary activities as follows (Tourism and Aviation Magazine, 2005, P: 51):

A- Management and service of cafeterias at airports.

B- Management and service of the hotel serving transit section at CIA.

C- Provision meals to the hospital of Egypt Air.

D- Establishment a factory of dry ice with productivity 625 Kg/h, to serve airplanes, hotels, and the public.

E- Activity of food and beverage (banquets at conventions and conferences.

3-2-3-2-3 Egypt Air Company for Ground Services

The activity of ground services in Egypt Air Holding Company began in year 1938. The duty of this company is to provide all types of ground services to Egypt Air and all other airlines (more than 80 international carriers) that need this sort of service in Egypt or abroad (Hours Magazine, 2005 (3,4) , PP: 60,50).

In addition there are subsidiary activities connected with this company which include the following types (Tourism and Aviation Magazine, 2005, P: 50):

A- Activities of land transport for employees.

B- Specific workshops for metal wood products to achieve self sufficiency for Egypt Air companies and to make best use of its extra working power.

C- Engineering activities to satisfy Egypt Air needs at workshops and furniture affairs.

D- Consultative services for building projects.

As a model of Egypt Air companies, the study which was conducted by the Total Consultative Center pointed out shortage in achievement the criteria and standards pertaining to quality, safety, and environment in performance of Egypt Air Ground Services Company. The report discovered that there are 75 items uncompatible with the three previous mentioned ISO's aspects (Abdel Mougheith, 2005, P: 7).

3-2-3-2-4 Egypt Air Company for Maintenance and Technical Affairs

The company supervises all overhauling, changes, inspecting works, auditing, and technical services connecting with aircrafts, engines, and equipments (Horus Magazine, 2005 (3,4), PP: 60,50).

Besides, the Technical Training Center (TTC) provides maintenance and overhaul courses on all aircraft types for different specialties. The center's fundamental purpose is to qualify and develop the personnel of Egypt Air in the field of maintenance and overhaul and to satisfy training needs of airlines in the Middle East Area. The courses include: general emergency course, initial course, transition course, refresher course, difference course A 320 / A 321, and hazardous materials course (Egypt Air, undated).

3-2-3-2-5 Egypt Air Company for Airways

The airways network began since year 1933 through the bounding up with domestic flights from Almaza to Marsa Matrouh and from Alexandria to Port Said. Also, in the same year it was the commencement of international flights to be conducted to El-khartoum, El-Hegaz, Baghdad, Damascus, Amman, Beni Ghazi. After the end of the Second World War, specifically in year 1947, there were 11 points (5 domestic cities and 6 international cities). By year 1961, the airways network included 27 foreign cities and 5 local cities. Through year 1971, it consisted of 42 international cities and 11 local cities. Now, there is conduction of flights to 72 foreign cities and 12 domestic cities, with the number of 400 flights per week (Tourism and Aviation Magazine, 2003, P: 9).

3-2-3-2-6 Egypt Air Company for Tourism and Free Markets

The beginning was since year 1963, by selling classic and traditional commodities such as cigarettes, perfumes and gifts. It has tourism bureaus in Egypt and provides its services abroad through Egypt Air offices which are scattered all over the world. The major activities of this company are organizing sightseeing tours accompanied by experienced guides, helping passengers to finish arrival and departure procedures, and providing accessibility service to railway stations and ports all around 24 hours (Hours Magazine, 2005, (3,4) , PP: 60,50).

3-2-3-2-7 Egypt Air Company for Medical Care

The health treatment for Egypt Air employees was based on health insurance discipline. At the end of 1960s the medical council was established in Almaza District. It was including 20 doctors, external clinics, and a pharmacy. Also, there was a clinic at the CIA with a pharmacy. All surgical operations were done at external hospitals and no health insurance for families of employees (Tourism and Aviation Magazine, 2003, P: 9).

The Egypt Air Hospital was opened in 1984, to provide health services for employees of Egypt Air and their families, any workers in civil aviation sector, and those of contracting companies with Egypt Air Hospital. It has external clinics at CIA at the area of preventive medicine, and the Egypt Air administrative square (Join) Furthermore, it is the only hospital in Egypt that has a department for aviation medicine, to make the medical tests for pilots and flight attendants (Hours Magazine, 2003, (3,4) , PP: 60,50).

The hospital has Intensive Care Unit equipped with modern technologies; kidney Diseases Unit providing medical care for patients under Renol Dialysis; Dental Department for Oral and Dental Patients; Surgical Rooms to operate Microscopic Surgeries, Surgical Endoscopies, Surgical Tumors, Orthopedics Operations, Urology (Ear, Nose, and Throat Operations), and Eyes Surgeries. Moreover, it has Laser Unit for diseases of Retina, Vitreous Body and Cataract by using Ultrasonic Waves Equipment. The hospital contains a section to operate the Plastic Surgeries such as Fact Suction, Burns, Tattoo... etc. Other divisions existed like Laboratories, Oncology and Nuclear Medicine, Radiology Department, Ophthalmology, Physic Therapy, and Urinary Teratology (www.egyptair.com.eg, 2005).

3-2-3- 2- 8 Egypt Air Company for Supplementary Industries

This company is the newest member of the Egypt Air Holding Company. It was created to support the wide variety of services provided by Egypt Air and its subsidiaries. The supplementary industries (Leather Goods Factory, Plastic Products Factory, Textile Factory, and Furniture Factory) provide everything from personnel uniforms; in-flight utensils; dining ware; plastic components for the airplane seats; to metal tools for maintenance, ground services, leather goods, office, and hotel furniture. A state-of-the art press supports all the needs of Egypt Air from letterhead to tickets and boarding passes (Hours Magazine, 2006, P: 42).

3-2-3-2-9 Egypt Air Express Company

Its main activity is to provide short and mid-range flight service for the domestic and regional markets. An agreement has been made with prominent Brazilian aircraft manufacturer Embraer to buy six of their mid-range EMB-170 aircraft (with an option to purchase six more) to be used as the Egypt Air Express fleet. The first EMB-170 aircraft was expected to arrive in April 2007, at which time Egypt Air Express will start its services. The remaining five planes are due to be delivered through May and June 2007 (Hours Magazine, 2006, P: 2).

3-2-3-3 The Permanent Higher Committee for Environmental Affairs

Chairman of Egypt Air, engineer/Mohammed Fahim Rayan issued decree no 1045/1999 forming the Permanent Higher Committee for Environmental Affairs. The committee is responsible for the following items (Egypt Air, 2002a):

A- Drawing up the general policy to deal with all activities of civil aviation from an environmental point of view, through a planned program and mechanisms that comply with environmental laws.

B- Issuing the environmental register for all sectors of Egypt Air, According to which, all environmental elements will be available for local and international inspections.

C- Environmental compliance and management within Egypt Air.

The rules and laws applied in Egypt Air Holding Company regarding to the environmental work are as follows (Egypt Air, 2002b, P; 9):

A- Civil Aviation Law no.28/1981 – international procedures of IATA and ICAO.

B- Environmental Law no. 4/1994 and its executive list no. 338.

C- Labor Law no. 137/1981 section 5 (professional safety and Health).

D- Work procedures in Egypt Air- section 20 (safety).

E- Rules of Chairman no. 11/1990, 10/1994, 7/2000 for prohibiting smoking in work locations and monitoring the execution of these rules

The literature said that, the environmental register of Egypt Air is the first out come of co-operation between the committee and the monitoring authorities. It is the first environmental document for regulating and activating the environmental work at all sectors of Egypt Air Holding

Company. The contents and details of this register are expressed in appendix no. 2 of this study.

Displaying the efforts of Egypt Air towards environmental protection mentioned in this dissertation, it may be said that Egypt Air has started a new era to guide its operations and businesses for environmental compliance. However, this progress to achieve sustainability in performance of Egypt Air is almost relative as being stated, for example, in the report of Total Consultative Center affiliated with the Egypt Air Company for Ground services.

Summary

Chapter three has handled the literature affiliated with the methodology' structure including the Egyptian aviation case study.

Literature stated that the beginning of interest to protect Egyptian civil aviation environment, and to sustain the aeronautical operations was in 1998, since the Decree for Minister of Transport no. 310, concerning aircraft and airports waste management. Moreover, the Resolution of the ECAA Head of Board no. 115 to establish a public administration to protect environment and control civil aviation operations, so as to achieve sustainability.

The objective of the TB3 and the new runway project is to maximize the capacity of the CIA so as to accommodate increase in air movements. This project contains of three aspects: civil works, equipment for TB3 and CV2, and technical assistance. Its cost was supposed to be $ 350 million. Besides, the project capacity was estimated to be 11 million passengers per year and will be inaugurated in 2007 or 2008. The study expressed some introductory ramifications pertaining to the environmental and social assessment of the project. They mainly connected with mitigation measures regarding nuisance, the ecological impact assessment, and mitigation measures belonged to cultural and archaeological sites.

The history of Egypt Air began in 1932 in accordance to the Royal Resolution, which was motivated by Talat Harb. It has had many modifications, in name and responsibilities, through its history. Now, the Egypt Air Holding Company has nine main companies namely; Egypt Air Company for Airways, Egypt Air Company for Cargo, Egypt Air Company for Air Services, Egypt Air Company for Ground Services, Egypt Air Company for Medical Care, Egypt Air Company for Tourism and Free Markets, Egypt Air Company for Maintenance and Technical Affairs, Egypt Air Company for Supplementary Industries, and Egypt Air Express Company.

The interest of Egypt Air in environmental issues was in 1999, Since the Chairman Decree no. 1045 to form the Higher Permanent Committee for Environmental Affairs. However, Egypt Air efforts to protect environment are relatively little and it did not gain any certificate of the environmental ISO (14000s) till May 2007.

CHAPTER FOUR

RESULTS AND DISCUSSION

(FIELLD STUDY)

Introduction

This chapter consists of three main parts: (1) Results connected with Cairo International Airport (TB3); (2) Results related to Egypt Air Holding Company; and (3) Results affiliated with correlation analysis among Respondents' answers.

4-1 Results Pertaining to the Terminal Building Three

The table 4-1 provides us with information and details about the feasibility study of the Terminal Building Three and the types of total environmental value attributed to it, according the order mentioned in the questionnaire form.

Table 4-1: The Frequencies, the Mean, and the Correlation Affiliated with the Cairo International Airport

Questions	Frequencies %						Mean	Standard Deviation	Chi. Square (Correlation)
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Totals			
1	30	40	30	-	-	100	4.00	0.79	0.555
2	20	25	45	10	-	100	3.55	0.94	0.118
3	10	40	40	10	-	100	3.50	0.83	0.777
4	-	15	60	20	5	100	2.85	0.75	0.063
5	15	20	50	15	-	100	3.35	0.93	0.821
6	10	15	50	25	-	100	3.10	0.91	0.877
7	25	15	45	15	-	100	3.50	1.05	0.119
8	20	-	65	10	5	100	3.20	1.06	0.051
9	20	20	50	10	-	100	3.50	0.95	0.215
10	10	-	70	10	10	100	2.90	0.97	0.265
11	10	10	65	5	10	100	3.05	1.00	0.270
12	10	20	55	5	10	100	3.15	1.04	0.636
13	15	15	55	5	10	100	3.20	1.11	0.309
Totals							**3.30**	**0.95**	**0.390**

From the previous table we can implicit the following facts and results:

The moderate value of mean that lays between the alternatives agree and neutral. The total mean value (3.30) indicates that there is no ability to describe the situation of the feasibility study of TB3 by concerning stakeholders. This result is subsidized by the weak correlation value (0.390) between answers of respondents and the overwhelming agreement of opinions represented by the total standard deviation value (0.95).

2- Estimation of benefits / losses pertaining to employees and revenues of TB3 at Cairo International Airport and the governmental taxes (direct use value) has the first position with the mean value (4.00), the standard deviation value (0.79), and the strong correlation value (0.555). Respondents say that most of the Egyptian projects' feasibility studies depend mainly on determination of direct use value. This is compatible with Bush (2000, pp: 429–435) who said that traditional economic theory deals only with commodities that have a price; which brings us to the concept of market value.

