

**Occupational Health Management System
(OHMS)**

By

Mohd Nazrul Effendy Mohd Isa

Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
INFORMATION & COMMUNICATION TECHNOLOGY
JUNE 2006

University Technology PETRONAS
Bandar Seri Iskandar
31750 Tronoh
Perak Darul Ridzuan

t
RC
965
.m697
2006

1) Occupational health
2) IT IS -- theory

CERTIFICATION OF APPROVAL

Occupational Health Management System (OHMS)

By

Mohd Nazrul Effendy Mohd Isa

A project dissertation submitted to the
Information Technology Programme
Universiti Teknologi PETRONAS

in partial fulfillment of the requirement for the
Bachelor of Technology (Hons)

INFORMATION & COMMUNICATION TECHNOLOGY

Approved by,



(MR. JALE AHMAD)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

June 2006

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

.....

MOHD NAZRUL EFFENDY MOHD ISA

ACKNOWLEDGEMENTS

This report should not have been finished without the help and guidance from my Final Year Project supervisor, Mr. Jale Ahmad. His positive comments and critics have been vital in getting the best out of me for this project.

I would also like to thank other UTP IT/IS lecturers for their views and suggestions during the presentation and evaluation. Not to forget, all my friends and peers throughout my 5 years at this university.

Lastly, I would like to thank again to all individuals who had given their support and thoughts on the completion of this project.

TABLE OF CONTENT

CERTIFICATION OF APPROVAL	ii
CERTIFICATION OF ORIGINALITY	iii
ACKNOWLEDGEMENT	iv
CHAPTER 1	1
INTRODUCTION	1
1.1 BACKGROUND OF STUDY	1
1.2 PROBLEM STATEMENT.....	2
1.3 OBJECTIVES AND SCOPE OF STUDY	4
1.3.1 Objectives	4
1.3.2 Scope of Study	5
CHAPTER 2	6
LITERATURE REVIEW	6
2.1 OHMS – METHOD OF EFFECTIVELY MANAGING SAFETY AND HEALTH AT WORKPLACE BY J.Q CAMPBELL	6
2.2 WHY COMPANIES ARE INCREASINGLY ADOPTING AN INNOVATIVE APPROACH TO OH&S INFORMATION MANAGEMENT?	7
2.2.1 New Challenges, Old Solutions	7
CHAPTER 3	9
METHODOLOGY	9
3.1 PLANNING	10
3.1.1 Hardware, Tools and Software	
3.1.2 Gantt Chart for Development Process of OHMS	
3.2 ANALYSIS.....	14
3.3 DESIGN.....	16
3.3.1 Architecture, Use-Case and Flow Chart Design	
3.3.2 Code Design	
3.3.2.1 Declaration Procedure	
3.3.2.2 Main Procedure	
3.3.2.3 Dbopen Procedure	
3.3.2.4 Dbclose Procedure	
3.3.2.5 Generate_Sheet Procedure	
3.3.2.6 mail Procedure	
3.3.3 Database Design	
3.4 IMPLEMENTATION.....	34
3.4.1 Running the OHMS	
3.4.1.1 Excel_Automation.exe and Microsoft Outlook Dialog Box	
3.4.1.2 Output in Microsoft Excel	
3.4.1.3 Mail Folder in Microsoft Outlook	

CHAPTER 4	39
RESULT AND DISCUSSION.....	39
4.1 UNIVERSITY TECHNOLOGY PETRONAS NETWORK RESTRICTION	
4.2 INTEGRATING EXCEL WITH VB.NET	
4.3 LESSON LEARNED FROM PROJECT	
4.4 PROBLEM FACED	
4.5 FUTURE RECOMMENDATION	
CHAPTER 5	44
CONCLUSION.....	44
REFERENCES	45
APPENDIX.....	46

LIST OF FIGURES/ TABLES

Figure 1: Waterfall Model

Figure 2: Gantt chart

Figure 3: OHMS System Architecture

Figure 4: OHMS Use-Case Diagram

Figure 5: OHMS Flow Chart

Figure 6: Database dbase.mdb (Microsoft Access)

Figure 7: Excel_Automation.exe and Microsoft Outlook Dialog Box

Figure 8(a): Output (Microsoft Excel)

Figure 8(b): Output (Microsoft Excel)

Figure 9: Mail Folder (Microsoft Outlook)

Figure 10: Mail Message Containing Attachment File (Statistics.xls)

Figure 11: Add Reference

Figure 12: Solution Explorer

Table 1: Scope of Study

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

The Occupational Safety and Health Regulation 1994 focus on a comprehensive approach to safety management, the responsibility for which rests with the employer. The objective is to create a safety workplace free from risk.

An Occupational Health Management System (OHMS) is a set of plans, actions and procedures to systematically manage health and safety in the workplace that is endorsed by the committed employer to achieve the following:

- i. Provision of a safe and healthy workplace and the prevention/ reduction of illness and injury for employees
- ii. Identification of workplace hazards, assessments and control of all risks

The purpose of the OHMS is to systematically eliminate the possibility of accident, illness, injury or fatality in the workplace by ensuring that the hazards in the workplace are eliminated or controlled in systematic manner, rather than waiting a crisis to occur. Employer has legal responsibilities to provide a safe workplace and systems of work, to consult with employees and to keep them informed about health and safety matters. In objective the goal of the project, the paper will also discuss about the advantages, issues and intended users of the Occupational Health Management System (OHMS).

1.2 PROBLEM STATEMENT

The needs of having Occupational Health Management System (OHMS) for an organization can be seen through the increased number of work-related injuries and fatalities in this country. Having such a system will minimize the risk of incident occurrence in the workplace and encourage employees to be more responsible when working in the high-risk area.

Research and studies have been conducted by the author and the findings show that organization that operates in high-risk industry needs to have a systematic-computerized system that manages occupational health and safety. Based on the previously done research, there are problems associated with safety at workplace which should be considered by employer. The findings are based on the statistic provided by the International Labour Organization, Geneva, Switzerland. Below are the findings:

- i. Each day an average of 5,000 people die as a result of work-related accidents or diseases.
- ii. Workers suffer approximately 270 million occupational incidents each year (fatal and non-fatal), and there are some 160 millions incidents of occupational diseases. In one third of these cases, the illness causes the loss of four or more working days.
- iii. Four percent of the world's gross domestic product (GDP) which is about US\$ 1251353 million is lost with the cost of injury, death and disease through absence from work, sickness treatment, and disability and survivor benefits.
- iv. Hazardous substances kill 340,000 workers annually. Asbestos only claims 100,000 lives.
- v. An estimated 11 million workers worldwide are monitored for exposure to ionizing radiation.
- vi. There are some 355,000 on-the-job fatalities each year. It is estimated that half of them occur in agriculture, the sector with the half the world's workforce. Other high-risk sectors are mining and construction.

In the case of accident, company normally relies on written reports that will be kept in files. Most companies actually use filing system in order to keep documentation such as accident written. When presenting the data about the accident, there will be difficulties since user has to retrieve the data back from the file. This will be the waste of time and energy.

When considering statistics that have to be prepared for analysis purpose, it is hard since the preparer have to revise all the written reports before producing the reports, normally by using Microsoft Excel. This will consume so much time for the user. Studying the current problems, the author managed to identify the needs of having such a systematic system to record data and generate statistics form the data.

In most company, some statistics that have been prepared will normally be shared among top members of the company. This is for the purpose of informing all employees about the main factors that contribute to the accidents. Through sharing the statistics, employees can know the critical part of their workplace that requires greater emphasis in term of safety.

Considering all the problem statements, the author would like to conclude that there is the need of having the system that will provide the medium to record data, generate statistics based on the stored data and attach the statistics as mail attachment, which will be forwarded to the intended receivers.

1.3 OBJECTIVES AND SCOPE OF STUDY

1.3.1 Objectives

The main objectives of the Occupational Health Management System (OHMS) are:

- i. To provide the medium for company to store data regarding the accidents.
- ii. To have a system that can generate analysis and statistics based on the reported incidents, injuries and fatalities

There are other objectives identified by the author which are considered as the benefits offered by the OHMS. They are:

- i. To prevent occupational injury and disease
- ii. To reduce loss of working days due to injury and accidents
- iii. To minimize work stoppages due to safety disputes
- iv. To improve work methods and worker moral thus leading to improved productivity
- v. To ensure competitiveness in business entity by continuously controlling and monitoring health status

Doing the project, the author also identifies the following objectives of completing the system. They are:

- i. To study on the integration of Microsoft software (Microsoft Visual Studio, Microsoft Access, Microsoft Excel and Microsoft Outlook)
- ii. To study the algorithms developed to generate graphs and statistics in other application.

1.3.2 Scope of Study

The scope of study covers the deep understanding on the health, safety and environment. There should be deep understanding on the tools and software to be used in the development phase. In order to produce a good system, process flow of the normal accident reporting has to be understood.

The author did also research on several issues regarding the integration of Microsoft software since it will be implemented in the project. This is necessary when determining the compatibility of each version of Microsoft software. Some new version applications can not be easily integrated with the older one without additional 'reference data', that is to be included in the program code.

The study on the similar system has been done in order to find the necessary field to be included in the developed system.

The study also covers various applications and tools to be used in the design and development process. The author studied on the capability of each tool needed in the development phase.

CHAPTER 2

LITERATURE REVIEW

2.1 OHMS – METHOD OF EFFECTIVELY MANAGING SAFETY AND HEALTH AT WORKPLACE BY J.Q CAMPBELL

A workplace safety culture comprises all the values, attitudes, rules, managerial systems and practices, participatory principles and working behaviour conducive to creating a safe and healthy working environment – a place where people can produce with a high degree of quality and productivity [1]. The International Labour Organization ILO's Occupational Safety and Health Convention, 1981 (No. 155) provides a suitable framework supporting a safety and health culture at work [4].

Effective prevention of occupational accidents and diseases begins at the enterprise level but involves broad participation from governments, workers' and employers' organizations. Worker participation, implementation of work organisation procedures, the provision of training and information to workers and inspection activities are important tools to promote a safety and health culture. Enterprise management and commitment plays a key role, as evidenced by the fact that companies with Occupational Health Management System (OHMS) have better records both in safety and productivity than those that do not have such systems [2, 3]. Meanwhile, government labour inspectors have a pivotal role in promoting, informing about, and monitoring as well as ensuring compliance with core International Labour Organization (ILO) Labour Standards on the basis of flagship ILO SafeWork conventions [4].

Occupational Health Management System (OHMS) is one of the most useful tools that has been developed to manage and reduce the risk of accident occurrence at the workplace [2, 3]. Despite having guidelines and regulations about the way of performing works, such system can alert workers about the potential of accident occurrence. It is better to prepare for uncertain event rather than preventing the event from the second occurrence [1].

2.2 WHY COMPANIES ARE INCREASINGLY ADOPTING AN INNOVATIVE APPROACH TO OH&S INFORMATION MANAGEMENT?

The effective management of occupational health and safety (OH&S) information remains a significant logistical challenge for many businesses. Most large organizations create, collect and store vast amounts of OH&S data in order to meet regulatory requirements, to reduce absence, to improve workplace productivity, and to safeguard an organization's most important asset, its workers. Despite these common requirements, many organizations take different approaches to the management of health and safety information.

Typically, OH&S data is not kept in a single repository. Instead, it is spread across independent OH&S functions, separate computer systems, and various business units, regions and facilities. This approach has meant that many companies have not kept pace with the volume and complexity of OH&S, business and compliance data. While this gap continues to widen for some, others have embraced an innovative, integrated approach that is beginning to reap significant rewards.

2.2.1 New Challenges, Old Solutions

While no two organizations are alike, health and safety professionals are faced with many of the same challenges when it comes to managing OH&S data, including the need to:

- Efficiently document health and safety data;
- Improve the tracking of required regulatory information;
- Generate reports that turn that data into useful management information;
- Identify trends, problem areas and root cause analysis;
- Protect sensitive content;
- Automate manual processes where possible; and,
- Carry out all of the above in a manner that is cost effective and that meets the financial and operational goals of an organization.

To meet these challenges, the majority of companies continue to rely heavily on paper-based systems, interspersed with a variety of independent computer systems. However, the international expansion of operations and the pace of regulatory change have created a shortfall with this approach. How can an organization efficiently track, manage, and coordinate high volumes of data from a variety of functional areas, while at the same time consolidating information from global operations subject to their own respective legislative regimes? Efficiency concerns aside, without a complete picture of their world in real-time, how can OH&S professionals be sure they are making accurate and useful recommendations to senior management?

CHAPTER 3

METHODOLOGY

The project follows the Waterfall Methodology where the planning, analysis, design, and implementation phases proceed in sequence from one phase to another. This chapter will describe the detailed explanations of each phases of the methodology. The Waterfall model is chosen as it is the most suitable model in order to accomplish the project. The Waterfall model is chosen as it is the most suitable model in order to accomplish the project. The phases are all important and will be applied throughout the development lifecycle. Waterfall model is one of a number of structured approaches to information system development, created to guide all the processes involved, from initial feasibility study through maintenance of the completed application.

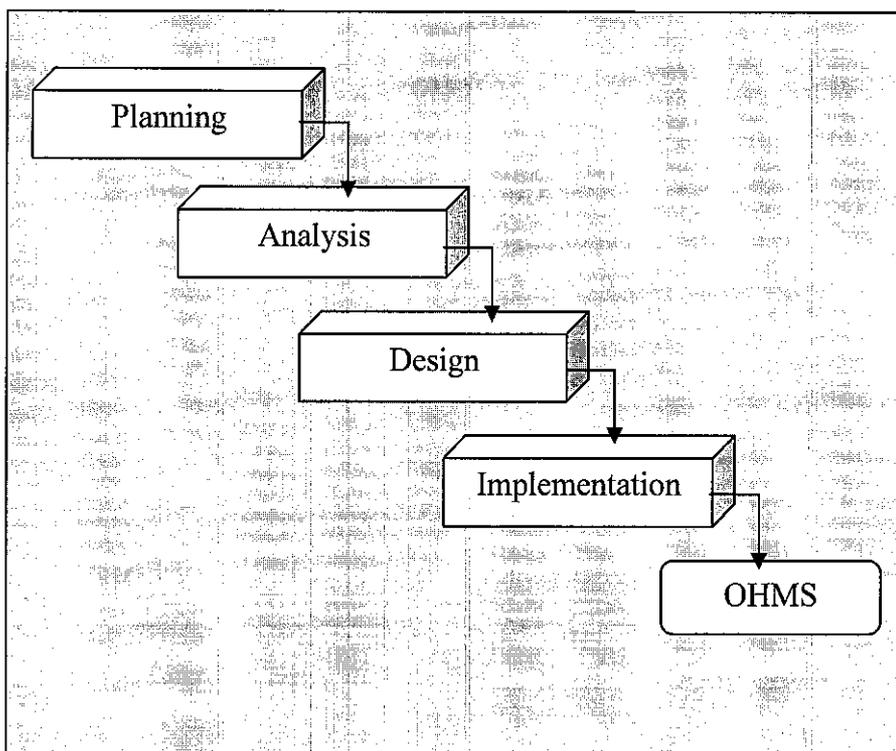


Figure 1: Waterfall Model

3.1 PLANNING

Conducting the feasibility study, the author revises at the present-similar Occupational Health Management System (OHMS) to determine the general requirements that it was intended to meet. Study has also been done to identify problems in meeting these requirements, new requirements that have come to light since it was first implemented and briefly investigates solutions. In the stage, the author mainly plan the work in order based on each priority. The project will be developed in 2 semesters; 1 semester for researching and designing and the other semester for developing and implementing.

The other part is to identify problems associated in occupational and health and based on the identified problems, the objectives of the system were determined. The problem statement and objectives of the system are included in Chapter 1 of this report.

The author emphasized more on the timeline and duration required in completing the system. Through proper planning in term of time, only the project will be well-completed. The first semester of the development process is assigned for researching purpose. This includes studying the requirements, tools and software to be used and also the related documents. The second semester is assigned for the designing, developing and implementing purposes. The author emphasized more on the first semester because through the proper planning, the system can be well-produced. However, both semesters are very important for the author.

The summary of the time and duration assigned by the author for the development phase can be seen in figure 2 which shows the Gantt chart of the development phase during the second semester.

During the planning phase, the author also determines the scopes of study that are going to be covered when developing the system.

3.1.1 Hardware, Tools and Software

The hardware used to develop the system is the author's personal computer with:

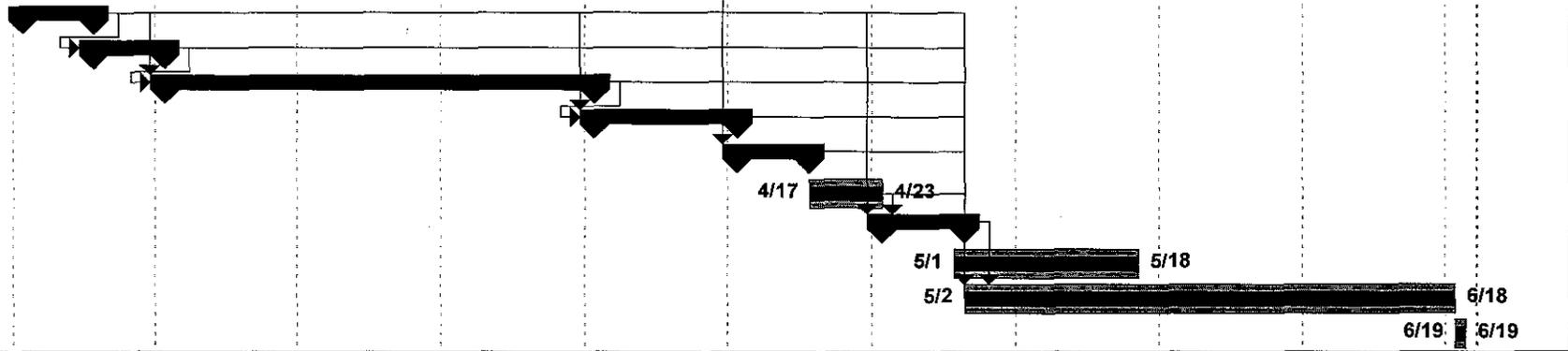
- i. Intel Pentium 4 775 2.8 E 800/ 1MB
- ii. 512MB RAM
- iii. 80GB hard disk space (include window and basic software)

The softwares needed to develop the system are:

- i. Microsoft Visual Studio.Net 2003
- ii. Microsoft Office Access 2003
- iii. Microsoft Office Excel 2003
- iv. Microsoft Office Outlook 2003

2	✓	Review on system design :	3 days	Mon 1/23/06	Wed 1/25/06	
3	✓	Review on flow of system	2 days	Fri 1/27/06	Sun 1/29/06	2
4	✓	Design and Create Database I	5 days?	Mon 1/30/06	Sun 2/5/06	
5	✓	Review FYP1 for database	2 days	Mon 1/30/06	Tue 1/31/06	
6	✓	Identify elements to be insr	2 days	Tue 1/31/06	Wed 2/1/06	
7	✓	Create tables into databas	2 days	Thu 2/2/06	Sun 2/5/06	
8	✓	Name database to dbase.n	0 days?	Sun 2/5/06	Sun 2/5/06	
9	✓	Setup Connection to Databas	6 days?	Mon 2/6/06	Sun 2/12/06	4
10	✓	Setup dbopen procedure	3 days?	Mon 2/6/06	Wed 2/8/06	
11	✓	Setup dbclose procedure	3 days?	Thu 2/9/06	Sun 2/12/06	10
12	✓	Code Generate_Sheet Proced	35 days?	Mon 2/13/06	Sun 3/26/06	4,9
13	✓	Code for output format	6 days?	Mon 2/13/06	Sun 2/19/06	
14	✓	Populate data from databa	6 days?	Mon 2/20/06	Sun 2/26/06	
15	✓	Specify output (bar graph)	6 days?	Mon 2/27/06	Sun 3/5/06	14
16	✓	Specify output (pie chart)	6 days?	Mon 3/6/06	Sun 3/12/06	14
17	✓	Code for Generate_Sheet2	11 days?	Mon 3/13/06	Sun 3/26/06	
18	✓	Code Main Procedure	11 days?	Mon 3/27/06	Sun 4/9/06	4,9,12
19	✓	Code for saving file in bin f	5 days?	Mon 3/27/06	Sun 4/2/06	
20	✓	Code for assigning filenam	5 days?	Mon 4/3/06	Sat 4/8/06	
21	✓	Code for calling all funcior	1 day?	Sun 4/9/06	Sun 4/9/06	
22	✓	Code automail Procedure	6 days?	Mon 4/10/06	Sun 4/16/06	1
23	✓	Code for attaching save file	4 days?	Mon 4/10/06	Thu 4/13/06	
24	✓	Assign function to be caller	2 days?	Fri 4/14/06	Sun 4/16/06	
25	✓	Setting up Microsoft Outlook Cc	6 days?	Mon 4/17/06	Sun 4/23/06	
26	✓	Compile and Test System	7 days?	Mon 4/24/06	Mon 5/1/06	4,9,12,18,22,25
27	✓	Compile and run system	4 days?	Mon 4/24/06	Thu 4/27/06	
28	✓	Fix errors and bugs	3 days?	Fri 4/28/06	Mon 5/1/06	
29	✓	Prepare Final Report	14 days	Mon 5/1/06	Thu 5/18/06	
30	✓	Implementing system	34 days?	Tue 5/2/06	Sun 6/18/06	4,9,12,18,22,25,26
31	✓	Project Presentation	1 day?	Mon 6/19/06	Mon 6/19/06	

4	✓
9	✓
12	✓
18	✓
22	✓
25	✓
26	✓
29	✓
30	✓
31	✓



Project: nazyaganitchart
Date: Wed 6/21/06

Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone		Project Summary	
Milestone		Rolled Up Progress		Group By Summary	
Summary		Split		Deadline	

3.2 ANALYSIS

Analysis was done in order to understand and document the user's need for the system and emphasize what the system is to do. Data on the current system available was identified and solutions for the limitation arose were determined.

The stage involves detailed fact-finding of the application area which look at the functional requirement of the existing system, the requirements of the new system, any constrained imposed, exception conditions and problems of the present working methods. The facts are gained through observation, searching records and documentations. In the stage the study has been done to some aspects which are to be included in the system.

The author did have an experience working with Corporate Health, Safety and Environment Unit which is one of the subsidiaries of PETRONAS that manages occupational health related problem in PETRONAS. So, it is easier to find the information needed based on experience.