3- Specification of benefits / losses connected with market services in the surround areas of the Terminal Building Three Project (indirect use value) occupies the second position represented by the mean value (3.55), the standard deviation value (0.94), and the correlation value (0.118).

4-Quantification of benefits / losses affiliated with the existence and use of the TB3 project or not (market option value); Specification of welfare benefits / losses that future generations – For example through 50 years, will gain in the nearby areas Of TB3 (Altruism value); and determination of (passive nonuse value) have the third rank by the mean value (3.50). This is accompanied with standard deviation values (0.83, 1.05, and 0.95) and correlation values (0.777, 0.119, and 0.215) respectively.

5-Quantification of benefits / losses that future airports are expected to hold as a result of the existence of the Terminal Building Three project (bequest value comes in the fourth center with the mean value (3.35), the standard deviation value (0.93), and the correlation value (0.821).

6- Specification of the total market value which includes direct use value, indirect use value, and option value (use value); determination of the nonhuman value; and the total economic value of alternative projects (social opportunity cost) have the fifth order by the mean value (3.20), the standard deviation value values (1.06 and 1.11), and the correlation values (0.051 and 0.309) separately in the mentioned order.

7- Evaluation of the market benefits / losses of opportunities foregone affiliated with alternative projects (private opportunity cost) occupies the sixth center by the mean value (3.15), the standard deviation value (1.04), and the correlation value (0.636).

8- Estimation of market benefits / losses that the TB3 project will cause on the biological species in their own right (nonhuman value) comes in the seventh rank with the moderate mean value (3.10), the standard deviation value (0.91), and the correlation value (0.877). This matches with the argument which is stated in table no.5-3. The analysis of table 5-3 indicates that the natural ecology of the TB3 site has been radically altered or eliminated altogether as a result of urban development. Whereas, the desert country to the east of the airport still supports some significant biodiversity.

9- Evaluation of the total benefits / losses pertaining to the sum of nonhuman value and total economic value (total environmental value) has the eighth order represented by the moderate mean value (3.05), the standard deviation value (1.00), and the weak correlation value (0.270).

10 - Determination of total benefits / losses concerning to the use value and the passive nonuse value (the total economic value) has the ninth position with the semi-moderate mean value (2.90), the standard deviation value (0.97), and the strong correlation value (0.265).

In the last position, the tenth order is determination of future benefits / losses that people place on the existence of the TB3 project, even if they do not be expected to use it, or do not live near it (the existence value). It has the semi-moderate value (2.85), the standard deviation value (0.75), and the weak correlation value (0.063).

Based on the previous answers affiliated with the feasibility study of Terminal Building Three and owing to the respondents' points of view, one can implicit the following results:

1-There is no logical order in answers of the respondents regarding priority areas for the feasibility study of the Terminal

Building Three at Cairo International Airport. For instance, they gave the fifth order for the social opportunity cost value, while they gave the eighth order for the total environmental value of the Terminal Building Three.

2-The decision – makers at the Ministry of Civil Aviation do not pay equitable attention towards the environmental affairs in the Egyptian Airports.

3-The environmental audits conducted out by the Public Environmental Administration show the following facts:

A- There is no responsible for the environmental affairs in almost of the Egyptian Airports.

B- The environmental organizational structure at the Ministry of Civil Aviation is recent (since 1998) and ineffective in its authorities, possibilities, and training affairs.

C- The need to have the permission of the concerned institution to be inspected according the environmental standards and criteria.

4-In the case of a new airport the role of the Public Environmental Administration is coordination with consultative bureaus to prepare the comprehensive feasibility study for it.

5-There is no best use of techniques to measure the total environmental value in the feasibility study of Terminal Building Three (TB3) at Cairo International Airport. However there are three main categories mentioned in the literature review in this current study: (1) valuation using market prices, (2) valuation using information on individuals' preferences, and (3) valuation using benefit transfer. The overall techniques of measure were social cost- benefit analysis and multi-criteria analysis methods.

6-The main purpose of preparing the feasibility study of Terminal Building Three (TB3) at Cairo International Airport had been to gain the acceptance of the World Bank to fund the TB3 project.

7-For consistency of the previous results, it has been depended on the reliability scale with the alpha value of the study variables equals (0.8969). This alpha value is greater than (0.7), which means that there is a high degree of consistency between variables and the study results could be accepted.

4-2 Results Affiliated with the Egypt Air Holding Company

The following table shows details about respondents' answers connected with the environmental performance in the Egypt Air Holding Company, due to the sequence in the form of questionnaire.

Table 4-2: The Frequencies, the Mean, and the Correlation Affiliated with the Egypt Air Holding Company

Questions	Frequencies %						Mean	Standard Deviation	Chi. Square (Correlation)
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Totals			
14	31.58	21.05	21.05	10.53	15.79	100	3.42	1.46	0.873
15	52.63	10.53	21.05	15.79	-	100	4.00	1.20	0.100
16	36.84	21.05	36.84	5.26	-	100	3.89	0.99	0.021
17	31.58	26.32	21.05	5.26	15.79	100	3.53	1.43	0.075
18	36.84	[illegible]	42.11	10.53	5.26	100	3.58	1.26	0.323
19	52.63	26.32	21.05	-	-	100	4.32	0.82	0.205
20	21.05	42.11	21.05	-	15.79	100	3.53	1.31	0.020
21	42.11	31.58	21.05	5.26	-	100	4.11	0.94	0.076
22	42.11	36.84	21.05	-	-	100	4.21	0.79	0.276
23	52.63	21.05	26.32	-	-	100	4.26	0.87	0.012
24	10.53	10.53	47.37	26.32	5.26	100	2.95	1.03	0.527
25	10.53	21.05	36.84	15.79	15.79	100	2.95	1.22	0.279
26	31.58	15.79	21.05	15.79	15.79	100	3.32	1.49	0.767
27	21.05	15.79	31.58	15.79	15.79	100	3.11	1.37	0.820
28	21.05	15.79	26.32	15.79	21.05	100	3.00	1.45	1.00
29	31.58	15.79	31.50	21.05	-	100	3.58	1.17	0.020
30	36.84	5.26	42.11	-	15.79	100	3.47	1.43	0.184
Totals							**3.60**	**1.26**	**0.349**

Analyzing of table 4-2 points out the following implications:

1-There is no agreement a bout the criteria of the environmental performance. This represented by the mean value (3.60), the standard deviation value (1.26), and the significantly weak correlation value (0.349).

2-Identification of fuel cost per passenger-kilometer for passenger aircraft and per ton- kilometer for cargo aircraft comes in the first order with the mean value (4.32), the standard deviation value (0.82), and the relatively weak correlation value (0.205).

3-According to the respondents there are techniques and practices to make fuel consumption saving as follows:

A- Leaning of the freight towards the back of a plane that also facilitates the process of taking-off.

B- Avoiding the nose-heavy planes such as Airbus 321-200 which pertains to air cargo.

C- Altitude, the more high altitude, the less need to the pushing power for airplanes. This results in little amount of used fuel.

D- Turning off some of the aircraft's engines during the operation or phase of arrival and departure taxiing.

E- The direct air flight route lessens the percentage of fuel consumption.

F- Following correct procedures for loading aircraft as mentioned below:

- The fuel provision process should come in the beginning accompanied by the Ground Power Unit (GPU).
- The rest of operations like catering, loading of cargo, embarking of passengers ought to be occurred after the process of fueling, to avoid accidents and for safety conditions.
- Avoiding turning on the equipment of the ground service out of the loading process.

- Using a vehicle named transporter to carry dollies means saving in consuming fuel, time of loading, and taking part of accidents.
- All processes of loading should be conducted on the right side of the plane except passenger embarking on the left side. This procedure makes best use of time, fuel, and safety items.

G- The fuel operation must be suitable for the requirements of the Main Aerodynamic Chord (MAC). The MAC is an imaginary line / axe on which the center of gravity moves during operations of fueling / defueling, loading/ offloading, passengers embarking / disembarking, and pending the flight. There are two types of fuel MAC namely; zero fuel weight MAC (on the ground) and take off weight MAC.

4-Evaluation of Safety cost pertaining to Egypt Air passengers and crews occupies the second position by the mean value (4.26), the standard deviation value (0.87), and the significantly weak correlation value (0.012). Owing to respondents, the procedures of safety include gloves, napkins, glasses, reflective dress for night or mist, etc. There is shortage in these procedures which is attributed to unawareness, high costs of these items, or disobeying for compulsory rules.

Moreover Egypt Air Holding Company has created a register for the injuries of the work divided into categories like what has been mentioned in the experience of the British Airways in this thesis. The injuries have been four categories namely: minor, serious, major, and fatal. This is compatible with Fewster and Appelbaum (2004, p: 9) that information about safety and customer satisfaction can be obtained in a number of varied forms including: corporate audits, employee opinion surveys, focus groups and customer feed back.

5-Determination of security cost connected with equipment and employees occupies the third rank by the mean value (4.21), the standard deviation value (0.79), and the significantly weak correlation value (0.276). Egypt Air is keeping in touch with international airlines in this area. An example has been mentioned in the British Airways experience which installed reinforced cockpit doors across its fleets and the provision of 100 percent hold baggage screening at all departure points on its network.

6-Quantification of the value affiliated with employees' pensions has the fourth order with the mean value (4.11), the standard deviation value (0.94), and the correlation value (0.076). Due to the respondents the social care for retired employees is tended according to the vision of each the head of board of the Egypt Air Holding Company. Furthermore there is no accuracy in statistics affiliated with social care specifically pensions.

7-Estimation of professional cost pertaining to diseases, death levels, and the reduction in the productivity of employees has the fifth position by the mean value (4.00), the standard deviation value (1.20), and the correlation value (0.100). The Permanent Higher Committee for Environmental Affairs has recently submitted a register that includes these issues.

8-Identification of direct costs, opportunity costs, and environmental costs connected water and sewage development and treatment comes in the sixth rank with the mean value (3.89), the standard deviation value (0.99), and the correlation value (0.021). Respondents say that sewage car pulls the liquid waste from the aircraft to the hole of public sewage link at the airport. However, there are no isolation for the coming plane and no injection for employees or the sewage car.

This procedure is pursuing to what has been stated in the literature pointed out that there are two main approaches to handle sewage discharges: a public sewage line and a private sewage disposal system which must be installed if the first is not available or not capable of handling sewage (Stutts and Borsenik, 1987, pp: 470–471; Gleick, 2000, pp: 15–16; www.aviation and the environment-soil and water pollution index, 2005).

But there is no clear determination of means of data collection about waste water which may include the following items: discharged volume by means of meters and water quality assessed by monthly water samples made by third party laboratory. The main measures, such as waste water discharged per 1000 passengers (liters) and discharged waste quality: substances (000kgs) and Heavy metal (kgs), do not mentioned either.

9-Estimation of monetary losses attributed to hitting birds by airplanes of Egypt Air and identification of cost concerning advertisement for vacant jobs to offer a fair and equal opportunity to applicants come in the seventh center by the mean value (3.58), the standard deviation values (1.26, 1.17), and the correlation values (0.323, 0.020) respectively.

According to respondents the number of birds in Cairo International Airport is few, so there is no problem of accidents or losses affiliated with hitting birds. For vacant jobs there is no accurate amount of spent money, although five percent of employees must be handicapped persons.

9- Quantification of monetary benefits gained from solid waste management (source reduction, reuse, recycling, recovery and incineration, or disposal; and estimation of environmental training costs for employees have the eighth center accompanied with the mean value (3.53), the standard deviation values (1.43, 1.31), and the correlation values (0.075, 0.020) separately in the mentioned order.

Respondents state the following information a bout solid waste management in Egypt Air Holding Company:

A- All phases of waste management (collection, transport, and disposal) are performed by Care Service Company.

B- The Institute of Technical Safety, Ain Shams University, is charged with the radioactive wastes.

C- The toxic medical wastes are separated from others and are put in red plastic bags, while other wastes are thrown in black bags. The waste of medical needles and cutters is put into plastic barrels.

D- Care Service Company takes the solid wastes to the governmental factories of solid waste processing in

Aboud, El-Salam, and El-Obour districts. Also, to factories owned by individuals, such as Manshia Nasr Factory which is belonged to the Dust Men Society.

E- Recycled materials like egg boxes, match boxes, match sticks, handkerchiefs, pencils, etc., are common products resulted from the solid waste management process.

For the environmental training and awareness pertaining to employees of Egypt Air, there is a monthly magazine that addresses environmental issues inside Egypt Air companies. This magazine is created by the Permanent Higher Committee for Environmental Affairs. However, there is neither determined number of benefits gained from solid waste management, nor costs of environmental training for employees.

10- Determination of the fund connected with the Permanent Higher Committee for Environmental Affairs at Egypt Air comes in the ninth order with the mean value (3.47), the standard deviation value (1.43), and the correlation value (0.184).

11- Application of "polluter pays principle", particularly environmental taxes and surcharges on flights of Egypt Air has the tenth rank by the mean value (3.42), the standard deviation value (1.46), and the correlation value (0.873).

In Egypt there is no equitable application of environmental taxes. However, this type of taxes is applied all over the world especially in Europe and the United States of America. Environmental taxes are an answer for the Committee on Aviation Environmental Protection's measures. The example is in Amsterdam Airport Experience, since the noise surcharge provided a more optimal balance between economic costs and environmental benefits.

11- Estimation of costs affiliated with modification of combustors in aircraft and vehicle fleets to reduce emissions of No_x and Co_2 and quantification of sound insulation grants to the local community have the eleventh and twelfth positions with the mean values (3.32, 3.11), the standard deviation values (1.49, 1.37), and the correlation values (0.767, 0.820) respectively.

Respondents state the following information about the noise and emissions of the aircraft:

A- Functional procedures to control noise and emissions of the airplane:

- Reducing the flying time of airplanes over the tarmac. The long flying time is attributed to the traffic congestion at airports.
- Dragging the plane till the beginning of the runway to take off and push it back by special equipment to its park of the airport's apron system.
- Reducing the rotation rate of the time for taking-off that affects the economics of the flight also. For example, the $17 million lose in revenues of the airlines operating at Cairo International Airport in year 2005 which was attributed to the strike of the navigation officers.

B- The technical procedure to control noise and emissions of the airplane is represented in designing environmental friendly engines. This action will be cheaper than the periodic overhauling.

C- The chapter four aircraft are the latest and the best style in the history of the aircraft industry. This type of airplanes results in less noise and few emissions. Boeing and Airbus styles include both chapter three aircraft and chapter four aircraft. The European Union uses the chapter four airplanes in 70% of its fleet, while the United States of America has this type of aircraft in nearly 35% of its fleet.

D- There is no chapter four aircraft owned by Egyptian airlines till 2007. Egypt Air Holding Company has sold its fleet (Airbus + Boeing) to the manufacturers as a deposit for chapter four aircraft transactions. Now, Egypt Air Holding Company is renting its fleet from the manufactures of Boeing and Airbus styles.

E- The noise and emissions certificate is issued once in the shelf-life of the aircraft. The certificate may be only be changed or modified in case of new measures and standards of ICAO.

13- Estimation of Egypt Air Funds to local projects that protect cultural and natural assets comes in the thirteenth position by the mean value (3.00), the standard deviation value (1.45), and the correlation value (1.00). However, there is no accurate statistics in this area, merely some individual financial aids.

14- Estimation of charitable donations value per year which are directed from Egypt Air to the local community and identification of volunteering awards that are gained from the local community as result for endeavors of employees have the fourteenth position with the mean value (2.95), the standard deviation values (1.03, 1.22), and the correlation values (0.527, 0.279) separately in the mentioned order.

However, respondents say that employees can get rewards such as:

- Financial help in incidents or accidents.
- Medical care.
- Hage and Omra.
- Free flight ticket after three years of the recruitment and two flight tickets after 20 years.
- Retirement celebration.
- 24 pound as a monthly bonus per a child.

In general, economics of Egypt Air flights, owing to respondents, includes the following items:

1- Expenditure of Egypt Air flights

- Aircraft share price (handling for flight).
- Fuel provision.
- Ground handling by other companies.
- Repairs and spare parts.
- Over flying or stopping over fees.
- Administrative expenditure.
- Food and beverage (catering on airplanes).

- Arrival and departure taxes.

- Environmental taxes.

2-The relationship among companies of Egypt Air during preparation for a flight.

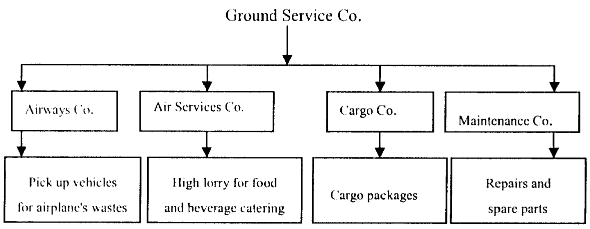


Figure 4-1: The Teamwork of Egypt Air's flights

3- Revenues of ground services

A- Pay load that consists of live load (passengers) and the dead load (baggage of passengers, cargo, mail parcels).

B- Ground handling both for MS and foreign carriers.

4- Ground handl ing economics

A- Aircraft handling for flight (the main activity).

B- Auxiliary activities such as:

- Unit Load Devices (ULDs) concerning the cargo of wide body aircraft.

- Baggage identification.

- Straps and stretchers.
- Cargo of Aircraft on Ground (AOG). For example, this may occur for repair affairs of aircraft.

5- Components of the main activity of the aircraft handling for the flight.

A- Loading platform in case of wide body aircraft.

B- Passenger stairs.

C- Passenger vehicles like VIP cars and coaches.

D- High lorry for food and beverage catering.

E- Conveyor belt.

F- Aircraft waste pick up vehicles.

G- Generating power unit which exists at Terminal Building 1, unlike pipes at Terminal Building 2.

H- Loading tractors.

I- Loading labor.

J- Traffic officers.

K- Air starter in case of weak batteries of aircraft.

L- Air condition unit used in case of bad weather.

6- Egypt Air Holding Company has not gained any environmental ISO14000 certificates. However, Egypt Air has made several significant accomplishments. Examples are the renewal of IATA Operational Safety Audit (IOSA) certification, which is the highest in the world for civil - aviation security and safety granted by the IATA, and Egypt

Air Maintenance and Engineering Company that has been awarded the European Aviation Safety Agency (EASA) Part-145 phase two certification (according to respondents' answers and Horus Magazine, 2006, p: 2).

7- For consistency of the previous results, it has been depended on the reliability scale with the alpha value of the study variables equals (0.9153). This alpha value is greater than (0.7), which means that there is a high degree of consistency between variables and the study results could be accepted.

4-3 Correlation Analysis among Respondents' Answers

Details in this area are pointed out at tables from 6-3 to 6-31. The study concentrates on the over- moderate and strong correlation. The importance of this section lays in providing information that enables the decision- makers to take the right resolutions and measures affiliated with the total environmental value and the environmental performance. Decision- makers can anticipate for a criterion by knowing its correlation values with the other criteria.

Table 4-3: Correlation Analysis of Question 1

Item	Q14	Q26
Q1	0.572	0.572

Table 4-3 indicates that the correlation values affiliated with estimation of benefits / losses pertaining to employees and revenues of TB3 at Cairo International Airport (Direct use value) are as follows:

1- The governmental taxes and application of "polluter pays principle" particularly environmental taxes and surcharges on flights (0.572).

2- Costs connected with modification of combustors in aircraft and vehicle fleets (0.572).

Figure 4-2 displays this relationship of correlation as a model 1 of the researcher point of view about the expected relationship of correlation values.

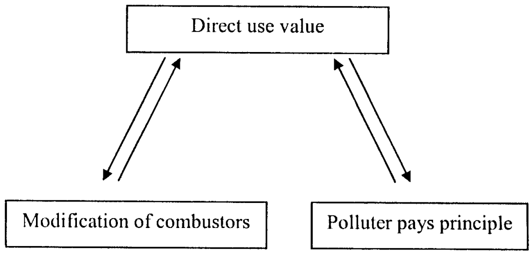


Figure 4-2: Model 1 of Correlation Relationship

* Own elaboration based on results review

Table 4-4: Correlation Analysis of Question 2

Item	Q3
Q2	0.505

The above mentioned table shows that there is a correlation value (0.505) between estimation of Benefits / losses connected with market services in the surround areas of TB3 (Indirect use value) and benefits / losses affiliated with the existence and the use of TB3 or not. Figure 4-3 displays this relationship of correlation as a model 2 of the expected relationship of correlation values.

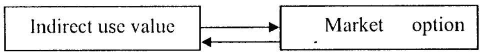


Figure 4-3: Model 2 of Correlation Relationship

*** Own elaboration based on results review**

Table 4-5: Correlation Analysis of Question 3

Item	Q2	Q22	Q25	Q26
Q3	0.505	0.565	0.552	0.580

According to table 4-5, benefits / losses affiliated with the existence and the use of TB3 or not (Market Option Value) has the following items:

1- Benefits / losses connected with market services in the surround areas of TB3 (0.505).

2- Security cost attributed to equipment and employees in Egypt Air Holding Company (0.565).

3- Identification of volunteering awards that are gained from the local community for the volunteering endeavors of employees (0.552).

4- Costs affiliated with modification of combustors in aircraft and vehicle fleets (0.580).

Figure 4-4 illustrates this relationship of correlation as a model 3 of the expected relationship of correlation values.

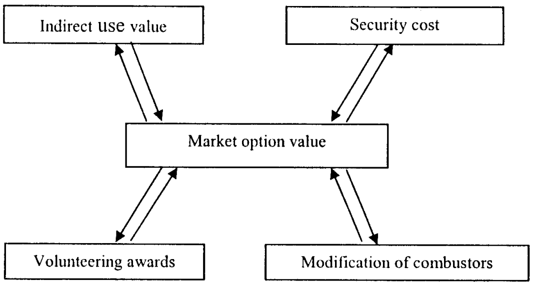


Figure 4-4: Model 3 of Correlation Relationship

*** Own elaboration based on results review**

Table 4-6: Correlation Analysis of Question 4

Item	Q5	Q6	Q8	Q10	Q20	Q21	Q22	Q23
Q4	0.534	0.643	0.575	0.635	0.637	0.547	0.592	0.615

From table 4-6 we find future benefits/losses that people place on the existence of the TB3 project, even if they do not expect to use it or do not live near it (Existence value) has the following correlation values:

1-Benefits/losses those future airports expect to gain as a result of the TB3 project (0.534).

2-Market benefits/losses that the TB3 project will cause on the biological species in their own right (0.643).

3-Total market value, which includes direct use value, indirect use value, and option value (0.575).

4-Total benefits/losses concerning to use value and passive nonuse value (0.635).

5- Environmental training costs for employees (0.637).

6- Employees pensions (0.547).

7- Security cost attributed to equipment and employees (0.592).

8- Safety cost pertaining to Egypt Air passengers and crews (0.615).

Figure 4-5 illustrates this relationship of correlation as a model 4 of the expected relationship of correlation values.

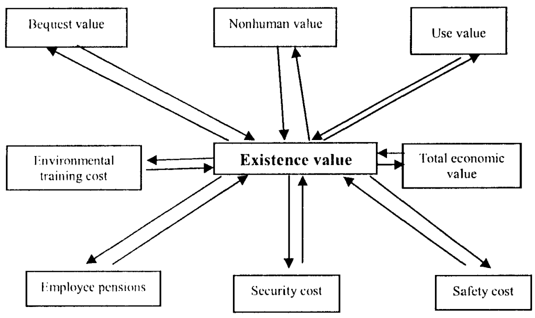


Figure 4-5: Model 4 of Correlation Relationship
*** Own elaboration based on results review**

Table 4-7: Correlation Analysis of Question 5

Item	Q4	Q6	Q7	Q9	Q10	Q11	Q12	Q13	Q15	Q19	Q20	Q22	Q23	Q25	Q26	Q30
Q5	0.643	0.761	0.671	0.626	0.623	0.658	0.702	0.745	0.563	0.601	0.744	0.766	0.642	0.547	0.597	0.527

The quantification of benefits/losses that future airports expect to gain as a result of the TB3 project (Bequest Value) correlates with the following items:

1- Future benefits/losses that people place on the existence of the TB3 project, even if they do not expect to use it or do not live near it (0.643).

2- Market benefits/losses that the TB3 project will cause on the biological species in their own right (0.761).

3- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.671).

4- The passive nonuse value that includes the bequest value, existence value, and altruism value (0.626).

5- The total economic value which has the total benefits/losses concerning to use value and passive nonuse value (0.623).

6- The total environmental value that consists of the total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.658).

7- The market benefits/losses of opportunities foregone affiliated with alternative projects (0.702).

8- The social opportunity cost that includes the nonhuman value and total economic value of alternative projects (0.745).

9- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.563).

10- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.601).

11- Environmental training costs for employees (0.744).

12- The security cost attributed to equipment and employees (0.766).

13- The safety cost pertaining to Egypt Air passengers and crews (0.642).

14- Volunteering awards that are gained from the local community for the volunteering endeavors of employees (0.547).

15- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.597).

16- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.527).

Figure 4-6 illustrates this relationship of correlation as a model 5 of the expected relationship of correlation values.

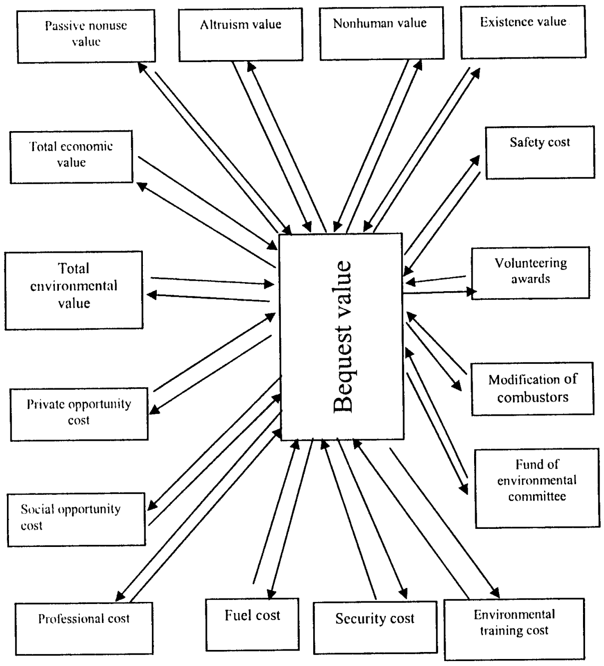


Figure 4-6: Model 5 of Correlation Relationship

*** Own elaboration based on results review**

Table 4-8: Correlation Analysis of Question 5

Item	Q4	Q5	Q8	Q10	Q11	Q12	Q13	Q16	Q17	Q20	Q21	Q23
Q6	0.643	0.761	0.525	0.727	0.572	0.594	0.501	0.346	0.566	0.592	0.700	0.681

There is a relationship between the nonhuman value and other criteria of evaluation. The correlation values are as follows:

1- Future benefits / losses that people place on the existence of the TB3 project, even if they do not expect to use it or do not live near it (0.643).

2- Benefits / losses that future airports expect to gain as a result of the TB3 project (0.761).

3- The total market value, which includes direct use value, indirect use value, and option value (0.525).

4- The total economic value that includes total benefits/losses concerning to use value and passive nonuse value (0.727).

5- The total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.572).

6- The market benefits/losses of opportunities foregone affiliated with alternative projects (0.594).

7- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.501).

8- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.346).

9- Monetary benefits gained from solid waste management -source reduction, reuse, recycling, recovery & incineration, or disposal (0.566).

10- Environmental training costs for employees (0.592).

11- Employees' pensions (0.700).

12- The safety cost pertaining to Egypt Air passengers and crews (0.681).

Table 4-9: Correlation Analysis of Q7

Item	Q5	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q19	Q20	Q22	Q23	Q26	Q27	Q29	Q30
Q7	0.671	0.853	0.900	0.621	0.677	0.746	0.770	0.766	0.875	0.601	0.888	0.748	0.817	0.599	0.766	0.626	0.565	0.777

Owing to table 4-9, the altruism value correlates with the following items:

1- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.671).

2- The total market value, which includes direct use value, indirect use value, and option value (0.853).

3- The passive nonuse value that consists of the bequest value, existence value, and altruism value (0.900).

4- The total economic value that includes total benefits/losses concerning to use value and passive nonuse value (0.621).

5- The total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.677).

6- The market benefits/losses of opportunities foregone affiliated with alternative projects (0.746).

7- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.770).

8- Application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air (0.766).

9- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.875).

10- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.601).

11- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.888).

12- Environmental training costs for employees (0.748).

13- The security cost attributed to equipment and employees (0.817).

14- The safety cost pertaining to Egypt Air passengers and crews (0.599).

15- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.766).

16- Sound insulation grants to the local community (0.626).

17- The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicant (0.565).

18- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.777).

Table 4-10: Correlation Analysis of Question 8

Item	Q4	Q6	Q7	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q19	Q20	Q21	Q22	Q23	Q26	Q27	Q28	Q29	Q30
Q8	0.575	0.525	0.853	0.757	0.793	0.639	0.594	0.550	0.656	0.673	0.839	0.729	0.700	0.680	0.649	0.595	0.694	0.558	0.571	0.583	0.758	0.832

The correlation values that are affiliated with the use value are indicated below:

1- Future benefits/losses that people place on the existence of the TB3 project, even if they do not expect to use it or do not live near it (0.575).

2- Market benefits/losses that the TB3 project will cause on the biological species in their own right (0.525).

3- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.853).

4- The passive nonuse value that includes the bequest value, existence value, and altruism value (0.757).

5- The total economic value that includes total benefits/losses concerning to use value and passive nonuse value (0.793).

6- The total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.639).

7- The market benefits/losses of opportunities foregone affiliated with alternative projects (0.594).

8- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.550).

9- Application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air (0.656).

10- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.673).

11- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.839).

12- Monetary benefits gained from solid waste management -source reduction, reuse, recycling, recovery & incineration, or disposal (0.729).

13- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.700).

14- Environmental training costs for employees (0.680).

15- Employees' pensions (0.649).

16- The security cost attributed to equipment and employees (0.595).

17- The safety cost pertaining to Egypt Air passengers and crews (0.694).

18- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.558).

19- The sound insulation grants to the local community (0.571).

20- Egypt Air The Egypt Air Funds to local projects, which protect cultural and natural assets (0.583).

21- The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants (0.758).

22- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.832).

Table 4-11: Correlation Analysis of Question 9

Item	Q5	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q26	Q27	Q28	Q29	Q30
Q9	0.626	0.900	0.737	0.517	0.696	0.562	0.705	0.780	0.846	0.764	0.677	0.611	0.864	0.792	0.604	0.778	0.721	0.730	0.671	0.594	0.538	0.884

The passive nonuse value has the following correlation values:

1- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.626).

2- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.900).

3- The total market value, which includes direct use value, indirect use value, and option value (0.737).

4- The total economic value that includes total benefits/losses concerning to use value and passive nonuse value (0.517).

5- The total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.696).

6- The market benefits/losses of opportunities foregone affiliated with alternative projects (0.562).

7- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.705).

8- Application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air (0.780).

9- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.846).

10- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.764).

11- Monetary benefits gained from solid waste management; source reduction, reuse, recycling, recovery & incineration, or disposal (0.677).

12- Monetary losses attributed to hitting birds by airplanes of Egypt Air (0.611).

13- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.864).

14- Environmental training costs for employees (0.792).

15- Employees' pensions (0.604).

16- The security cost attributed to equipment and employees (**0.**778).

17- The safety cost pertaining to Egypt Air passengers and crews (0.721).

18- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.730).

19- The sound insulation grants to the local community (0.671).

20- The Egypt Air Funds to local projects that protect cultural and natural assets (0.594).

21- The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants (0.538).

22- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.884).

Table 4-12: Correlation Analysis of Question 10

Item	Q4	Q5	Q6	Q7	Q8	Q9	Q11	Q12	Q13	Q16	Q17	Q20	Q21	Q23	Q30
Q10	0.635	0.623	0.727	0.621	0.793	0.517	0.822	0.695	0.659	0.536	0.625	0.590	0.663	0.659	0.573

The values of correlation affiliated with the total economic value are displayed below:

1- Future benefits/losses that people place on the existence of the TB3 project, even if they do not expect to use it or do not live near it (0.635).

2- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.623).

3- Market benefits/losses that the TB3 project will cause on the biological species in their own right (0.727).

4- The welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.621).

5- The total market value, which includes direct use value, indirect use value, and option value (0.793).

6- The passive nonuse value that has the bequest value, existence value, and altruism value (0.517).

7- The total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.822).

8- The market benefits/losses of opportunities foregone affiliated with alternative projects (0.695).

9- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.659).

10- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.536).

11- Monetary benefits gained from solid waste management- source reduction, reuse, recycling, recovery & incineration, or disposal (0.625).

12- Environmental training costs for employees (0.590).

13- The value affiliated with employees' pensions (0.663).

14- The safety cost pertaining to Egypt Air passengers and crews (0.659).

15- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.573).

Table 4-13: Correlation Analysis of Question 11

Item	Q5	Q6	Q7	Q8	Q9	Q10	Q12	Q13	Q17	Q19	Q20	Q21	Q22	Q23	Q30
Q11	0.658	0.572	0.677	0.639	0.696	0.822	0.753	0.897	0.573	0.599	0.705	0.622	0.646	0.690	0.625

Table 4-13 points out that the total environmental value has the following values of correlation:

1- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.658).
2- Market benefits/losses that the TB3 project will cause on the biological species in their own right (0.572).
3- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.677).
4- The total market value, which includes direct use value, indirect use value, and option value (0.639).
5- The passive nonuse value that has the bequest value, existence value, and altruism value (0.696).
6- The total economic value which has the total benefits/losses concerning to use value and passive nonuse value (0.822).
7- The market benefits/losses of opportunities foregone affiliated with alternative projects (0.753).
8- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.897).
9- Monetary benefits gained from solid waste management-source reduction, reuse, recycling, recovery & incineration, or disposal (0.573).
10- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.599).

11- Environmental training costs for employees (0.705).

12- The value affiliated with employees' pensions (0.622).

13- The security cost attributed to equipment and employees (0.646).

14- The safety cost pertaining to Egypt Air passengers and crews (0.690).

15- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.625).

Table 4-14: Correlation Analysis of Question 12

Item	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q13	Q19	Q20	Q22
Q12	0.702	0.594	0.746	0.594	0.562	0.695	0.753	0.888	0.599	0.504	0.646

The relationship between the private opportunity cost and the other criteria is cleared as follows:

1- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.702).

2- Market benefits/losses that the TB3 project will cause on the biological species in their own right (0.594).

3- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.746).

4- The total market value, which includes direct use value, indirect use value, and option value (0.594).

5- The passive nonuse value that has the bequest value, existence value, and altruism value (0.562).

6- The total economic value which has the total benefits/losses concerning to use value and passive nonuse value (0.695).

7- The total environmental value that has total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.753).

8- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.888).

9- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.599).

10- Environmental training costs for employees (0.504).

11- The security cost attributed to equipment and employees (0.646).

Table 4-15: Correlation Analysis of Question 13

Item	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q15	Q19	Q20	Q22	Q25	Q26
Q13	0.745	0.501	0.770	0.550	0.705	0.659	0.897	0.888	0.596	0.681	0.637	0.743	0.545	0.558

Table 4-15 states that the social opportunity cost correlates with the following criteria:

1- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.745).

2- Benefits/losses that the TB3 project will cause on the biological species in their own right (0.501).

3- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.770).

4- The total market value, which includes direct use value, indirect use value, and option value (0.550).

5- The passive nonuse value that has the bequest value, existence value, and altruism value (0.705).

6- The total economic value which has the total benefits/losses concerning to use value and passive nonuse value (0.659).

7- The total environmental value that has total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.897).

8- The market benefits/losses of opportunities foregone affiliated with alternative projects (0.888).

9- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.596).

10- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.681).

11- Environmental training costs for employees (0.637).

12- The security cost attributed to equipment and employees (0.743).

13- Volunteering awards that are gained from the local community for the volunteering endeavors of employees (0.545).

14- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.558).