Analysis stage also includes the study on the functionality of the system. The author specified that the main function of the OHMS is to provide the medium for generating statistics (table, graphs and chart) based on the stored data in the Microsoft Excel. The other functionality is to provide the medium to store data in the database (Microsoft Access). The system will also provide the opportunity for user to automatically save statistics file generated earlier and attach it in the mail, which is to be sent.

The author also specified that all the codes in the program will be developed using Microsoft Visual Studio.Net.

Table 1 summarizes the study that has been done by the author about all the aspects needed.

No.	Topics	Description
1	Occupational Health Issues	Study on the current issues on occupational health to determine the general requirement of the proposed OHMS.
2	Health Safety and Environment (HSE) Policy and Implementation	Conduct research on the HSE regulation for an organization and study on the how the policy being implemented in the organization. The research includes reviewing documentation about National Institute of Occupational Safety and Health (NIOSH) Malaysia.
3	Incident Reporting Procedure	Study on the procedure used to report incidents that occur in the workplace. Find that current handwritten report is obsolete and there is the need of having computerized system.
4	Impact from Occupational Injury and Disease	Study on the effects from the injury to the organization. Review statistic produced by International Labour Organization (ILO) Geneva, Switzerland.
5	Tools and Software	Study on software and application that will be used during the development phase such as Microsoft Visual Studio.Net, Microsoft Access, Microsoft Excel and Microsoft Outlook.

Table 1: Scope of Study

3.3 DESIGN

3.3.1 Architecture, Use-Case and Flow Chart Design

The design stage involves the design of both computer and documentation part. The first part is to design the system architecture of the OHMS. In the process, the target users have been identified by the author. The purpose of developing the architecture is to provide representation of the OHMS, and the process and discipline for effectively implementing the design for such a system.

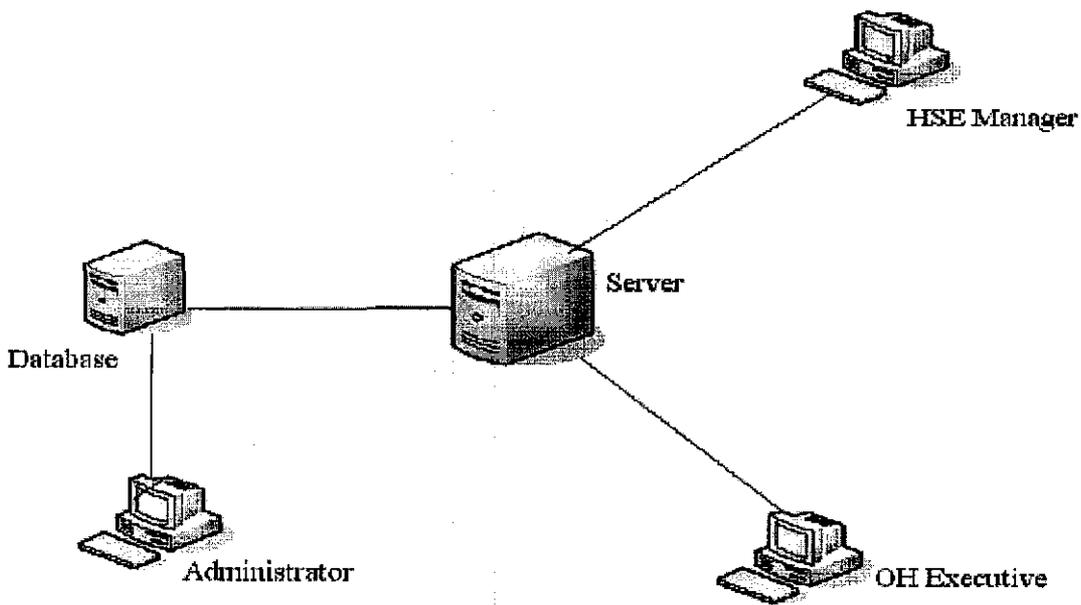


Figure 3: OHMS System Architecture

The information collected earlier will be used to accomplish the logical design of the system. The design is specific to the technical requirements of the system that will be required to operate in and the tools used in building the system. Based on the requirements needed for the system, the author developed the process flow for functionality. There are three main functionalities for the OHMS which are:

- i. Data Storing in Database
- ii. Graph Generating for Analysis and Statistics
- iii. Attachment in Mail

The first process covers the development of the Unified Modeling Language (UML) diagrams which are use-case and flowcharts. The use-case diagram describes the agents and processes involved in the system.

The use-case diagram is used to represent the processes and the users that involved in the system. The diagram shows “which user can access which functionality”.

The flow-chart specifies the process flow of the system. During this phase, the author identifies “which process comes first and which process follows it”. The author specified that the process of generating the statistics start with the occurrence of accident. In the case of accident, user will enter data in the database which is stored in Microsoft Access. The program will then convert the data stored in the database to the tables, graphs and charts in Microsoft Excel. After that the, system will save the statistics as the name specified in the system earlier before attaching the file as attachment in the Microsoft Outlook. The mail will then be sent by the user to the intended receiver.

Figure 4 illustrates the OHMS use-case diagram while figure 5 shows the flowchart of OHMS.

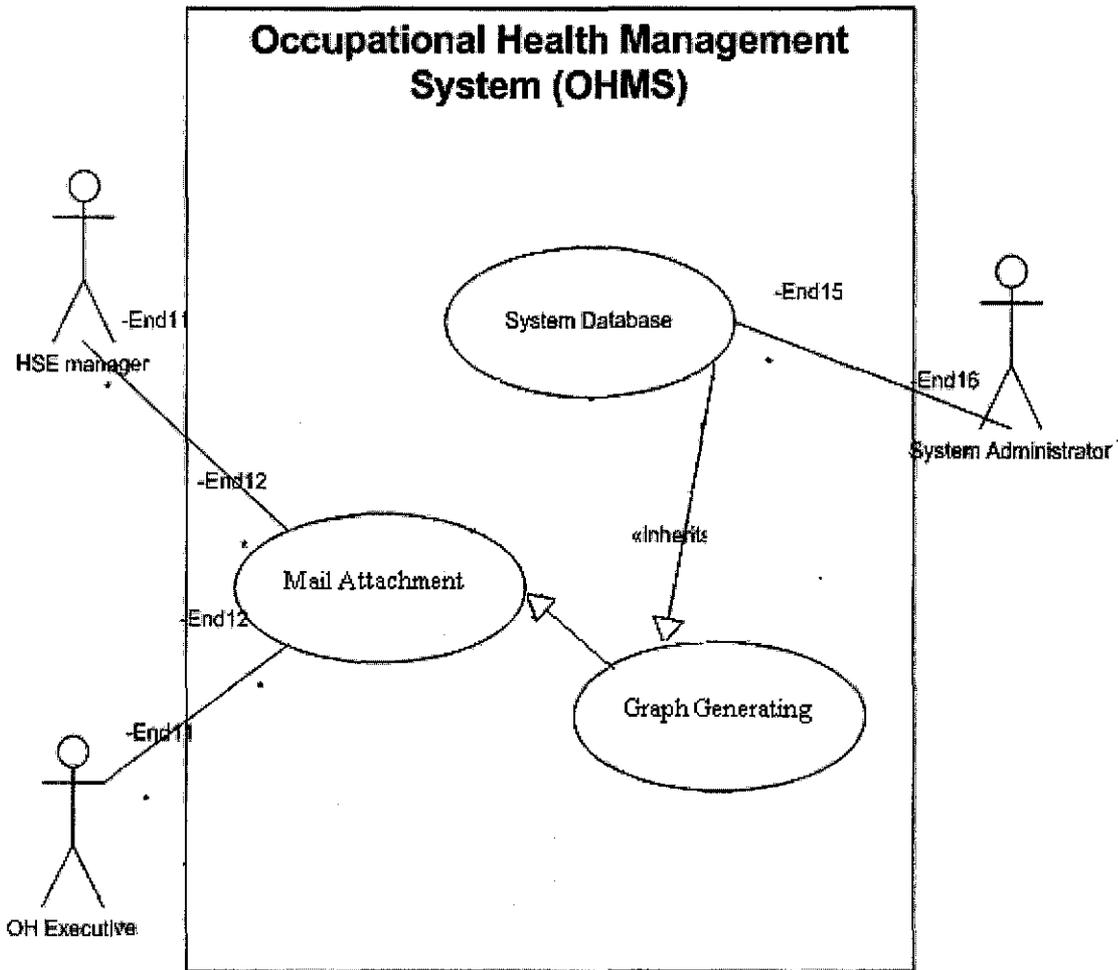


Figure 4: OHMS Use-Case Diagram

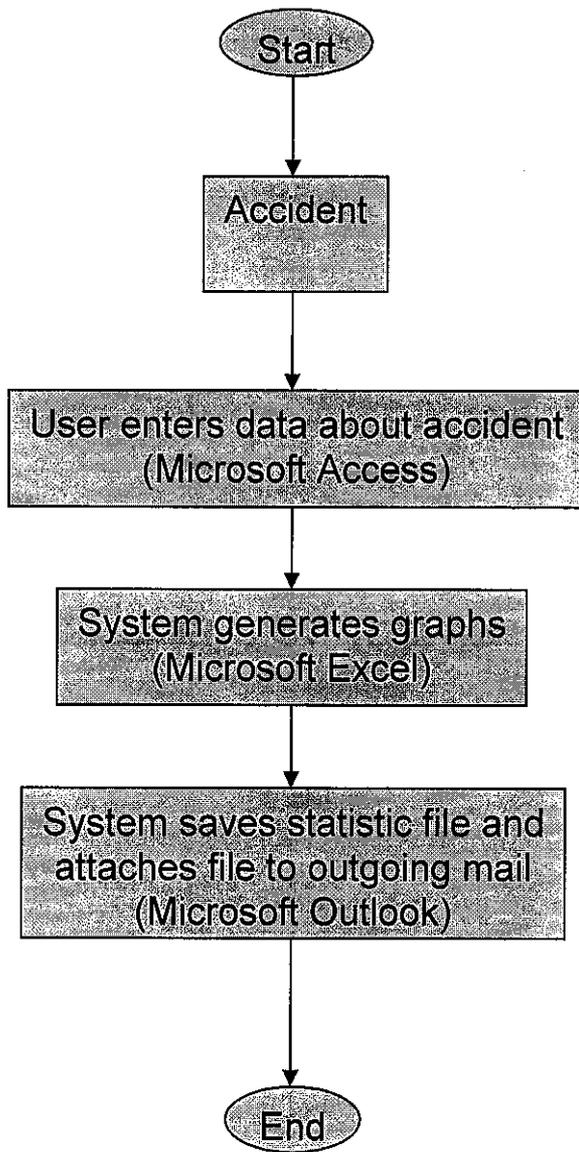


Figure 5: OHMS Flow Chart

3.3.2 Code Design

The next design part conducted by the author is the code design. In this part the author designed the code based on functionalities. Each functionality is assigned with the each code function developed in Microsoft Visual Studio.Net. There are six procedures included in the design of the code.