Table 4-16: Correlation Analysis of Question 14

Item	Q1	Q7	Q8	Q9	Q15	Q16	Q19	Q22	Q26	Q27	Q28	Q29
Q14	0.572	0.766	0.656	0.780	0.883	0.604	0.623	0.545	0.723	0.669	0.600	0.628

The previous mentioned table illustrates the correlation values connected with the "polluter pays principles":

1- Benefits/losses pertaining to employees and revenues of TB3 at Cairo International Airport and the governmental taxes (0.572).

2- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.766).

3- The total market value, which includes direct use value, indirect use value, and option value (0.656).

4- The passive nonuse value that has the bequest value, existence value, and altruism value (0.780).

5- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.883).

6- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.604).

7- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.623).

8- The security cost attributed to equipment and employees (0.545).

9- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.723).

10- The sound insulation grants to the local community (0.669).

11- The Egypt Air Funds to local projects that protect cultural and natural assets (0.600).

12- The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants (0.628).

Table 4-17: Correlation Analysis of Question 15

Item	Q5	Q7	Q8	Q9	Q13	Q14	Q16	Q19	Q22	Q23	Q26	Q27	Q28	Q29
Q15	0.563	0.875	0.673	0.846	0.596	0.883	0.697	0.789	0.705	0.583	0.681	0.607	0.509	0.711

The professional cost pertaining to diseases, death levels, and reduction in employee productivity, Owing to table 4-17, has the following correlation values:

1- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.563).
2- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.875).
3- The total market value, which includes direct use value, indirect use value, and option value (0.673).
4- The passive nonuse value that has the bequest value, existence value, and altruism value (0.846).
5- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.596).
6- Application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air (0.883).
7- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.697).
8- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.789).
9- The security cost attributed to equipment and employees (0.705).
10- The safety cost pertaining to Egypt Air passengers and crews (0.583).

11- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.681).

12- Sound insulation grants to the local community (0.607).

13- The Egypt Air Funds to local projects that protect cultural and natural assets (0.509).

14- The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants (0.711).

Table 4-18: Correlation Analysis of Question 16

Item	Q6	Q7	Q8	Q9	Q10	Q14	Q15	Q18	Q19	Q21	Q22	Q23	Q29
Q16	0.546	0.601	0.839	0.764	0.536	0.604	0.697	0.760	0.656	0.848	0.527	0.803	0.820

The table 4-18 represents the correlation values affiliated with direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment:

1- Market benefits/losses that the TB3 project will cause on the biological species in their own right (0.546).

2- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.601).

3- The total market value, which includes direct use value, indirect use value, and option value (0.839).

4- The passive nonuse value that has the bequest value, existence value, and altruism value (0.764).

5- The total economic value which has the total benefits/losses concerning to use value and passive nonuse value (0.536).

6- Application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air (0.604).

7- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.697).

8- Monetary losses attributed to hitting birds by airplanes of Egypt Air (0.760).

9- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.656).

10- The value affiliated with employees' pensions (0.848).

11- The security cost attributed to equipment and employees (0.527).

12- The safety cost pertaining to Egypt Air passengers and crews (0.803).

13- The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants (0.820).

Table 4-19: Correlation Analysis of Question 17

Item	Q6	Q8	Q9	Q10	Q11	Q20	Q25	Q27	Q28	Q30
Q17	0.566	0.729	0.677	0.625	0.573	0.915	0.652	0.538	0.589	0.933

Analyzing the table 4-19 declares the correlation values pertaining to the monetary benefits gained from solid waste management (source reduction, reuse, recycling, recovery & incineration, or disposal) as follows:

1- Market benefits/losses that the TB3 project will cause on the biological species in their own right (0.566).

2- The total market value, which includes direct use value, indirect use value, and option value (0.729).

3- The passive nonuse value that has the bequest value, existence value, and altruism value (0.677).

4- The total economic value which has the total benefits/losses concerning to use value and passive nonuse value (0.625).

5- The total environmental value that has total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.573).

6- Environmental training costs for employees (0.915).

7- Volunteering awards that are gained from the local community for the volunteering endeavors of employees (0.652).

8- The sound insulation grants to the local community (0.538).

9- The Egypt Air Funds to local projects that protect cultural and natural assets (0.589).

10- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.933).

Table 4-20: Correlation Analysis of Question 18

Item	Q9	Q16	Q21	Q23	Q29
Q18	0.611	0.760	0.651	0.511	0.513

Table 4-20 illustrates correlation values for monetary losses attributed to hitting birds by airplanes of Egypt Air:

1- The passive nonuse value that has the bequest value, existence value, and altruism value (0.611).

2- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.760).

3- Employees' pensions (0.651).

4- The safety cost pertaining to Egypt Air passengers and crews (0.511).

5- The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants (0.513).

Table 4-21: Correlation Analysis of Question 19

Item	Q5	Q7	Q8	Q9	Q11	Q12	Q13	Q14	Q15	Q16	Q21	Q22	Q23
Q19	0.601	0.888	0.700	0.864	0.599	0.599	0.681	0.623	0.789	0.656	0.678	0.924	0.732

The above table addresses the correlation values pertaining to the fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft:

1- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.601).

2- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.888).

3- Total market value, which includes direct use value, indirect use value, and option value (0.700).

4- The passive nonuse value that has the bequest value, existence value, and altruism value (0.864).

5- The total environmental value that has total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.599).

6- The market benefits/losses of opportunities foregone affiliated with alternative projects (0.599).

7- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.681).

8- Application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air (0.623).

9- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.789).

10- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.656).

11- Employees' pensions (0.678).

12- The security cost attributed to equipment and employees (0.924).

13- The safety cost pertaining to Egypt Air passengers and crews (0.732).

Table 4-22: Correlation Analysis of Question 20

Item	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q17	Q25	Q26	Q30
Q20	0.637	0.744	0.592	0.748	0.680	0.792	0.590	0.705	0.504	0.637	0.915	0.748	0.565	0.901

Environmental training costs for employees have correlation values as follows:

1- Future benefits/losses that people place on the existence of the TB3 project, even if they do not expect to use it or do not live near it (0.637).

2- Benefits/losses those future airports expect to gain as a result of The TB3 project (0.744).

3- Market benefits/losses that the TB3 project will cause on the biological species in their own right (0.592).

4- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.748).

5- The total market value, which includes direct use value, indirect use value, and option value (0.680).

6- The passive nonuse value that has the bequest value, existence value, and altruism value (0.792).

7- The total economic value which has the total benefits/losses concerning to use value and passive nonuse value (0.590).

8- The total environmental value that has total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.705).

9- The market benefits/losses of opportunities foregone affiliated with alternative projects (0.504).

10- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.637).

11- Monetary benefits gained from solid waste management- source reduction, reuse, recycling, recovery & incineration, or disposal (0.915).

12- Volunteering awards that are gained from the local community for the volunteering endeavors of employees (0.748).

13- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.565).

14- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.901).

Table 4-23: Correlation Analysis of Question 21

Item	Q4	Q5	Q6	Q8	Q9	Q10	Q11	Q16	Q18	Q19	Q22	Q23	Q29
Q21	0.547	0..507	0.700	0.649	0.604	0.663	0.622	0.848	0.651	0.678	0.646	0.917	0.600

According to table 4-23, the correlation values of employees' pensions are described below:

1- Future benefits/losses that people place on the existence of the TB3 project, even if they do not expect to use it or do not live near it (0.547).

2- Benefits/losses those future airports expect to gain as a result of The TB3 project (0.507).

3- Market benefits/losses that the TB3 project will cause on the biological species in their own right (0.700).

4- The total market value, which includes direct use value, indirect use value, and option value (0.649).

5- The passive nonuse value that has the bequest value, existence value, and altruism value (0.604).

6- The total economic value which has the total benefits/losses concerning to use value and passive nonuse value (0.663).

7- The total environmental value that has total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.622).

8- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.848).

9- Monetary losses attributed to hitting birds by airplanes of Egypt Air (0.651).

10- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.678).

11- The security cost attributed to equipment and employees (0.646).

12- The safety cost pertaining to Egypt Air passengers and crews (0.917).

13- The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants (0.600).

Table 4-24: Correlation Analysis of Question 22

Item	Q3	Q4	Q5	Q7	Q8	Q9	Q11	Q12	Q13	Q14	Q15	Q16	Q19	Q21	Q25
Q22	0.565	0.592	0.766	0.817	0.595	0.778	0.646	0.646	0.743	0.545	0.705	0.527	0.924	0.646	0.724

The security cost attributed to equipment and employees has the values of correlation as follows:

1- Benefits/losses affiliated with the existence and use of the TB3 project or not (0.565).

2- Future benefits/losses that people place on the existence of the TB3 project, even if they do not expect to use it or do not live near it (0.592).

3- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.766).

4- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.817).

5- The total market value, which includes direct use value, indirect use value, and option value (0.595).

6- The passive nonuse value that has the bequest value, existence value, and altruism value (0.778).

7- The total environmental value that has total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.646).

8- The market benefits/losses of opportunities foregone affiliated with alternative projects (0.646).

9- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.743).

10- Application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air (0.545).

11- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.705).

12- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.527).

13- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.924).

14- Employees' pensions (0.646).

15- Volunteering awards that are gained from the local community for the volunteering endeavors of employees (0.724).

Table 4-25: Correlation Analysis of Question 23

Item	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q15	Q16	Q18	Q19	Q21	Q22	Q29
Q23	0.615	0.642	0.681	0.599	0.694	0.721	0.659	0.690	0.583	0803	0.511	0.732	0.917	0.724	0.605

Table 4-25 displays the criteria correlated with the safety cost pertaining to Egypt Air passengers and crews:

1- Future benefits/losses that people place on the existence of the TB3 project, even if they do not expect to use it or do not live near it (0.615).

2- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.642).

3- Market benefits/losses that the project will cause on the biological species in their own right (0.681).

4- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.599).

5- The total market value, which includes direct use value, indirect use value, and option value (0.694).

6- The passive nonuse value that has the bequest value, existence value, and altruism value (0.721).

7- The total economic value which has the total benefits/losses concerning to use value and passive nonuse value (0.659).

8- The total environmental value that has total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.690).

9- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.583).

10- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0803).

11- Monetary losses attributed to hitting birds by airplanes of Egypt Air (0.511).

12- The fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft (0.732).

13- Employees' pensions (0.917).

14- The security cost attributed to equipment and employees (0.724).

15- The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants (0.605).

Table 4-26: Correlation Analysis of Question 25

Item	Q3	Q5	Q13	Q17	Q20	Q26	Q27	Q28	Q30
Q25	0.552	0.547	0.545	0.652	0.748	0.800	0.766	0.656	0.810

The volunteering awards that are gained from the local community for the volunteering endeavors of employees correlates with the following elements:

1- Benefits/losses affiliated with the existence and use of the TB3 project or not (0.552).

2- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.547).

3- The total environmental value that has total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.545).

4- Monetary benefits gained from solid waste management- source reduction, reuse, recycling, recovery & incineration, or disposal (0.652).

5- Environmental training costs for employees (0.748).

6- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.800).

7- Sound insulation grants to the local community (0.766).

8- The Egypt Air Funds to local projects that protect cultural and natural assets (0.656).

9- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.810).

Table 4-27: Correlation Analysis of Question 26

Item	Q1	Q3	Q5	Q7	Q8	Q9	Q13	Q14	Q15	Q20	Q25	Q27	Q28	Q30
Q26	0.572	0.580	0.597	0.766	0.558	0.730	0.558	0.723	0.681	0.565	0.800	0.879	0.656	0.810

Table 4-27 illustrates correlations details about costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2:

1- Benefits/losses pertaining to employees and revenues of TB3 at Cairo International Airport and the governmental taxes (0.572).

2- Benefits/losses affiliated with the existence and use of the TB3 project or not (0.580).

3- Benefits/losses those future airports expect to gain as a result of the TB3 project (0.597).

4- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.766).

5- The total market value, which includes direct use value, indirect use value, and option value (0.558).

6- The passive nonuse value that has the bequest value, existence value, and altruism value (0.730).

7- The social opportunity cost which has the nonhuman value and total economic value of alternative projects (0.558).

8- Application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air (0.723).

9- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.681).

10- Environmental training costs for employees (0.565).

11- Volunteering awards that are gained from the local community for the volunteering endeavors of employees (0.800).

12- Sound insulation grants to the local community (0.879).