3.3.2.1 Declaration Procedure

This part involves declaration of several variables with the libraries in VB.Net.

```
Imports System
```

```
Imports System.Data
```

```
Imports System.Data.OleDb
```

```
Imports System.IO
```

```
Module Module1
```

```
    Public conn As New OleDbConnection()
```

```
    Public Filename As String
```

```
    Public chkexcel As Boolean
```

```
    Public oexcel As Excel.Application
```

```
    Public obook As Excel.Workbook
```

```
    Public osheet As Excel.Worksheet
```

```
    Public R As Integer
```

3.3.2.2 Main Procedure

This part of the code generates an Excel workbook and calls some other procedures for database handling, data population, and auto-mailing.

```
Sub Main()  
    Try  
        Dbopen()
```

```
'File name and path, here i used Statistoics file to be stored in Bin  
directory in the solution directory
```

```

        Filename = AppDomain.CurrentDomain.BaseDirectory &
"Statistics.xls"

'check if file already exists then delete it to create a new file
    If File.Exists(Filename) Then
        File.Delete(Filename)
    End If
    If Not File.Exists(Filename) Then
        chkexcel = False

'create new excel application
        oexcel = CreateObject("Excel.Application")

'add a new workbook
        obook = oexcel.Workbooks.Add

'set the application alerts not to be displayed for confirmation
        oexcel.Application.DisplayAlerts = True

'check total sheets in workbook
        Dim S As Integer = oexcel.Application.Sheets.Count()

'leaving first sheet delete all the remaining sheets
        If S > 3 Then
            oexcel.Application.DisplayAlerts = False
            Dim J As Integer = S
            Do While J > 3
                oexcel.Application.Sheets(J).delete()
                J = oexcel.Application.Sheets.Count()
            Loop
        End If

'to check the session of excel application
        chkexcel = True

        oexcel.Visible = True

'this procedure populate the sheet
        Generate_Sheet1()
        Generate_Sheet2()
        Generate_Sheet3()

'save excel file
        obook.SaveAs(Filename)

'end application object and session
        osheet = Nothing
        oexcel.Application.DisplayAlerts = False
        obook.Close()
        oexcel.Application.DisplayAlerts = True
        obook = Nothing
        oexcel.Quit()
        oexcel = Nothing
        chkexcel = False

```

```

'mail excel file as an attachment
        automail("send.file@somedomain.com", "Auto Excel File",
"any message", Filename)
        End If
    Catch ex As Exception

'mail error message
        automail("err.mail@somedomain.com", "Error Message",
ex.Message, "")
    Finally
        Dbclose()
    End Try
End Sub

```

3.3.2.3 Dbopen Procedure

The procedure opens connection to the database.

```

Public Sub Dbopen()

'open connection for db.mdb stroed in the base directory
    conn.ConnectionString = "Provider=Microsoft.Jet.OLEDB.4.0; Data
Source='" & AppDomain.CurrentDomain.BaseDirectory & "dbase.mdb'"
    conn.Open()
End Sub

```

3.3.2.4 Dbclose Procedure

The procedure closes connection from the database.

```

Public Sub Dbclose()

'check and close db connection
    If conn.State = ConnectionState.Open Then
        conn.Close()
        conn.Dispose()
        conn = Nothing
    End If

'check and close excel application
    If chkexcel = True Then
        osheet = Nothing
        oexcel.Application.DisplayAlerts = False
        obook.Close()
        oexcel.Application.DisplayAlerts = True
        obook = Nothing
        oexcel.Quit()
        oexcel = Nothing
    End If
End Sub

```

3.3.2.5 Generate_Sheet Procedure (Generate_Sheet1, Generate_Sheet2, Generate_Sheet3)

The Generate_Sheet procedure populates data from database in Microsoft Access, generate simple table in Microsoft Excel and generate bar graph and pie chart in Microsoft Excel according to the specification. This procedure is used to create new sheet in Microsoft Excel Application. In the system, the author decided to generate only three sheets, so, there are only there Generate_Sheet procedure included.

```
Sub Generate_Sheet1()
    Console.WriteLine("Generating Auto Report")
    Console.WriteLine("This is a project by Mohd Nazrul Effendy")
    osheet = oexcel.Worksheets(1)

'rename the sheet
    osheet.Name = "Excel Charts"
    osheet.Range("A1:AZ400").Interior.ColorIndex = 2
    osheet.Range("A1").Font.Size = 12
    osheet.Range("A1").Font.Bold = True
    osheet.Range("A1:I1").Merge()
    osheet.Range("A1").Value = "OHMS - Analysis and Statistics"
    osheet.Range("A1").EntireColumn.AutoFit()

'format headings
    osheet.Range("A3:C3").Font.Color = RGB(255, 255, 255)
    osheet.Range("A3:C3").Interior.ColorIndex = 5
    osheet.Range("A3:C3").Font.Bold = True
    osheet.Range("A3:C3").Font.Size = 10

'columns heading
    osheet.Range("A3").Value = "Sector"
    osheet.Range("A3").BorderAround(8)
    osheet.Range("B3").Value = "Fire"
    osheet.Range("B3").BorderAround(8)
    osheet.Range("C3").Value = "Explosion"
    osheet.Range("C3").BorderAround(8)

'populate data from DB
    Dim SQLQuery As String = "select * from Accident1"
    Dim SQLCommand As New OleDbCommand(SQLQuery, conn)
    Dim SqlDataReader As OleDbDataReader = SQLCommand.ExecuteReader
    Dim R As Integer = 3
    While SqlDataReader.Read
        R = R + 1
        osheet.Range("A" & R).Value =
SqlDataReader.GetValue(0).ToString
        osheet.Range("A" & R).BorderAround(8)
```

```

        osheet.Range("B" & R).Value =
SQLReader.GetValue(1).ToString
        osheet.Range("B" & R).BorderAround(8)
        osheet.Range("C" & R).Value =
SQLReader.GetValue(2).ToString
        osheet.Range("C" & R).BorderAround(8)
    End While
    SQLReader.Close()
    SQLReader = Nothing

'create chart objects
    Dim oChart As Excel.Chart
    Dim MyCharts As Excel.ChartObjects
    Dim MyCharts1 As Excel.ChartObject
    MyCharts = osheet.ChartObjects

'set chart location
    MyCharts1 = MyCharts.Add(150, 30, 400, 250)
    oChart = MyCharts1.Chart

'use to draw chart on the default location
    oChart.Location(Excel.XlChartLocation.xlLocationAsObject,
osheet.Name)
    With oChart

'set data range for chart
        Dim chartRange As Excel.Range
        chartRange = osheet.Range("A3", "C" & R)
        .SetSourceData(chartRange)

'set how to draw chart i.e column wise or row wise
        .PlotBy = Excel.XlRowCol.xlColumns

'set data lables for bars
.ApplyDataLabels(Excel.XlDataLabelsType.xlDataLabelsShowNone)

'set legend to be displayed or not
        .HasLegend = True

'set legend location
        .Legend.Position =
Excel.XlLegendPosition.xlLegendPositionRight

'select chart type
        ChartType = Excel.XlChartType.xl3DBarClustered

'chart title
        .HasTitle = True
        .ChartTitle.Text = "Fire and Explosion based on Business
Sectors"

'set titles for Axis values and categories
        Dim xlAxisCategory, xlAxisValue As Excel.Axes
        xlAxisCategory = CType(oChart.Axes(,
Excel.XlAxisGroup.xlPrimary), Excel.Axes)

```

```

xlAxisCategory.Item(Excel.XlAxisType.xlCategory).HasTitle =
True

xlAxisCategory.Item(Excel.XlAxisType.xlCategory).AxisTitle.Characters.T
ext = "Business Sectors"
xlAxisValue = CType(oChart.Axes(,
Excel.XlAxisGroup.xlPrimary), Excel.Axes)
xlAxisValue.Item(Excel.XlAxisType.xlValue).HasTitle = True

xlAxisValue.Item(Excel.XlAxisType.xlValue).AxisTitle.Characters.Text =
"Fire/ Explosion"
End With

'set style to show the totals
R = R + 1
osheet.Range("A" & R & ":C" & R).Font.Bold = True
osheet.Range("A" & R & ":C" & R).Font.Color = RGB(255, 255,
255)
osheet.Range("A" & R).Value = "Total"
osheet.Range("A" & R & ":C" & R).Interior.ColorIndex = 5
osheet.Range("A" & R & ":C" & R).BorderAround(8)

'sum the values from column 2 to 3
Dim columnno = 2
For columnno = 2 To 3
Dim Htotal As String = 0
Dim RowCount As Integer = 4
Do While RowCount <= R
Htotal = Htotal + osheet.Cells(RowCount,
columnno).value
osheet.Cells(RowCount, columnno).borderaround(8)
RowCount = RowCount + 1
Loop

'display value
osheet.Cells(R, columnno).Value = Htotal

'format colums
With DirectCast(osheet.Columns(columnno), Excel.Range)
.AutoFit()
.NumberFormat = "0,00"
End With
Next

'add a pie chart for total comparison
MyCharts = osheet.ChartObjects
MyCharts1 = MyCharts.Add(150, 290, 400, 250)
oChart = MyCharts1.Chart
With oChart
Dim chartRange As Excel.Range
chartRange = osheet.Range("A" & R, "C" & R)
.SetSourceData(chartRange)
.PlotBy = Excel.XlRowCol.xlRows
.ChartType = Excel.XlChartType.xl3DPie

```

```

.ApplyDataLabels (Excel.XlDataLabelsType.xlDataLabelsShowPercent)
    .HasLegend = False
    .HasTitle = True
    .ChartTitle.Text = "Fire/ Explosion Pie Chart"
    .ChartTitle.Font.Bold = True
End With
End Sub

Sub Generate_Sheet2()

    osheet = oexcel.Worksheets(2)

'rename the sheet
    osheet.Name = "Excel Charts2"
    osheet.Range("A1:AZ400").Interior.ColorIndex = 2
    osheet.Range("A1").Font.Size = 12
    osheet.Range("A1").Font.Bold = True
    osheet.Range("A1:I1").Merge()
    osheet.Range("A1").Value = "OHMS - Analysis and Statistics"
    osheet.Range("A1").EntireColumn.AutoFit()

'format headings
    osheet.Range("A3:C3").Font.Color = RGB(255, 255, 255)
    osheet.Range("A3:C3").Interior.ColorIndex = 5
    osheet.Range("A3:C3").Font.Bold = True
    osheet.Range("A3:C3").Font.Size = 10

'columns heading
    osheet.Range("A3").Value = "Sector"
    osheet.Range("A3").BorderAround(8)
    osheet.Range("B3").Value = "Spillage"
    osheet.Range("B3").BorderAround(8)
    osheet.Range("C3").Value = "Transportation"
    osheet.Range("C3").BorderAround(8)

'populate data from DB
    Dim SQLQuery As String = "select * from Accident2"
    Dim SQLCommand As New OleDbCommand(SQLQuery, conn)
    Dim SQLReader As OleDbDataReader = SQLCommand.ExecuteReader
    Dim R As Integer = 3
    While SQLReader.Read
        R = R + 1
        osheet.Range("A" & R).Value =
SQLReader.GetValue(0).ToString
        osheet.Range("A" & R).BorderAround(8)
        osheet.Range("B" & R).Value =
SQLReader.GetValue(1).ToString
        osheet.Range("B" & R).BorderAround(8)
        osheet.Range("C" & R).Value =
SQLReader.GetValue(2).ToString
        osheet.Range("C" & R).BorderAround(8)
    End While
    SQLReader.Close()
    SQLReader = Nothing

```

```

'create chart objects
    Dim oChart As Excel.Chart
    Dim MyCharts As Excel.ChartObjects
    Dim MyCharts1 As Excel.ChartObject
    MyCharts = osheet.ChartObjects

'set chart location
    MyCharts1 = MyCharts.Add(150, 30, 400, 250)
    oChart = MyCharts1.Chart

'use to draw chart on the default location
    oChart.Location(Excel.XlChartLocation.xlLocationAsObject,
osheet.Name)
    With oChart

'set data range for chart
        Dim chartRange As Excel.Range
        chartRange = osheet.Range("A3", "C" & R)
        .SetSourceData(chartRange)

'set how to draw chart i.e column wise or row wise
        .PlotBy = Excel.XlRowCol.xlColumns

'set data labels for bars
.ApplyDataLabels(Excel.XlDataLabelsType.xlDataLabelsShowNone)

'set legend to be displayed or not
        .HasLegend = True

'set legend location
        .Legend.Position =
Excel.XlLegendPosition.xlLegendPositionRight

'select chart type
        ChartType = Excel.XlChartType.xl3DBarClustered

'chart title
        .HasTitle = True
        .ChartTitle.Text = "Spillage and Transportation based on
Business Sectors"

'set titles for Axis values and categories
        Dim xlAxisCategory, xlAxisValue As Excel.Axes
        xlAxisCategory = CType(oChart.Axes(,
Excel.XlAxisGroup.xlPrimary), Excel.Axes)
        xlAxisCategory.Item(Excel.XlAxisType.xlCategory).HasTitle =
True

xlAxisCategory.Item(Excel.XlAxisType.xlCategory).AxisTitle.Characters.T
ext = "Business Sectors"
        xlAxisValue = CType(oChart.Axes(,
Excel.XlAxisGroup.xlPrimary), Excel.Axes)
        xlAxisValue.Item(Excel.XlAxisType.xlValue).HasTitle = True

xlAxisValue.Item(Excel.XlAxisType.xlValue).AxisTitle.Characters.Text =
"Spillage/ Transportation"

```

```

End With

'set style to show the totals
R = R + 1
osheet.Range("A" & R & ":C" & R).Font.Bold = True
osheet.Range("A" & R & ":C" & R).Font.Color = RGB(255, 255,
255)
osheet.Range("A" & R).Value = "Total"
osheet.Range("A" & R & ":C" & R).Interior.ColorIndex = 5
osheet.Range("A" & R & ":C" & R).BorderAround(8)

'sum the values from column 2 to 3
Dim columnno = 2
For columnno = 2 To 3
    Dim Htotal As String = 0
    Dim RowCount As Integer = 4
    Do While RowCount <= R
        Htotal = Htotal + osheet.Cells(RowCount,
columnno).value
        osheet.Cells(RowCount, columnno).borderaround(8)
        RowCount = RowCount + 1
    Loop

'display value
osheet.Cells(R, columnno).Value = Htotal

'format columns
With DirectCast(osheet.Columns(columnno), Excel.Range)
    .AutoFit()
    .NumberFormat = "0,00"
End With
Next

'add a pie chart for total comparison
MyCharts = osheet.ChartObjects
MyCharts1 = MyCharts.Add(150, 290, 400, 250)
oChart = MyCharts1.Chart
With oChart
    Dim chartRange As Excel.Range
    chartRange = osheet.Range("A" & R, "C" & R)
    .SetSourceData(chartRange)
    .PlotBy = Excel.XlRowCol.xlRows
    .ChartType = Excel.XlChartType.xl3DPie

.ApplyDataLabels(Excel.XlDataLabelsType.xlDataLabelsShowPercent)
    .HasLegend = False
    .HasTitle = True
    .ChartTitle.Text = "Spillage/ Transportation Pie Chart"
    .ChartTitle.Font.Bold = True
End With
End Sub

```

```

Sub Generate_Sheet3()

    osheet = oexcel.Worksheets(3)

'rename the sheet
    osheet.Name = "Excel Charts3"
    osheet.Range("A1:AZ400").Interior.ColorIndex = 2
    osheet.Range("A1").Font.Size = 12
    osheet.Range("A1").Font.Bold = True
    osheet.Range("A1:I1").Merge()
    osheet.Range("A1").Value = "OHMS - Analysis and Statistics"
    osheet.Range("A1").EntireColumn.AutoFit()

'format headings
    osheet.Range("A3:C3").Font.Color = RGB(255, 255, 255)
    osheet.Range("A3:C3").Interior.ColorIndex = 5
    osheet.Range("A3:C3").Font.Bold = True
    osheet.Range("A3:C3").Font.Size = 10

'columns heading
    osheet.Range("A3").Value = "Sector"
    osheet.Range("A3").BorderAround(8)
    osheet.Range("B3").Value = "Injury"
    osheet.Range("B3").BorderAround(8)
    osheet.Range("C3").Value = "Fatality"
    osheet.Range("C3").BorderAround(8)

'populate data from DB
    Dim SQLQuery As String = "select * from Accident3"
    Dim SQLCommand As New OleDbCommand(SQLQuery, conn)
    Dim SqlDataReader As OleDbDataReader = SQLCommand.ExecuteReader
    Dim R As Integer = 3
    While SqlDataReader.Read
        R = R + 1
        osheet.Range("A" & R).Value =
SqlReader.GetValue(0).ToString
        osheet.Range("A" & R).BorderAround(8)
        osheet.Range("B" & R).Value =
SqlReader.GetValue(1).ToString
        osheet.Range("B" & R).BorderAround(8)
        osheet.Range("C" & R).Value =
SqlReader.GetValue(2).ToString
        osheet.Range("C" & R).BorderAround(8)
    End While
    SqlDataReader.Close()
    SqlDataReader = Nothing

'create chart objects
    Dim oChart As Excel.Chart
    Dim MyCharts As Excel.ChartObjects
    Dim MyCharts1 As Excel.ChartObject
    MyCharts = osheet.ChartObjects

'set chart location
    MyCharts1 = MyCharts.Add(150, 30, 400, 250)
    oChart = MyCharts1.Chart

```

```

'use to draw chart on the default location
    oChart.Location(Excel.XlChartLocation.xlLocationAsObject,
osheet.Name)
    With oChart

'set data range for chart
    Dim chartRange As Excel.Range
    chartRange = osheet.Range("A3", "C" & R)
    .SetSourceData(chartRange)

'set how to draw chart i.e column wise or row wise
    .PlotBy = Excel.XlRowCol.xlColumns

'set data lables for bars

.ApplyDataLabels(Excel.XlDataLabelsType.xlDataLabelsShowNone)

'set legend to be displayed or not
    .HasLegend = True

'set legend location
    .Legend.Position =
Excel.XlLegendPosition.xlLegendPositionRight

'select chart type
    ChartType = Excel.XlChartType.xl3DBarClustered

'chart title
    .HasTitle = True
    .ChartTitle.Text = "Injury and Fatality based on Business
Sectors"

'set titles for Axis values and categories
    Dim xlAxisCategory, xlAxisValue As Excel.Axes
    xlAxisCategory = CType(oChart.Axes(,
Excel.XlAxisGroup.xlPrimary), Excel.Axes)
    xlAxisCategory.Item(Excel.XlAxisType.xlCategory).HasTitle =
True

xlAxisCategory.Item(Excel.XlAxisType.xlCategory).AxisTitle.Characters.T
ext = "Business Sectors"
    xlAxisValue = CType(oChart.Axes(,
Excel.XlAxisGroup.xlPrimary), Excel.Axes)
    xlAxisValue.Item(Excel.XlAxisType.xlValue).HasTitle = True

xlAxisValue.Item(Excel.XlAxisType.xlValue).AxisTitle.Characters.Text =
"Injury/ Fatality"
    End With

'set style to show the totals
    R = R + 1
    osheet.Range("A" & R & ":C" & R).Font.Bold = True
    osheet.Range("A" & R & ":C" & R).Font.Color = RGB(255, 255,
255)
    osheet.Range("A" & R).Value = "Total"
    osheet.Range("A" & R & ":C" & R).Interior.ColorIndex = 5
    osheet.Range("A" & R & ":C" & R).BorderAround(8)

```

```

'sum the values from column 2 to 3
    Dim columnno = 2
    For columnno = 2 To 3
        Dim Htotal As String = 0
        Dim RowCount As Integer = 4
        Do While RowCount <= R
            Htotal = Htotal + osheet.Cells(RowCount,
columnno).value
            osheet.Cells(RowCount, columnno).borderaround(8)
            RowCount = RowCount + 1
        Loop
    Next columnno

'display value
    osheet.Cells(R, columnno).Value = Htotal

'format columns
    With DirectCast(osheet.Columns(columnno), Excel.Range)
        .AutoFit()
        .NumberFormat = "0,00"
    End With
Next

'add a pie chart for total comparison
MyCharts = osheet.ChartObjects
MyCharts1 = MyCharts.Add(150, 290, 400, 250)
oChart = MyCharts1.Chart
With oChart
    Dim chartRange As Excel.Range
    chartRange = osheet.Range("A" & R, "C" & R)
    .SetSourceData(chartRange)
    .PlotBy = Excel.XlRowCol.xlRows
    .ChartType = Excel.XlChartType.xl3DPie

.ApplyDataLabels(Excel.XlDataLabelsType.xlDataLabelsShowPercent)
    .HasLegend = False
    .HasTitle = True
    .ChartTitle.Text = "Injury/ Fatality Pie Chart"
    .ChartTitle.Font.Bold = True
End With
End Sub
End Module

```

3.3.2.6 automail Procedure

The method is used to generate attachment file from the file saved earlier in the system. It will then attach the file to outgoing mail using Microsoft Outlook.

```
Public Sub automail(ByVal mail_to As String, ByVal subject As String,
ByVal msg As String, ByVal filename As String)
    Dim myOutlook As New Outlook.Application()
    Dim myMailItem, attach As Object
    myMailItem =
myOutlook.CreateItem(Outlook.OlItemType.olMailItem)
    myMailItem.Body = msg
    If File.Exists(filename) Then
        attach = myMailItem.Attachments
        attach.Add(filename)
    End If
    If Trim(mail_to) <> "" Then
        myMailItem.to = Trim(mail_to)
    End If
    myMailItem.SUBJECT = subject
    myMailItem.send()
    myMailItem = Nothing
    myOutlook = Nothing
End Sub
```

3.3.3 Database Design

The database is being designed by the author using Microsoft Access. There are three tables included in the database (dbase.mdb). The table Accident1 and Accident2 is designed to stored causes of accident which are fire, explosion, spillage and transportation. The first table (Accident1) stores Business Sector, Fire and Explosion data while the second table (Accident2) stores Business Sector, Spillage and Transportation data. Business Sector is set to be the primary key for both tables.

The third table which is Accident3 records the number of Injury and Fatality based on Business Sector. Figure 6 illustrates the Microsoft Access file (dbase.mdb) which stores the data.