13- The Egypt Air Funds to local projects that protect cultural and natural assets (0.656).

14- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.810).

Table 4-28: Correlation Analysis of Question 27

Item	Q7	Q8	Q9	Q14	Q15	Q17	Q25	Q26	Q28	Q29	Q30
Q27	0.626	0.571	0.671	0.669	0.607	0.538	0.766	0.879	0.949	0.549	0.739

The correlation values affiliated with sound insulation grants to the local community are declared below:

1- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.626).

2- The total market value, which includes direct use value, indirect use value, and option value (0.571).

3- The passive nonuse value that has the bequest value, existence value, and altruism value (0.671).

4- Application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air (0.669).

5- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.607).

6- Monetary benefits gained from solid waste management-source reduction, reuse, recycling, recovery & incineration, or disposal (0.538).

7- Volunteering awards that are gained from the local community for the volunteering endeavors of employees (0.766).

8- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.879).

9- The Egypt Air Funds to local projects that protect cultural and natural assets (0.949).

10- The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants (0.549).

11- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.739).

Table 4-29: Correlation Analysis of Question 28

Item	Q8	Q9	Q14	Q15	Q17	Q25	Q26	Q27	Q29	Q29
Q28	0583	0.594	0.600	0.509	0.589	0.656	0.743	0.949	0.621	0.723

According to table 4-29, The Egypt Air Funds to local projects that protect cultural and natural assets have values of correlation as follows:

1- The total market value, which includes direct use value, indirect use value, and option value (0583).

2- The passive nonuse value that has the bequest value, existence value, and altruism value (0.594).

3- Application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air (0.600).

4- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.509).

5- Monetary benefits gained from solid waste management-source reduction, reuse, recycling, recovery & incineration, or disposal (0.589).

6- Volunteering awards that are gained from the local community for the volunteering endeavors of employees (0.656).

7- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.743).

8- Sound insulation grants to the local community (0.949).

9- The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants (0.621).

10- The fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air (0.723).

Table 4-30: Correlation Analysis of Question 29

Item	Q7	Q8	Q9	Q14	Q15	Q16	Q18	Q21	Q23	Q27	Q28
Q29	0565	0.758	0.538	0.628	0.711	0.820	0.513	0.600	0.605	0.549	0.621

The cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants has the following values of correlation:

1- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0565).

2- The total market value, which includes direct use value, indirect use value, and option value (0.758).

3- The passive nonuse value that has the bequest value, existence value, and altruism value (0.538).

4- Application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air (0.628).

5- The professional cost pertaining to diseases, death levels, and reduction in employee productivity (0.711).

6- Direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment (0.820).

7- Monetary losses attributed to hitting birds by airplanes of Egypt Air (0.513).

8- Employees' pensions (0.600).

9- The safety cost pertaining to Egypt Air passengers and crews (0.605).

10- Sound insulation grants to the local community (0.549).

11- The Egypt Air Funds to local projects that protect cultural and natural assets (0.621).

Table 4-31: Correlation Analysis of Question 30

Item	Q5	Q7	Q8	Q9	Q10	Q11	Q17	Q20	Q25	Q26	Q27	Q28
Q30	0527	0.777	0.832	0.884	0.573	0.625	0.933	0.901	0.810	0.734	0.739	0.723

Table 4-31 illustrates values of correlation connected with the fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air:

1- Benefits/losses those future airports expect to gain as a result of the TB3 project (0527).

2- Welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (0.777).

3- The total market value, which includes direct use value, indirect use value, and option value (0.832).

4- The passive nonuse value that has the bequest value, existence value, and altruism value (0.884).

5-The total economic value which has the total benefits/losses concerning to use value and passive nonuse value (0.573).

6- The total environmental value that has total benefits/losses pertaining to the sum of nonhuman value and total economic value (0.625).

7- Monetary benefits gained from solid waste management- source reduction, reuse, recycling, recovery & incineration, or disposal (0.933).

8- Environmental training costs for employees (0.901).

9- Volunteering awards that are gained from the local community for the volunteering endeavors of employees (0.810).

10- Costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2 (0.734).

11- Sound insulation grants to the local community (0.739).

12- Egypt Air funds to local projects that protect cultural and natural assets (0.723).

Regarding results pertaining to section 4-3 one can reach to and implicit the following issues:

1- It may be predict for a criterion of the total environmental value, or the environmental and social performance in case of gathering information about the criteria that correlate with it as mentioned above.

2- All of correlation values are positive which means the compliance about one direction. For example, the correlation analysis of benefits / losses pertaining to employees and revenues of TB3 at Cairo International Airport (Direct use value). If the governmental taxes and application of "polluter pays principle" particularly environmental taxes and surcharges on flights are increased, the benefits gained by employees and revenues of TB3 at Cairo International Airport will be raised too. Furthermore, the higher the costs connected with modification of combustors in aircraft and vehicle fleets, the higher losses affiliated with employees and revenues of TB3 at Cairo International Airport.

3- Charitable donations per year, which are directed from Egypt Air to local community has no over moderate or strong correlation values with other criteria. According to the respondents there is no specific policy in this area and donations depend on the individual efforts, so they come in the last position of the mean values and it is difficult to expect their value.

CHAPTER FIVE

SUMMARY AND CONCLUSION

Introduction

Keeping touch with The World Travel and Tourism Council vision for the third millennium, which includes Promoting sustainable development as one of the main four prepositions to secure the full economic benefits from development of travel and tourism (WTTC, 1999, P: 15), since sustainable development concept is the best economic approach to involve environment (nature, community) and to confront negative impacts of development. Also, it is the concept that will pursue along the 21st century; as being the pioneer approach for all sorts of development including tourism (Holden, 2000, p; 161). Furthermore, in spite of technological, operational, and other mitigation measures to minimize the environmental impacts, the growth rates being predicted for air transport, if allowed to take place, will mean that the environmental impacts will be increased (Anne, 2002, P: 229).

So, the researcher has made his current thesis concerning how to maintain economic and social benefits from air transport and encourage economic development through mobility and yet respond to the increasing environmental pressures resulted by air transport sector in Egypt. In addition he formulated the title of his thesis as "Economics of Sustainable Tourism Development: the Case of Air Transport in Egypt", and the problem of the study was titled "The arguing about minimizing adverse impacts, to make savings, to raise and enhance efficiency of resources, and to capitalize opportunities available for the Egyptian Air

Transport Services, to be compatible with the environmental and social challenges".

This study has three objectives as follows: (1) Analyzing the concept of the total environmental value, its components, and how it could be measured applied to the aviation industry, (2) exploring the aspects of economics attributed to sustainability in the performance of the air transport industry, and (3) evaluating the Egyptian aviation sector using the economics of sustainability standards.

To achieve the objectives of the study, the researcher has tested two hypotheses that address estimation of the total environmental value in the feasibility study connected with the TB3 at the Cairo International Airport, and the economics criteria of sustainability in Egypt Air Holding Company.

The methodology of the study consists of the descriptive approach using the case study method, the deductive reasoning, the survey method, and the SPSS program for analyzing data.

The structure of study includes: the first chapter "Introduction", the second chapter "Air Transport Business", the third chapter "The Total Environmental Value", the fourth chapter "Environmental and Social Issues in Aviation Operating Processes", the fifth chapter "The Egyptian Case Study", the sixth chapter "Field Study Results", and the seventh chapter "General Results and Recommendations".

5-1 The general results of the study

1- The null hypotheses of the study have been achieved. Results indicate that the total mean values of the Terminal Building Three and the Holding Company of Egypt Air are set between the Alternatives neutral (value 3) and agree (value 4). They are (3.30) and (3.60) for the former and the later respectively. However, there is a significant difference connected with the agreement and then reliability of respondents' answers, since the total standard deviation values are (0.95) for the Terminal Building Three and (1.26) for the Holding Company of Egypt Air.

2- Liberalization in aviation business has advantages and disadvantages affiliated with air transport industry. Furthermore, procedures of Liberalization cleared the pioneer role of developed countries particularly the Untied States of America in application for principles of liberalization.

3- The Agenda 21 is the popular and the most important worldwide response towards environmental, social, and safety issues, especially in aviation industry.

4- The rudimentary role of environmental economics in quantification and internalization of negative impacts and by-products in general, so that it adds a price or value on damage to society.

5- The implementation range of aviation economics connected with sustainability issues may be a regional policy as

European Experience, a country policy like China Experience, an airport experience (Heathrow Airport), or an airline experience (British Airways). Moreover there was a variety of procedures to implement sustainability' principles. They include: legislation, technical, economic, and administrative actions. The clarified case studies in this current dissertation enable us to decide which procedure or action will be suitable to be used. The example was in Amsterdam Airport Experience, since the noise surcharge provided a more optimal balance between economic costs and environmental benefits.

6- The total environmental value may be expressed by a market value or a non-market value. In absence of a market price, the task tends to estimate consumers' willingness to pay for environmental assets and services based on them.

7- Techniques or approaches to measure the total environmental value consist of (1) valuation using market prices, (2) valuation using information on individuals' preferences, and (3) valuation using benefit transfer. The overall techniques of measure were social cost- benefit analysis and multi-criteria analysis methods. There are two types of multi-criteria analysis: (1) multi-objective analysis and (2) multi-attribute analysis. The first concentrates on feasible solutions identified by a system of constraints and pursuing a given number of objectives. The second enables decision–makers to select within a finite and explicit set of alternatives in respect to some of determined attributes.

8- The payment (willingness to pay) to support pollution and externalities control is a function of many variables like popular attitude in society towards preservation of environment, advancing in environmental technology... etc.

9- There is no logical order in answers of the respondents regarding priority areas for the feasibility study of the Terminal Building Three at the Cairo International Airport. For instance, they gave the fifth order for the social opportunity cost value, while they gave the eighth order for the total environmental value of the Terminal Building Three.

10-The decision – makers at the Ministry of Civil Aviation do not pay equitable attention towards the environmental affairs in the Egyptian Airports.

11- The environmental audits conducted out by the Public Environmental Administration show the following facts:

A- There is no responsible for the environmental affairs in almost of the Egyptian Airports.

B- The environmental organizational structure at the Ministry of Civil Aviation is recent (since 1998) and ineffective in its authorities, possibilities, and training affairs.

C- The need to have the permission of the concerned institution to be inspected according the environmental standards and criteria.

12- In the case of a new airport the role of the Public Environmental Administration is coordination with consultative bureaus to prepare the comprehensive feasibility study for it.

13-There is no best use of techniques to measure the total environmental value in the feasibility study of Terminal Building Three (TB3) at the Cairo International Airport.

14-The main purpose of preparing the feasibility study of Terminal Building Three (TB3) at Cairo International Airport had been to gain the acceptance of the World Bank to fund the TB3 project.

15- Egypt Air Holding Company has not gained any environmental ISO14000 certificates. However, Egypt Air has made several significant accomplishments. Examples are the renewal of IATA Operational Safety Audit (IOSA) certification, which is the highest in the world for civil -aviation security and safety granted by the IATA, and Egypt Air Maintenance and Engineering Company that has been awarded the European Aviation Safety Agency (EASA) Part-145 phase two certification (according to respondents' answers and Horus Magazine, 2006, p: 2). Moreover, the Egypt Air Company for Ground Services has contracted with the TUV Organization to gain ISO 9001/2000 and ISO 14001/2004 (Tourism and Aviation Magazine, 2007, p: 23).

16- Based on the previous results and the respondents' answers, it may be said that the air transport sector in Egypt is still in the Green Globe Affiliate/Awareness level, as a response to the Agenda 21 and its certification program. The certification program's levels are displayed as follows:

Green Globe Certified Level

• This is the highest level of Green Globe qualification.
• Requires implementation of an integrated Environmental Management System.
• The logo is only used/issued once the operation has been successfully Benchmarked AND passed an independent on site assessment/audit.
• Certification is required annually in order to maintain the use of the logo.

Green Globe Benchmarked Level

• A Green Globe Benchmarked business has undergone an independent assessment of measurements against key indicators and passed.

• Requires the development of an Environmental and Social Sustainability Policy and annual collection of measures in key environmental and social performance areas.
• Benchmarking is required annually in order to maintain the use of the logo.