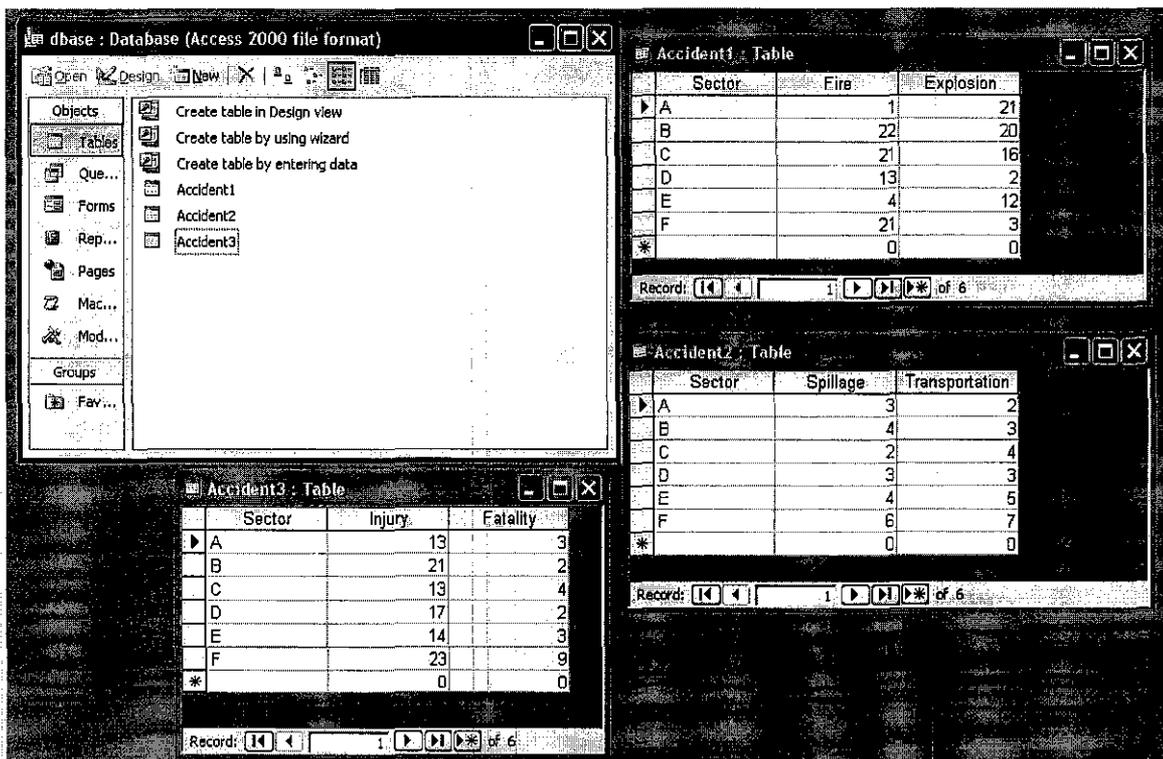


Figure 6: Database dbase.mdb (Microsoft Access)

3.4 IMPLEMENTATION

In this part, the product has been executed after completing the development phase. When running the application, the following processes involved:

3.4.1 Running the OHMS

3.4.1.1 Excel_Automation.exe and Microsoft Outlook Dialog Box

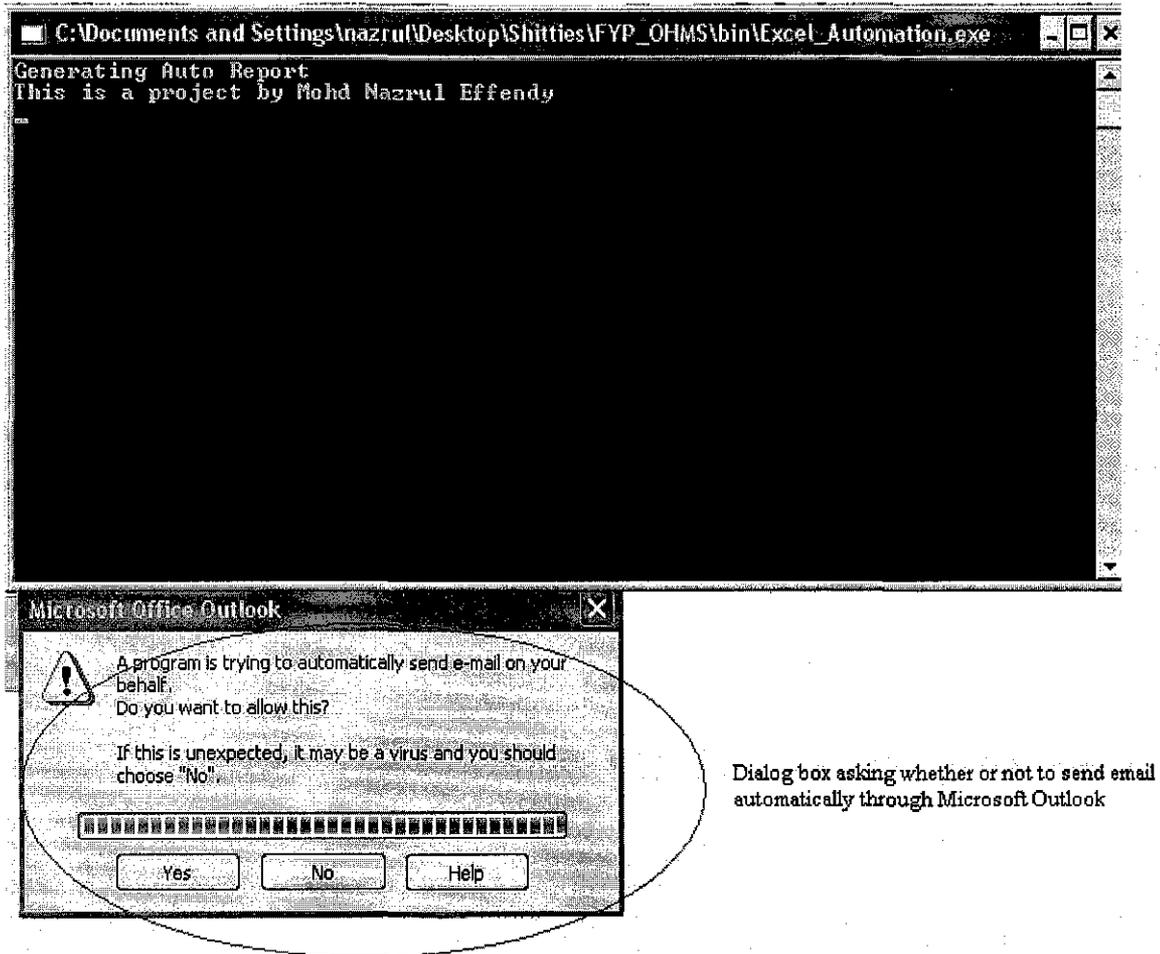


Figure 7: Excel_Automation.exe and Microsoft Outlook Dialog Box

When running the application, this is the first page that will appear on the screen. The Excel_Automation.exe indicates that the program is running the Microsoft Excel Application. The dialog box shows that the system asks the user whether or not to send mail automatically using Microsoft Outlook. If the user selects “Yes”, the program will

attached the statistics file generated earlier (Figure 8) to the mail outbox in Microsoft Outlook. If the user selects “No”, the system will not attach the file to the mail.

3.4.1.2 Output in Microsoft Excel

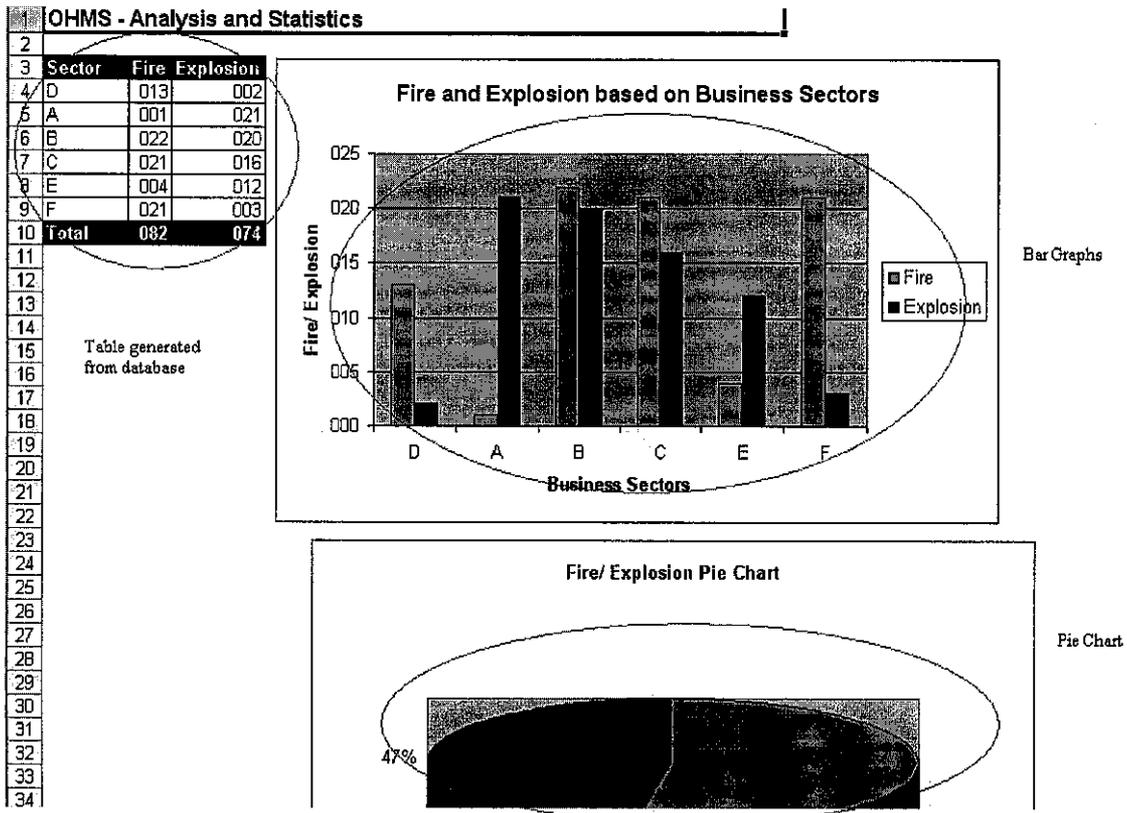


Figure 8(a): Output (Microsoft Excel)

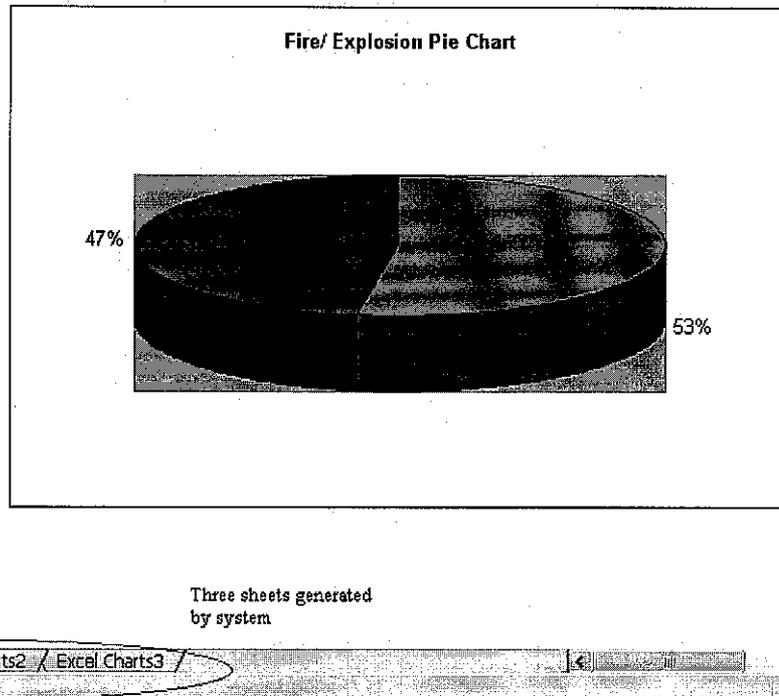


Figure 8(b): Output (Microsoft Excel)

Figure 8 (a) and (b) illustrate the output of the system which is displayed in Microsoft Excel. In Figure 8(a), there is the table generated from database in Microsoft Access. The Table is exactly the same as the table in the Microsoft Access. The system did generate back the table from Microsoft Access.

The bar graph is displayed next to the table as coded in the program, where the author has specified the location of the table. The pie chart in Figure 8(b) is also located at the location which has been specified by the author.

Referring to the Figure 8(b), the “Excel Charts, Excel Charts2, Excel Charts3” are generated by the function `Generate_Sheet(1-3)`.

After displaying the output to users, the system will then save the Excel file as `Statistics.xls`, as specified in the program. If there is any existing document with the same name, the system will overwrite the document with the new one.

After saving the file, the system will then run the dialog box (Figure 7) to ask whether or not the user want to attach file to the mail in Microsoft Outlook. Should the user select “Yes” on the dialog box, the file will be attached to the mail in the outbox folder in Microsoft Outlook.

3.4.1.3 Mail Folder in Microsoft Outlook

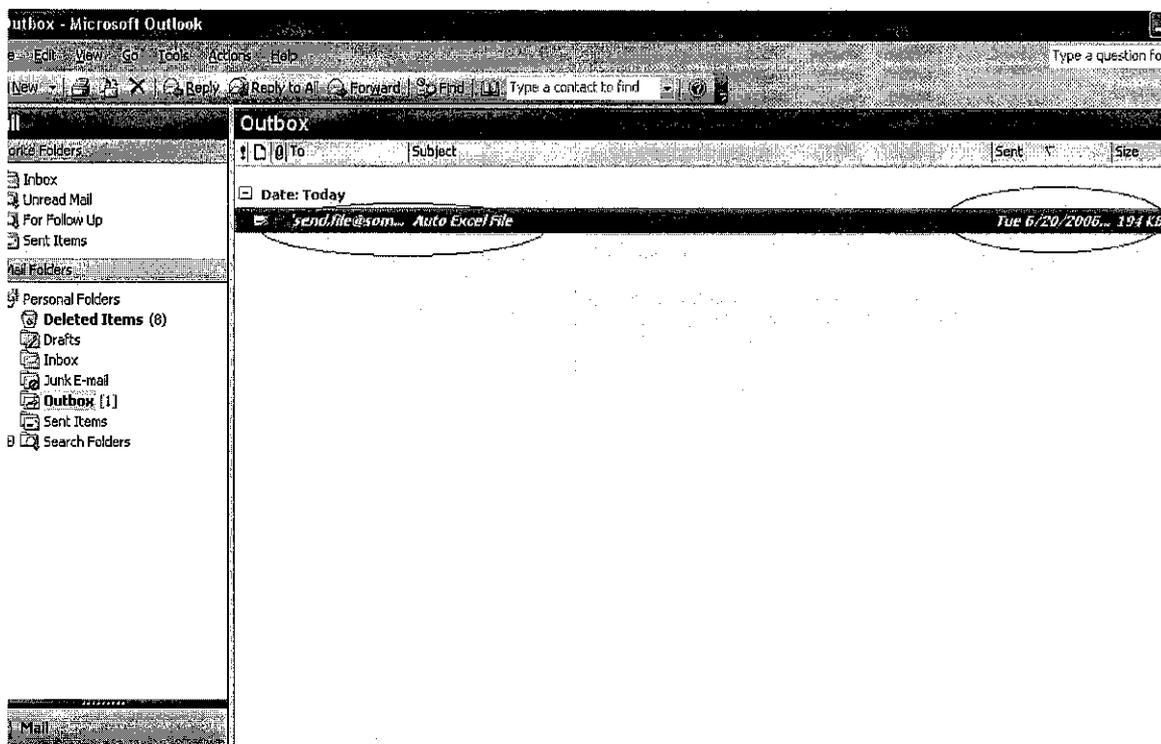


Figure 9: Mail Folder (Microsoft Outlook)

Selecting “Yes” in the dialog box shown earlier in Figure 7, the system will automatically attach the file to the blank mail in Microsoft outlook as illustrated in Figure 9. The highlighted area in the figure shows link to mail and size of the attachment file which is 194 KB. When clicking on the link of the mail which is highlighted, screen in Figure 10 will appear.

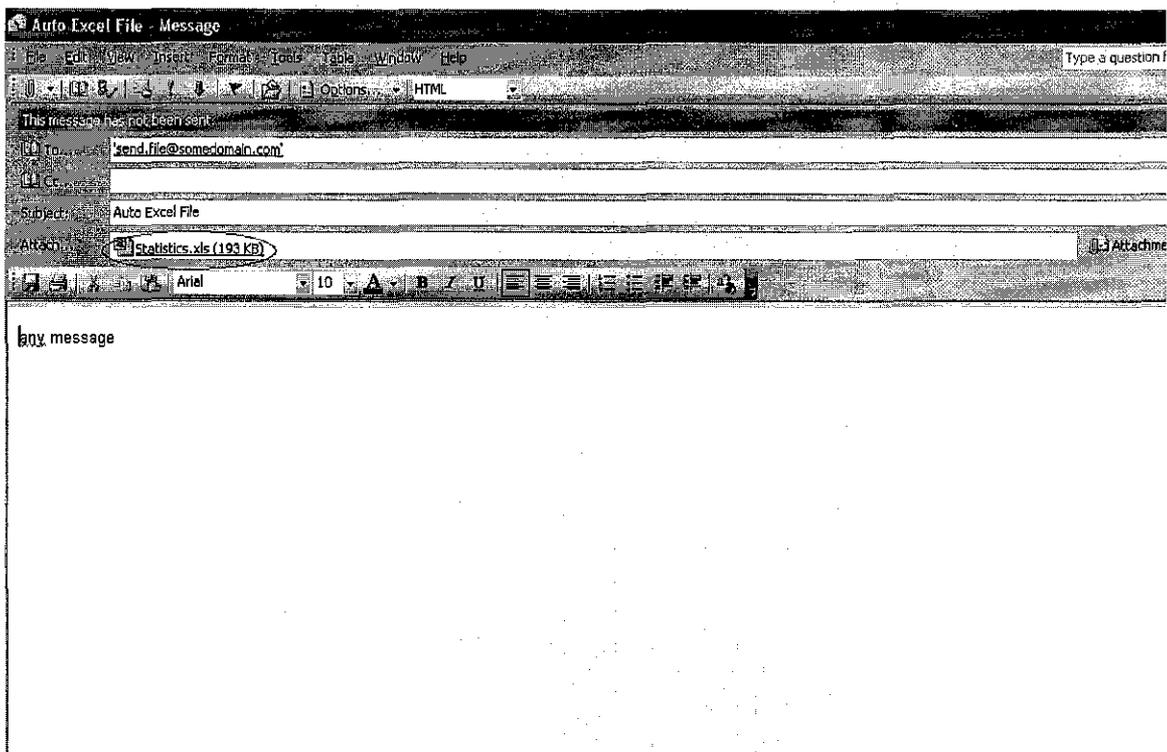


Figure 10: Mail Message Containing Attachment File (Statistics.xls)

This screen will appear when the link in Figure 9 is clicked. The screen allows the user to send mail with the attachment file. Note that the highlighted item in Figure 10 is the attachment file (Statistics.xls). User can specify the mail address and after that the mail can be sent to the intended users.

CHAPTER 4

RESULT AND DISCUSSION

4.1 UNIVERSITY TECHNOLOGY PETRONAS NETWORK RESTRICTION

As mentioned earlier, one of the functionality of the OHMS is to attach file to outbox in Microsoft Outlook. When using Microsoft Outlook, user will have to configure their mail such YahooMail or Hotmail with the Microsoft Outlook. Configuring, the Microsoft Outlook will require connection to the Simple Mail Transfer Protocol (SMTP) and Post Office Protocol (POP3). SMTP is a text-based protocol standard for e-mail transmission across the Internet. POP3 is protocols used to retrieve e-mail from a mail server (sometimes called an e-mail client). There are two versions of POP. The first, called POP2, became a standard in the mid-80 and requires SMTP to send messages. The newer version, POP3, can be used with or without SMTP.

Due to restriction imposed by UTP network, SMTP and POP3 protocols can not be connected. This is because of security reason of the network. Due to this restriction, the Microsoft Outlook can not be connected to the mail server of the author (YahooMail, Hotmail, gmail). The author has implemented the system in the outside network, where the system functioned normally as intended. This is because no restriction has been imposed on the outside network.

There are mail servers such as YahooMail and Hotmail that offers connection to SMTP and POP3 where users will have to pay for the subscription fees. Mail server such as gmail allows SMTP and POP3 for free. However, this would not ease the problem since the UTP network itself does not allow connection to SMTP and POP3.

Because of restriction, the system can not send mail to intended users by using the Microsoft Outlook. However, the functionality to attach file to the mail message is still working.

4.2 INTEGRATING EXCEL WITH VB.NET

The program must be able to open either pre-existing files or templates and also create new ones as required. Some of the spreadsheets needed to be built and formatted using values obtained from pre-existing standard Windows INI files. A few of these also would include either charts and/or pivot tables.

There are several steps required in order to enable the integration between VB.Net and Microsoft Excel and Microsoft Outlook. Below, the author would like to share on how he managed to integrate the VB.Net with Microsoft Excel during the development phase.

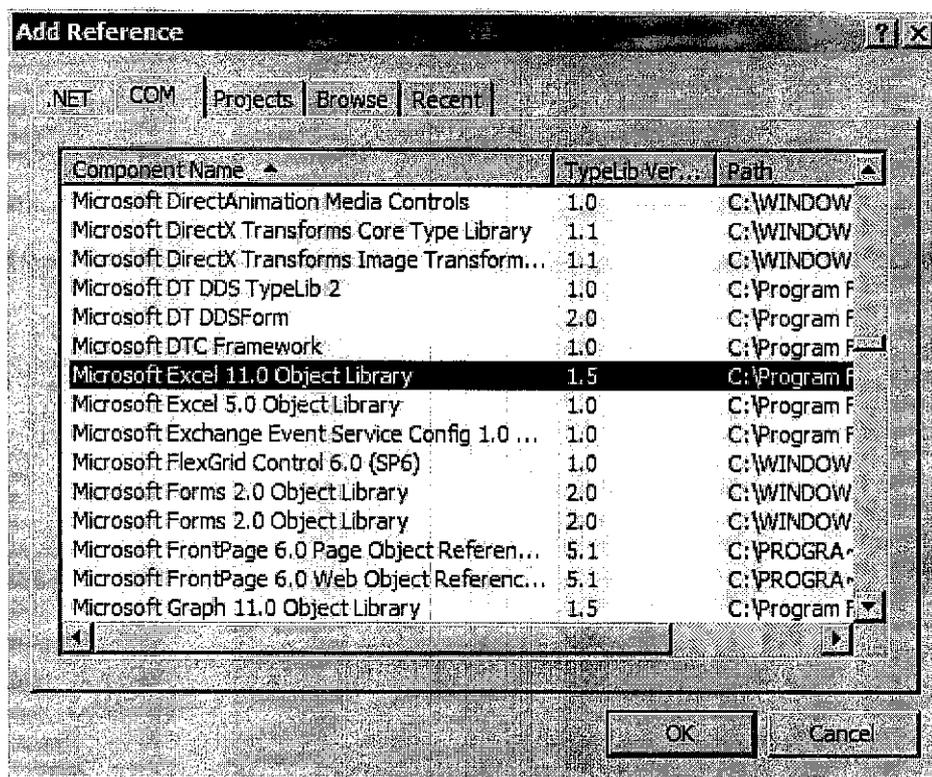


Figure 11: Add reference

In order to retrieve Figure 11 in Microsoft Visual Studio.Net, user will have to click on the **Project** menu. Select **Add Reference**. From the **COM** tab, locate and select the Microsoft Excel 10.0 or 11.0 Object Library. The version installed in the computer will be automatically detected in the list of libraries.