• This logo is only used after an operation is successfully benchmarked. The Affiliate stamp is used up until this time.

Green Globe Affiliate/Awareness Level

GREEN GLOBE
AFFILIATE

• An Affiliate is the first step towards becoming a full Green Globe participant that is, committing to Benchmarking and Certification.

• A Green Globe Affiliate is committed to gathering information about sustainable tourism practices and principles.

• An Affiliate is required to prepare an Environmental and Social Sustainability Policy, which must be submitted to Green Globe on renewal.

17- It may be predict for a criterion of the total environmental value, or the environmental and social performance in case of gathering information about the criteria that correlate with it as mentioned above. Moreover all of correlation values are positive, which means the agreement about the environmental and social issues mentioned in this study. For example, the correlation analysis of benefits / losses pertaining to employees and revenues of TB3 at Cairo International Airport (Direct use value). If the governmental taxes and application of "polluter pays principle" particularly environmental taxes and surcharges on flights are increased, the benefits gained by employees and revenues of TB3 at the Cairo International Airport will be raised too. Furthermore, the higher the costs connected with modification of combustors in aircraft and vehicle fleets, the higher losses affiliated with employees and revenues of TB3 at Cairo International Airport.

5-2 The recommendations

To enhance the performance of the Egyptian air transport sector due to the environmental economics, the study provides the following conditions and requirements:

1- The importance to make the best use of the advantages and to decrease the disadvantages concerning liberalization in the Egyptian aviation industry. This method will cut down environmental and social externalities resulted from this economic sector.

2- The adaptation of Agenda 21's principles that address environmental, social and safety issues in aviation industry. Moreover, increasing the range of use for environmental economics on all levels (either national policy, airport policy, or airline policy), to quantify and internalize negative impacts and by-products in the Egyptian aviation industry.

3- The necessity to evaluate the total environmental value connected with the feasibility study of new projects in the

Egyptian aviation industry. It may be expressed by a market value or a non-market value. In absence of a market price, the task tends to estimate consumers' willingness to pay for environmental assets and services based on them.

4- Using the techniques or approaches to measure the total environmental value that include: valuation using market prices, valuation using information on individuals' preferences, valuation using benefit transfer, and the overall techniques of measure which are divided to social cost- benefit analysis and multi-criteria analysis methods. There are two types of multi-criteria analysis: (1) multi-objective analysis and (2) multi-attribute analysis. The first concentrates on feasible solutions identified by a system of constraints and pursuing a given number of objectives. The second enables decision–makers to select within a finite and explicit set of alternatives in respect to some of determined attributes.

5-Prevailing the popular attitude and awareness in air transport sector towards preservation of environment, using environmentally friendly technology... etc. Also, increasing the implementation of "willingness to pay" principle to support pollution and externalities attributed to the air transport industry.

6- The importance of adopting and considering Total Environmental Value as a tool to achieve ISO 14000s. It was stated that Total Quality Management leads to ISO 9000s in the managerial performance.

Total Quality Management ⟶ *ISO 9000s*

Total Environmental Value ⟶ *ISO 14000s*

7- The importance of adopting the scientific method affiliated with the following replica of "Risk Theory" with its three main steps as an approach in determination of the total environmental risks concerned with proposed feasibility studies for projects in the air transport industry:

Formula One

$$E(r) = P * C$$

Where:

r = a random variable expressing the type of risk.

E = the expected value of the risk.

P = the probability of the occurrence of the project's threats.

C = the total cost caused by the impact of the project's threats.

- To reduce E, minimize P or C or both

Formula Two

$$C(r1+r2) \geq C(r1)+(r2) \text{ and } E(r1+r2) \geq E(r1)+(r2)$$

Where:

C (x) = a function defines complexity of threats.

E (x) = a function defines efforts (in time, cost, ...) of threats.

- Partitioning threats facilitates them and reduces the cost of risks

Formula Three

$$Q(x) = \sum_{i=1}^{n} \sum_{j=1}^{k} M_i F_j \text{ and } R(x) = 1 - Q(x)$$

Where

M_i = the set of attributes concerned to the proposed project.

F_j = the set of factors comprising each attribute.

R (x) = the risk function.

Q (x) = the quality function.

- <u>To reduce R (x), maximize Q (x)</u>

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APPENDICES

Appendix (1): The Environmental Audit Checklist for Egyptian Airports

No.	Item	Application			Level			
		Y	P	N	E	G	A	B
	First: General							
1	Environmental record							
2	Authorized individual for environment							
3	Periodic environmental audit							
4	Walls and nearby wastes							
5	Front sides of buildings							
6	Environmental training plan							
7	Environmental awareness program							
8	Signage system of smoking							
9	Determined places for smokers							
	Second: Environmental Control							
10	Equipment to measure noise							
11	Standardization for noise equipment							
12	Certificated equipment to measure noise							
13	Measurement in good climate conditions							
14	Noise register							
15	Periodic noise audit							
16	Acceptable maximum noise levels							
17	Equipment to measure emissions							
18	Emissions register							
19	Periodic emissions audit							
20	Acceptable maximum emissions levels							

Appendix (1) Continued

21	Vehicle check for emissions							
	Third: Vegetation							
22	Dense green areas							
23	Good plants							
24	Clean vegetation parts/sectors							
25	Local plants							
	Fourth: Public cleanliness							
26	Garbage cans							
27	Available and good distribution of cans							
28	A plan for safe waste disposal							
29	Waste containers in offices							
30	Economic benefit of waste							
31	Good and clean water closets							
32	Fuel and oil spots on ground							
33	Good furniture							
34	Good varnish of walls and paint							
35	Equipment to remove oil spots							
36	Good water storage containers							
37	Periodic maintenance of water containers							
38	Regular analysis of water							
39	Record for results of water analysis							
40	Water results at acceptable limitations							
41	Health sewage system							

Appendix (1) Continued

No.	Item	Application			Level			
		Y	P	N	E	G	A	B
	Fifth: Safety and professional health							
42	Training program on safety procedures							
43	Awareness forums on safety							
44	Protection methods of work hazards							
45	Instructions to use protection equipment							
46	First aids in work places							
47	Meals for employees in hard job							
48	Regular medical check up on employees							
49	Register for work injuries							
50	Suitable ventilation at work places							
51	Suitable work area for employees number							
52	Ups and downs at work places							
53	Safe upstairs							
54	Guide instructions for professional safety							
55	Safety audit for cars of employees							
56	Health certificates for food and beverage handlers							
	Sixth: Fire abatement procedures							
57	Sound fire engines							
58	Available fire engines for an announced fire plan							
59	Map for fire vehicles itinerary							
60	Available fire extinguishing substances							
61	Fire equipments for fire men							
62	Simulation for fire experience							

Appendix (1) Continued

63	Training for fire men on fire emergency							
64	Wood ruins on the airport ground							
65	Paper substances on the airport ground							
66	Petroleum spots on the airport ground							
67	Application for fire preventative procedures							
68	Signage system for fire prevention							
69	Available automated fire alarm system							
70	Power plants							
71	Co-operation with fire station and ambulance							
72	Escape outlets of fire incidents							

* **Y**=yes, **P**=partial, **N**=no, **E**=excellent, **G**=good, **A**=acceptable, **B**=bad

Source: MCA, 2004

Appendix (2): Components of Egypt Air Environmental Register

1- Introducing the register and its aim.

2- Work responsibility at site.

3- Rules of usage.

4- Rules and laws applied in Egypt Air regarding the environmental work.

5- General policy of Egypt Air affiliated with no smoking.

6- General information about the site.

7- General description of the site:

7-1 Surrounding environment.

7-2 Nature of work.

7-3 Overview plan.

7-4 Balance of substances used according to nature of activity at site in the organization.

7-5 Types of energy consumption in the organization.

7-6 Balance of water used owing to nature of activity at site in the organization.

7-7 Wastes and how to deal with in the organization:

7-7-1 Solid wastes (Amounts and how to deal with).

7-7-2 Liquid wastes (Amounts and how to deal with).

7-7-3 Dangerous wastes (Amounts and how to deal with).

- Management (Amounts and how to deal with).
- Totals (Amounts and how to deal with).

7-8 Kinds of emissions and how to control.

7-9 Chimneys emissions measurements.

7-10 Register of site environment measurements:

7-10-1 Measurement of noise intensity.

7-10-2 Measurement of gases concentrations.

7-10-3 Measurement of thermal intensity.

7-10-4 Measurement of luminosity levels.

8- Environmental checklists:

8-1 Self-monitoring plan to which Egypt Air is committed.

8-2 Measurements and assessments of exposures inside work environment according to nature of activity at site.

8-3 Regular medical checkup.

8-4 Procedures followed for environmental recovery.

8-5 Summary of check result according to the regular.

9- Environmental quality register.

10- Emergency plan put at site.

11- Attachments.

12- Location of the Permanent Higher Committee for Environmental Affairs at Egypt Air.

Source: Egypt Air, 2002b, pp: 4-5.

Appendix (3): Questionnaire Form

Fayoum University
Faculty of Tourism and Hotels

Questionnaire Form

Dear
Sir,..............................Position,........................

It is my honor to present your excellency this form, which is affiliated with the Phd dissertation namely; " Economics of Sustainable Tourism Development: the Case of Air Transport in Egypt ". The main goal of the dissertation pertains to evaluating the current situation at the Cairo International Airport (Terminal Building Three) and at the Egypt Air Holding Company, according to criteria of environmental economics. Your answer and co-operation will highly be respected and will only be used for scientific purposes.

Farouk Abdel Naby Hassanien Atta Allah

Associate Lecturer at Tourism Studies Department

2006

First Section: The Feasibility of the Terminal Building Three

1- There is estimation of benefits/losses pertaining to employees and revenues of TB3 at Cairo International Airport and the governmental taxes (Direct Use Value).
very agree ( ) agree ( ) neutral ( ) disagree ( ) very disagree ( )

2- There is estimation of benefits/losses connected with market services in the surround areas of the project (Indirect Use Value).
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

3- There is quantification of benefits/losses affiliated with the existence and use of the project or not (Market Option Value)
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

4- There is determination of future benefits/losses that people place on the existence of the project, even if they do not expect to use it or do not live near it (Existence Value).
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

5- There is quantification of benefits/losses that future airports expect to gain as a result of this project (Bequest Value).
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

6- There is estimation of market benefits/losses that the project will cause on the biological species in their own right (Nonhuman Value).

very agree ( ) agree ( ) neutral( ) disagree ( ) very disagree ( )

7- There is specification of welfare benefits/losses, which future generations (through 50 years) will gain in the nearby areas (Altruism Value).
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

8- There is specification of total market value, which includes direct use value, indirect use value, and option value (Use Value).
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

9- There is determination of the bequest value, existence value, and altruism value (Passive Nonuse Value).
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

10- There is determination of the total benefits/losses concerning to use value and passive nonuse value (Total Economic Value).
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

11- There is evaluation of the total benefits/losses pertaining to the sum of nonhuman value and total economic value (Total Environmental Value).
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

12- There is evaluation of the market benefits/losses of opportunities foregone affiliated with alternative projects (Private Opportunity Cost).

very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

13- There is determination of the nonhuman value and total economic value of alternative projects (Social Opportunity Cost).

very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

Second Section: Egypt Air Holding Company

14- There is application of 'polluter pays principle', particularly environmental taxes and surcharges on flights of Egypt Air.

very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

15- There is estimation of professional cost pertaining to diseases, death levels, and reduction in employee productivity.

very agree ( )agree ( ) neutral( )disagree ( )very disagree( )

16- There is identification of direct costs, opportunity costs, and environmental costs connected with water and sewage development and treatment.

very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

17- There is quantification of monetary benefits gained from solid waste management (source reduction, reuse, recycling, recovery & incineration, or disposal).

very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

18- There is estimation of monetary losses attributed to hitting birds by airplanes of Egypt Air.

very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

19- There is identification of fuel cost per passenger – kilometer for passenger aircraft and per ton – kilometer for cargo aircraft.
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

20- There is estimation of environmental training costs for employees.
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

21- There is quantification of value affiliated with employees' pensions.
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

22- There is determination of security cost attributed to equipment and employees (e.g. cost of reinforced cockpit doors in the aircraft fleet).
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

23- There is evaluation of safety cost pertaining to Egypt Air passengers and crews.
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

24- There is estimation of charitable donations value per year, which are directed from Egypt Air to local community.
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

25- There is identification of volunteering awards that are gained from the local community for the volunteering endeavors of employees.

very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

26- There is estimation of costs affiliated with modification of combustors in aircraft and vehicle fleets, to reduce emissions of No_x and Co_2.
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

27- There is quantification of sound insulation grants to the local community.
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

28- There is estimation of Egypt Air funds to local projects, that protect cultural and natural assets.
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

29- There is identification of cost concerning advertisement for vacant jobs, to offer a fair and equal opportunity to applicants.
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

30- There is determination of fund pertaining to the Permanent Higher Committee for Environmental Affairs at Egypt Air.
very agree ( )agree ( ) neutral ( ) disagree ( ) very disagree ( )

Thank You

Appendix (4): Tables and Figures

4-1 List of Tables

Appendix (4): Continued

4-2 List of Figures

Appendix (5): Abbreviations

No.	Item	Definition
1	AAIJ	African Aviation Industry Journal
2	ACAC	Arab Civil Aviation Council
3	ACSI	American Customer Satisfaction Index
4	ADP	Airports Development Project
5	AOG	Aircraft on Ground
5	APU	Auxiliary Power Unit
6	ATC	Air Traffic Control
7	ATMs	Air Transport Movements
8	ATS	Air Traffic Services
9	AV	Altruism Value
10	BA	British Airways
11	BAA	British Airports Authority
12	BASI	Bureau of Air Safety Investigation
13	BOT	Build Operate and Transfer
14	BRCP	Black Rhino Conservation Program
15	BRSs	Business Response Schemes
16	BV	Bequest Value
17	CAA	Cairo Airport Authority
18	CAD	Civil Aviation Department
19	CAEP	Committee on Aviation Environmental Protection
20	CDAs	Continuous Descent Approaches
21	CEMP	Construction Environmental Management Plan
22	CIA	Cairo International Airport
23	CRS	Computer Reservation System
24	CV2	Cargo Village Two
25	CVM	Contingent Valuation Method
26	DETRs	Death Rates
27	DOCs	Direct Operating Costs
28	DSV	Discovery Value
29	DUE	Direct Use Value
30	EASA	European Aviation Safety Agency
31	ECAA	Egyptian Civil Aviation Authority
32	ECAC	European Civil Aviation Conference
33	EEAA	Egyptian Environmental Affairs Agency
34	EGP	Egyptian Pound
35	EHCAAN	Egyptian Holding Company for Airports and Air Navigation
36	EIA	Environmental Impact Assessment
37	EMP	Environmental Management Plan
38	EQ	Environmental Quality
39	EU	European Union
40	EV	Existence Value
41	GATS	Global Agreement for Trade and Services
42	GDP	Gross Domestic Product
43	IATA	International Air Transport Association
44	ICAO	International Civil Aviation Organization
45	IOCs	Indirect Operating Costs
46	IOSA	IATA Operational Safety Audit
47	IRR	Internal Revenue Rate
48	ISEW	Index of Sustainable Economic Welfare

Appendix (5): Continued

49	ISO	International Standardization Organization
50	IUV	Indirect Use Value
51	MA	Manchester Airport plc
52	MAA	Multi-Attribute Analysis
53	MAGENTA	Model for Assessing the Global Exposure to the Noise of Transport Aircraft
54	MCA	Multi-Criteria Analysis
55	MCA	Ministry of Civil Aviation
56	MFN	Most Favored Nation
57	MOA	Multi-Objective Analysis
58	MOT	Ministry of Tourism
59	MWTP	Marginal Willingness to Pay
60	NC	Noise Criteria
61	NED	National Economic Development
62	NHV	Nonhuman Value
63	NNI	Noise and Number Index
64	NPV	Net Present Value
65	NR	Noise Rating
66	NSDI	Noise Sensitivity Depreciation Index
67	NSRs	Noise Sensitive Receivers
68	OECD	Organization of Economic Co-operation and Development
69	OEMP	Operational Environmental Management Plan
70	OSE	Other Social Effects
71	OSHA	Occupational Safety and Health Act
72	OV	Option Value
73	PNC	Preferred Noise Criteria
74	PNV	Passive Nonuse Value
75	POC	Private Opportunity Cost
76	RED	Regional Economic Development
77	SIA	Singapore Airlines
78	SOC	Social Opportunity Cost
79	TB1	Terminal Building One
80	TB2	Terminal Building Two
81	TB3	Terminal Building Three
82	TCM	Travel Cost Method
83	TDENLM	Total Day Evening Night Level Method
84	TEV	Total Economic Value
85	TKP	Ton Kilometer Performed
86	TNE	Total Environmental Value
87	TTC	Technical Training Center
88	UAA	United Arab Airlines
89	UK	United Kingdom
90	UKSDC	United Kingdom Sustainable Development Commission
91	UNCTAD	United Nations Conference on Trade and Development
92	ULDs	Unit Load Devices
93	USA	United States of America
94	UV	Use Value
95	UVF	Utility and Value Function
96	VOCs	Volatile Organic Compounds
97	WTA	Willingness to Accept
98	WTP	Willingness to Pay
99	WTTC	World Travel and Tourism Council

جامعة الفيوم
Fayoum University

كلية السياحة والفنادق

إقتصاديات التنمية السياحية المتواصلة

(دراسة لحالة النقل الجوى فى مصر)

رسالة مقدمة من

فاروق عبدالنبى حسانين عطاالله

٢٠٠٨

جامعة الفيوم
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بكالوريوس السياحة والفنادق ١٩٩٩

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تاريخ الموافقة 19 / 2 / 2008

شكر وعرفان

- يتقدم الباحث بجميل العرفان والتقدير إلى أساتذته الذين أشرفوا علـــى رسالته وكان لهم الفضل بعد الله سبحانه وتعالى فى أن تخرج إلى حيز الوجود من خلال المتابعة الجادة وتوجيه الباحث إلى السبل التـــى ترتقـــى بالشخـــصية مـــن الناحيتين العلمية والأخلاقية آخذين فى الإعتبار مسئولية القدوة وأمانة العلم:

الدكتور/ **محمد إبراهيم عراقى**، أستاذ الدراسات السياحية ورئيس قسم الدراسات السياحية بكلية السياحة والفنادق- جامعة الفيوم.

وإلى الدكتورة/ **هدى سيد لطيف**، أســتاذ الدراســات الــسياحية ووكيل كلية السياحة والفنادق لشئون خدمة المجتمع وتنمية البيئة- جامعـــة الفيوم.

- كما يتقدم الباحث بخالص الإمتنان والتقدير إلى أساتذته الــذين يدين لهم بشرف الإقتباس من علمهم وخاصة الــدكتور/ **محمـــود محمـــود هويدى** أستاذ الدراسات الفندقية وعميد كلية الــسياحة والفنـــادق - جامعـــة القاهرة الأسبق، و الدكتور/ **نشأت السيد مرتضى** أستاذ الدراسات الفندقيـــة وعميد كلية السياحة والفنادق - جامعة الفيوم، و الدكتور/ **محمـــد رفعـــت محمود** أستاذ الدراسات السياحية ووكيل كلية الــسياحة والفنـــادق لـــشئون الدراسات العليا والبحوث - جامعة الفيوم، و الدكتور/ **محمد عبـــدالوهاب مرسى** أستاذ الدراسات الفندقية ووكيل كلية السياحة والفنادق لشئون التعلـــيم والطلاب - جامعة الفيوم.

- كما يشكر الباحث السادة أعضاء هيئة التدريس بالكلية وكـــذلك الزملاء بالكلية والمسئولين بالأجهزة الرسمية الذين لهم كـــل الـــشكر لمـــا قدموه من عون ومساعدة خلال فترة إعداد هذه الرسالة.

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أهدى هذا العمل المتواضع

إلى والدَىّ أطال الله فى عمرهمـــا

إلى إخوتى خير سند وخير معين فى الحياة

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- ٢٠٠٧ **وإلى الآن** عضو مجلس إدارة مركز تراث وحضارة الفيوم، جامعة الفيوم.
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- ٢٠٠٥ **وإلى الآن** عضو الجمعية المصرية للتنمية السياحية، الفيوم.

الملخص العربى

فى ضوء الاهتمام المتزايد بضرورة تفعيل أسس التنمية السياحية المتواصلة (المستديمة – المستدامة ...)، تناغماً مع الأجندة ٢١ لتحقيق التنمية اللاقتصادية والإجتماعية والبيئية بإعتبارها الفكر الرائد فى القرن الحادى والعشرين لكل أنواع التنمية الاقتصادية بمختلف أنواعها، وسعياً لتقليل نسبة التأثيرات السلبية وتعظيم التأثيرات الايجابية المتعلقة بالنقل الجوى باعتباره قطاع حيوى فى صناعة السياحة، فقد ركز الباحث دراسته فى هذا السياق تحت عنوان: "اقتصاديات التنمية السياحية المتواصلة: دراسة لحالة النقل الجوى فى مصر". كما أن مشكلة الدراسة تم صياغتها على أنها "الإفتقار إلى تبنى أو تطبيق فكر الاقتصاد البيئى فى صناعة النقل الجوى فى مصر".

وتتمثل أهداف الدراسة فى: (١) تحليل مفهوم القيمة البيئية الكلية، وعناصرها، وكيفية تطبيقها وقياسها فى صناعة النقل الجوى، و(٢) إلقاء الضوء حول القضايا الاجتماعية والبيئية فى صناعة النقل الجوى، و(٣) تقييم صناعة النقل الجوى فى مصر من منظور اقتصاديات التنمية السياحية المتواصلة(المبنى الثالث بمطار القاهرة والشركة القابضة لمصر للطيران).

وفرضا الدراسة هما: (١) وجود قصور فى فهم القيمة البيئية الكلية ومكوناتها وكيفية قياسها فى دراسة الجدوى المتعلقة بالمبنى الثالث بمطار القاهرة الدولى، و(٢) هناك إهمال للقضايا البيئية والاجتماعية فى أداء الشركة القابضة لمصر للطيران.

واعتمدت الدراسة على: المنهج الوصفى التحليلى، ودراسة الحالة، والنموذج الاستناجى (الإستنباطى)، والمسح الشامل لجمع البيانات؛ والبرنامج الإحصائى الجاهز SPSS-V-11 لتحليل البيانات.

واستنتجت الدراسة صدق فرضياتها من حيث القصور فى تقدير القيمة البيئية فى دراسة الجدوى الخاصة بالمبنى الثالث (تحت الإنشاء) بمطار القاهرة الدولى، وعدم حصول الشركة القابضة لمصر للطيران على أى شهادة من شهادات الجودة البيئية ISO١٤٠٠٠ حتى يناير ٢٠٠٧ (وفقاً للمحدد الزمنى للدراسة). فنجد أن قيمة المتوسط العام لإجابات المستقصى منهم تقع بين البديلين محايد (قيمة٣) وموافق (قيمة٤) حيث كانت (٣,٣٠) و (٣,٦٠) للمبنى الثالث بمطار القاهرة والشركة القابضة لمصر للطيران بالترتيب، وذلك على الرغم من اتفاق آراء المستقصى منهم حول هذا القصور فى دراسة الجدوى المرتبطة بالمبنى الثالث وتشتت هذه الآراء فيما يتعلق بالجزئية الخاصة بالشركة القابضة لمصر للطيران، حيث جاءت قيمة الانحراف المعيارى أقل من الواحد الصحيح (٠,٩٥) وأكبر من الواحد الصحيح (١,٢٦) للأول والثانى على الترتيب.

وقدمت الدراسة مجموعة من التوصيات منها على سبيل المثال، أهمية تبنى الأساليب والمداخل المختلفة لتقدير القيمة البيئية الكلية سواء كانت معتمدة على قيم السوق (يوجد سعر محدد لها)، أو تقدير رغبة المجتمعات والأفراد فى حماية البيئة الطبيعية والثقافية والاجتماعية، وذلك فى دراسات الجدوى للمشروعات الجديدة أو التوسعات فى المشروعات القائمة فى صناعة النقل الجوى فى مصر.