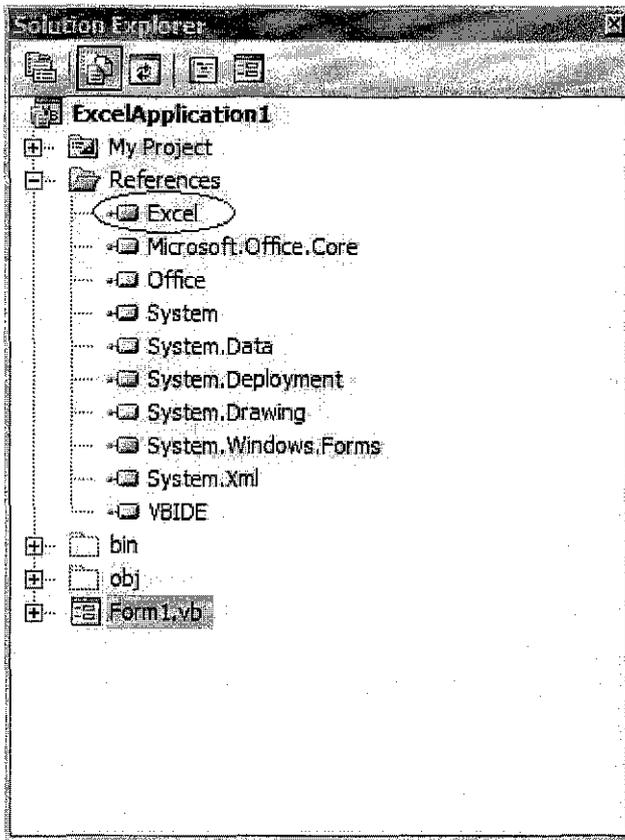


Figure 12: Solution Explorer

Once the Excel library is selected, the library will be shown in the solution explorer which is being illustrated in Figure 12. Then the author proceeded with the declaration method:

```
Dim objExcel As New Microsoft.Office.Interop.Excel.Application
```

4.3 LESSON LEARNED FROM PROJECT

Completing the project, the author managed to learn a lot of things. Some of them is the integration of Microsoft Excel and Microsoft Outlook with VB.Net. This is quite new for the author since he has only experienced integrating VB.Net with Microsoft Access as database. A lot of researches have to be made in order to identify the specific algorithm for generating graph from Microsoft Access to Microsoft Excel.

The other lesson learned during the development process of the OHMS is the code for specifying the graphs into specific location in Microsoft Excel. The author has to specify the specific coordinate that the graphs will appear.

4.4 PROBLEM FACED

The problem occurs when connecting to the SMTP and POP3 from Microsoft Outlook since there is restriction imposed on UTP network (Section 4.1)

4.5 FUTURE RECOMMENDATION

As for future improvement, the author would like to propose that the system should be developed with the graphical interface design (GUI). This will ease the users to enter data regarding accident. Currently, the method of keying in the data is implemented by using the Microsoft Access, where the database is stored.

This is because the main objective of the system is to generate graphs based on the data entered by the users. So, the author did not emphasized more on the interface.

Improving the system, the author would like to propose an interface that he managed to create by using Microsoft Visual Studio.Net. Please note that the author did not develop the interface with the functionality of entering data into Microsoft Access. The developed interface is just for the purpose of improvement that is to be made in the future.

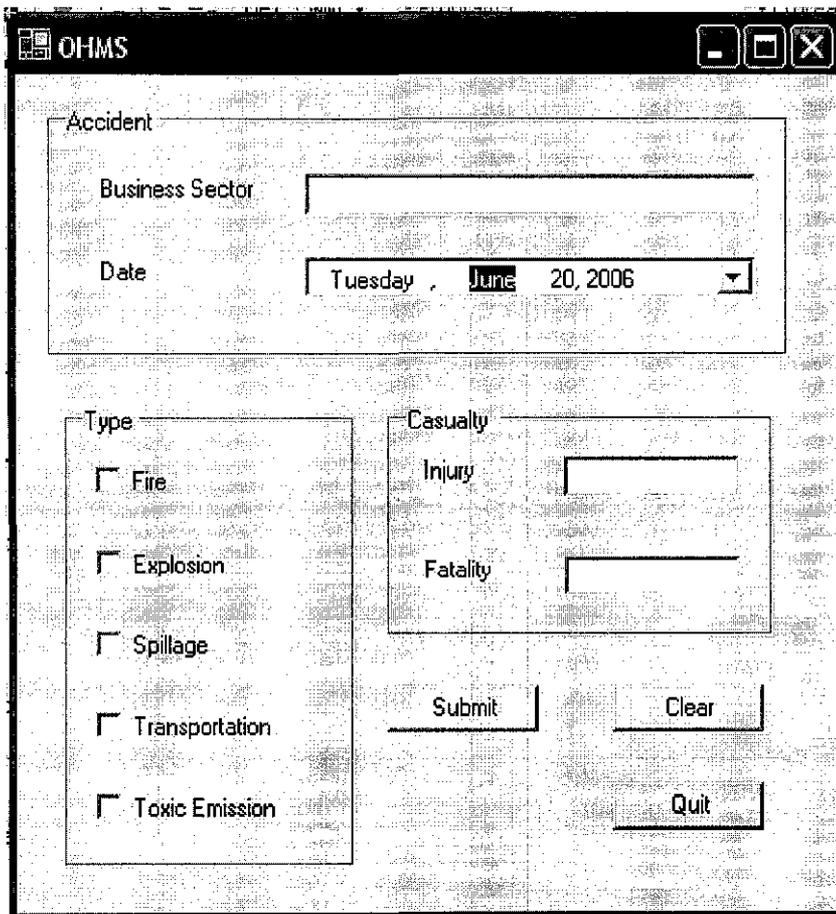


Figure 12: The proposed GUI for future recommendation

CHAPTER 5

CONCLUSION

Each year, two million men and women die as a result of occupational injury and disease. Across the globe, there are some 270 million occupational accidents and 160 million occupational diseases each year. The International Labour Organization (ILO) estimates that four per-cent of world's Gross Domestic Product (GDP) is lost due to accident or work-related diseases.

In summary, the Occupational Health Management System (OHMS) will be a useful platform for an organization that involved in high-risk sector to manage and reduce the risk of accident occurrence at the workplace. The OHMS will ease the process of reporting incident that occurs in the workplace by replacing the old-obsolete handwritten method.

REFERENCES

- [1] Campbell J.Q., Tetrick L.E. "Handbook of Occupational Health." AT&T Labs Technical Report TD-4ZCPZZ. Revision 2, August 2001.
- [2] Arbaugh, William A., Narendar Shankar, and Y.C. Justin Wan. "Safety System At Workplace: An Approach To Overcome Injury." March 30, 2001.
- [3] Walker, Jesse R. "Occupational Health: Computerized Approach of Minimizing Risk" IEEE Document 802.11-00/362, October 2000.
- [4] www.ilo.org
- [5] www.microsoft.com

APPENDIX

Incident Investigation Form

INCIDENT INFORMATION				
Date of Accident	Time	Day of Week <input type="checkbox"/> S <input type="checkbox"/> M <input type="checkbox"/> T <input type="checkbox"/> W <input type="checkbox"/> T <input type="checkbox"/> F <input type="checkbox"/> S	Shift <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	Department

INJURED PERSON				
Name:		Address:		
Age:	Phone:			
Job Title:		Supervisor Name:		
Length of Employment at Company:		Length of Employment at Job:		
Employee Classification: <input type="checkbox"/> Full Time <input type="checkbox"/> Part Time <input type="checkbox"/> Contract <input type="checkbox"/> Temporary				
Nature of Injury	<input type="checkbox"/> Bruising	<input type="checkbox"/> Dislocation	<input type="checkbox"/> Other (specify)	Injured Part of Body:
<input type="checkbox"/> Strain/Sprain	<input type="checkbox"/> Scratch/Abrasion	<input type="checkbox"/> Internal		
<input type="checkbox"/> Fracture	<input type="checkbox"/> Amputation	<input type="checkbox"/> Foreign Body	Remarks:	
<input type="checkbox"/> Laceration/Cut	<input type="checkbox"/> Burn/Scald	<input type="checkbox"/> Chemical Reaction		
Treatment	Name and Address of Treating Physician or Facility			
<input type="checkbox"/> First Aid				
<input type="checkbox"/> Emergency Room				
<input type="checkbox"/> Dr.'s Office				
<input type="checkbox"/> Hospitalization				

DAMAGED PROPERTY	
Property, Equipment, or Material Damaged	Describe Damage
Object or Substance Inflicting Damage:	

Describe what happened (attach photographs or diagrams if necessary)

ROOT CAUSE ANALYSIS (Check All that Apply)		
Unsafe Acts	Unsafe Conditions	Management Deficiencies
<input type="checkbox"/> Improper work technique	<input type="checkbox"/> Poor workstation design or layout	<input type="checkbox"/> Lack of written procedures or policies
<input type="checkbox"/> Safety rule violation	<input type="checkbox"/> Congested work area	<input type="checkbox"/> Safety rules not enforced
<input type="checkbox"/> Improper PPE or PPE not used	<input type="checkbox"/> Hazardous substances	<input type="checkbox"/> Hazards not identified
<input type="checkbox"/> Operating without authority	<input type="checkbox"/> Fire or explosion hazard	<input type="checkbox"/> PPE unavailable
<input type="checkbox"/> Failure to warn or secure	<input type="checkbox"/> Inadequate ventilation	<input type="checkbox"/> Insufficient worker training
<input type="checkbox"/> Operating at improper speeds	<input type="checkbox"/> Improper material storage	<input type="checkbox"/> Insufficient supervisor training
<input type="checkbox"/> By-passing safety devices	<input type="checkbox"/> Improper tool or equipment	<input type="checkbox"/> Improper maintenance
<input type="checkbox"/> Guards not used	<input type="checkbox"/> Insufficient knowledge of job	<input type="checkbox"/> Inadequate supervision
<input type="checkbox"/> Improper loading or placement	<input type="checkbox"/> Slippery conditions	<input type="checkbox"/> Inadequate job planning
<input type="checkbox"/> Improper lifting	<input type="checkbox"/> Poor housekeeping	<input type="checkbox"/> Inadequate hiring practices
<input type="checkbox"/> Servicing machinery in motion	<input type="checkbox"/> Excessive noise	<input type="checkbox"/> Inadequate workplace inspection
<input type="checkbox"/> Horseplay	<input type="checkbox"/> Inadequate guarding of hazards	<input type="checkbox"/> Inadequate equipment
<input type="checkbox"/> Drug or alcohol use	<input type="checkbox"/> Defective tools/equipment	<input type="checkbox"/> Unsafe design or construction
<input type="checkbox"/> Unnecessary haste	<input type="checkbox"/> Insufficient lighting	<input type="checkbox"/> Unrealistic scheduling
<input type="checkbox"/> Unsafe act of others	<input type="checkbox"/> Inadequate fall protection	<input type="checkbox"/> Poor process design
Other:	Other:	Other:

