Management Information System

for

Sri Lanka Bureau of Foreign Employment

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Master of Science in Information Technology
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February 2019

Declaration

I declare that this thesis is my own work and has been submitted in any form for another degree or diploma at any university or other institution of tertiary education information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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Date	…….

Acknowledgement

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And my thanks should go to all the lecturers of MSc in Information Technology degree program at Faculty of IT, who gave their hands to sharpen our knowledge and ideas throughout these two years as they were the illumination which lit up our path ways to success.

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Abstract

Management information systems (MIS) is an organized, diverse and automated information system that is concerned with the process of gathering, storing and transferring relevant information to support the management operations in the organization.

The data is distributed among the various departments in an organization. The processing of data takes place in various forms such as graphs, diagrams, charts, reports to generate accurate and relevant information for the management. MIS provides central storage of all the organization information. MIS is used across all levels in an organization.

A management information system collects and process data (information) and provides it to top level management who employs it for decision making, planning, program implementation, and organize. The MIS consists of many roles to perform like the decision support role, the performance monitoring role and the functional support role.

The MIS has deeply facilitated and matched the information flow in the organization and the management feels that is has played a role in the growth and improved performance of the organization.

Data mining is a process which finds useful patterns from large amount of data. Manually analyzing, classifying, and summarizing the data is impossible because of the incredible increase in data in this age of net work and information sharing. data mining refers to extracting useful information from vast amounts of data. Many other terms are being used to interpret data mining, such as knowledge mining from databases, knowledge extraction, data analysis, and data archaeology. Data mining process used by organization to revolve raw data into useful information. By using software to look for patterns in large batches of data, organizations can learn more about their customers to develop more effective marketing strategies, increase sales and decrease costs.

Linear regression is a basic and commonly used type of predictive analysis. Three major uses for regression analysis are determining the strength of predictors, forecasting an effect, and trend forecasting.

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Chapter 01

Introduction

Income generated from Foreign Employment is contribution to the GDP of Sri Lanka. Currently there are **242038** employees working outside the country who brings average income of **Rs. 1054489/- in million** annually in to the Sri Lankan economy.

Sri Lanka's Foreign Employment can be mainly categorized as Middle East and Non-Middle East workers. These two main categories can be sub divided as Domestic and Non-Domestic workers. Generally, Domestic workers consist of House Maids, Baby-sitters, and House Drivers. Whereas Non-Domestic workers are mostly Accountants, Office clerks, Book Keepers, Supervisors, Labours, Drivers, Carpenters, Machine Operators, Chefs etc.

Sri Lanka Bureau of Foreign Employment (SLBFE) is the sole government organization in Sri Lanka which has been entrusted with promoting Foreign Employment and welfare for expatriate Sri Lankan Employees.

The Vision of SLBFE stand as ***"Sri Lanka to be the best choice for competent human resources for overseas market."***

Sri Lanka Bureau of Foreign Employment regulates the activities of foreign employment and provides an efficient and effective training subjects on the job offer and the country overseers.

One of the main functions of SLBFE is to maintain a database on, the vast number of employees who goes for foreign employment each day. This is a requirement for State statistical and employee welfare purposes which comes under government policy.

Many researches prove that MIS lead to generate accurate and effective data in an organization.

Introduction of an advanced Management Information System (MIS) has become a necessity to the bureau since the current reporting system is outdated and inefficient. It is observed that the current paper based reporting is time consuming and requires high staff involvement.

With the increase of employees going overseas each day, switching into a highly IT based system has become essential to generate accurate MIS reports, going through the large database which the bureau currently handles.

Remittance - 2017

Origin	US$ million					Percentage share				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
Middle East	3562	3902	3769	3889	3711	55.6	55.6	54.0	53.7	51.8
European Union	1160	1270	1222	1282	1311	18.1	18.1	17.5	17.7	18.3
Far East Asia	557	611	698	739	824	8.7	8.7	10.0	10.2	11.5
Europe other	308	337	307	333	330	4.8	4.8	4.4	4.6	4.6
North America	186	204	209	210	208	2.9	2.9	3.0	2.9	2.9
South East Asia	288	316	391	398	394	4.5	4.5	5.6	5.5	5.5
Ausi and Newzealand	147	161	161	174	172	2.3	2.3	2.3	2.4	2.4
South Asia	83	91	98	109	107	1.3	1.3	1.4	1.5	1.5
South and										

central america	58	63	63	51	50	0.9	0.9	0.9	0.7	0.7
other	58	63	63	58	57	0.9	0.9	0.9	0.8	0.8
Total	**6407**	**7018**	**6980**	**7242**	**7164**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table 1: 1Remittance 2017

1.1 Statement of Research Problem

Currently the data gathered by the SLBFE is scattered in different data bases in various departments which has been difficult to accumulate and generate accurate reports. Which the information is necessary for the managerial decision and future reference.

1.2 Aim and Specific Objectives

1.2.1 Aim

"Identifying and implementing the most best IT based Management Information System to replace the outdated reporting system used by Sri Lanka Bureau of Foreign Employment."

1.2.2 Objectives

- System will generate a graphical interface about number of Foreign Employees who have registered at the SLBFE (Country Wise)
- System will generate a graphical interface about number of Foreign Employees who have registered at the SLBFE (Job Wise)
- System will generate a graphical interface about number of Foreign Employees who have registered at the SLBFE (Gender Wise)
- System will generate a graphical interface about number of Foreign Employees who have registered at the SLBFE (Age Wise)
- System will generate a report according to relevant comparison.

- System will forecast future number of departures by using data mining based on previous data.

1.3 Background

Having a MIS in SLBFE, will answer many questions. Currently, report generation is handling by a paper base method. And considerable time will be taken to generate an accurate report.

It is necessary by various organizations and parties the information regarding Sri Lanka employees for various preamble. In this connection it is important to have a system for accurate information and to receive them in a quick manner.

Not only for the Sri Lanka Bureau of Foreign Employment, but also for the other organization and parties to make their quick effective decisions on the economy and the development of the country.

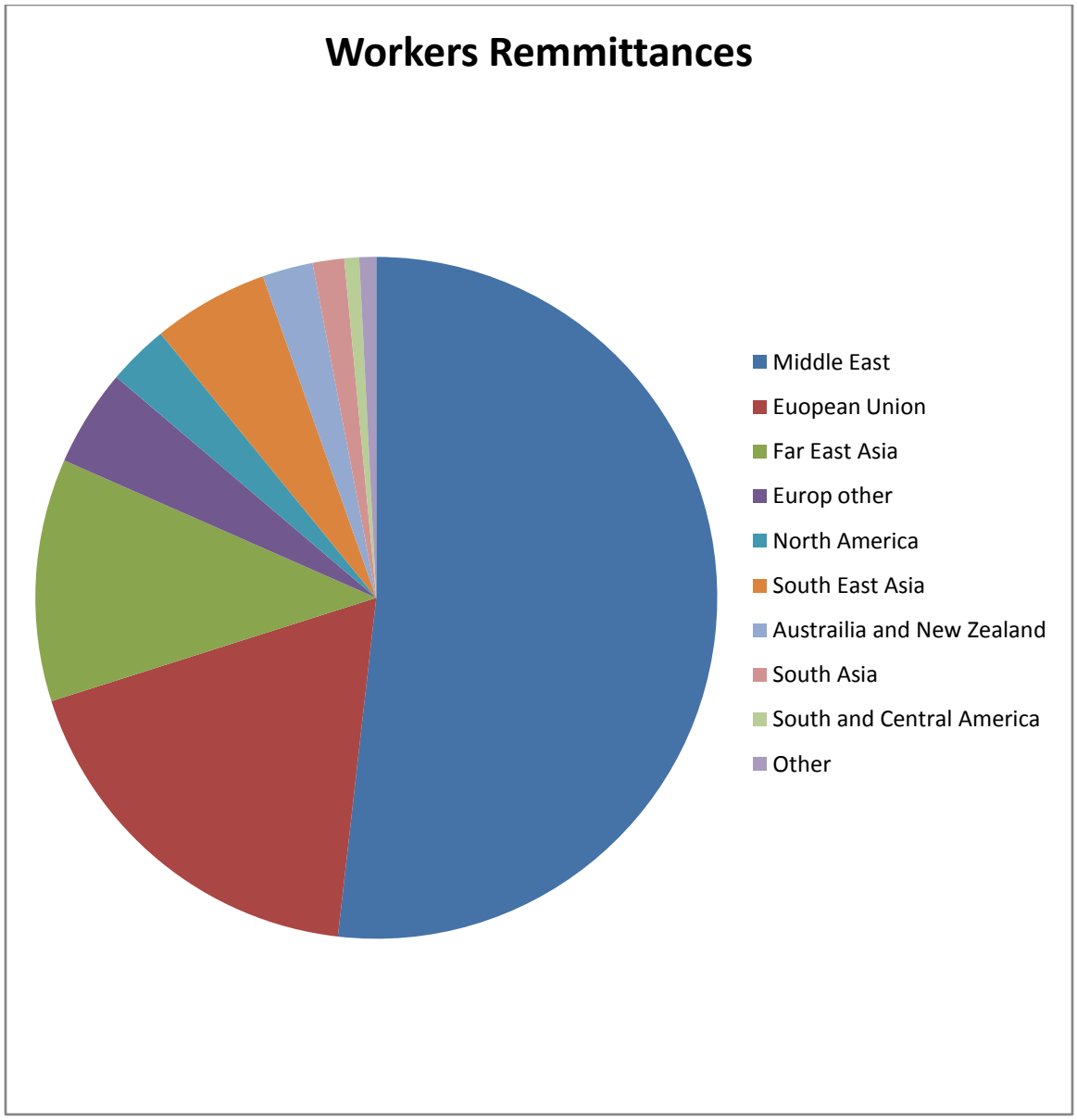


Figure 1: 1Workers Remittance 2017

1.4 Structure of the Report

This report will contain eight chapters. Introduction, Literature review, Methodology, Design, Implementation, Results and Evaluation, and Conclusion and Further work. Chapter 1 provides an introduction to the study whereas Chapter 2 reflects the findings from the earlier studies. Chapter 3 details the way of providing solutions and their functions. Chapter 4 and 5 detail the approach, analysis and design of the study respectively.

Chapter 6 briefs the high-level implementation details whereas Chapter 7 analyses the results of the study. Conclusions and further work related to this study is available in Chapter 8.

1.5 Chapter Summary

As mentioned in the Chapter, Management Information system is very important for decision-making in professional and personal life. MIS is needed for the functioning role, for performance role, and for support. Management Information system helps in planning, programming, controlling and decision-making.

And today Information technology (IT) has become a vital and integral part of every organization plan. From multi-national corporations who maintain mainframe systems and databases to small organizations that own a single computer, IT plays a role. The reasons for the omnipresent use of computer technology in organizations can best be determined by looking at how it is being used across the business world.

Chapter 02

Review of Literature

2.1 Introduction

In this chapter findings will connect to past studies which the researchers had been covered. Chapter briefs how past studies done on MIS to make effective and efficient decision to achieve organizational objectives. The way that researchers solve the problems will describe mainly.

2.2 Review of Others Work

Many researchers have observed the importance of MIS. And they have proved that the MIS leads organization to achieve the objectives. MIS plays the considerable role in an organization which generates accurate information.[1]Decision making process and its impact on top level management in a business organization is explained with an emphasis on automated decision making. Research published on MIS had mainly target on following objectives,

Management Information System

MIS and Decision Making

Concepts of MIS

Benefits of MIS

Need for MIS

The concepts found in each research are different. Some of them realized MIS as Decision Support System whereas some of researches found MIS as key requirement for an organization to achieve their targets.

Techniques to turn data in to valuable information's are depend on data, mining tools, type of information expects, technology adapted. [2]The research has identified several factors that appear to influence decision behavior: the problem requirements (including the decision task to be solved and the data set available) and the display format.

Based on the foregoing definitions, Management Information Systems refers to a system that uses information in order to ensure apt management of businesses. [3]Information Technology (IT) helps to optimize the use of scarce resources through intelligent information support for decision making, helps further in its implementation by support co-ordination effort without wasteful delays. Fundamentally, all the facts of MIS run concomitantly in order to ensure overall efficiency of the whole system. [4]Businesses in the developed countries are of dynamic nature and it has to get the information from all sources with minimum time and with most proper way having maximum good characteristics of information.

Essentially, without the established systems of getting information in MIS, it would be extremely difficult for organizations to make their decisions. This is because they would be forced to making baseless information due to the lack of confirmed information. Moreover, MIS normally lays a firm foundation for the establishment of concrete decisions through its systematic tools, timely information and adequate managerial policies and regulations. MIS will guide how the organization will achieve their objectives periodically with accurate information.

The MIS and its organizational subsystems contribute to decision making process in many basic ways. Nowadays, some of the organizations use MIS to assist managers for decision making.[5] It has been widely speculated that top MIS Managers are remiss in their use of the technology they provide to others.Data displays in different ways for users convenient in decision making.[6]Users can often interactively extract, design and present information in a formal report with tables, text, pie charts, bar charts, and other diagrams.[7] The type of chart, the selection of data, the ordering of bars, the scale of axes, the choice of titles and labels – all can be used to highlight or hide different aspects of the data.

Previously it was mentioned that the MIS is best suited in identifying problems and helping managers understanding them to make suitable and correct decisions, but the main weakness of MIS is that it is not aimed at the specific need of the individual and group decision makers. Very Often the MIS does not provide exactly the information that is needed to solve problems for individual and group decision making. [5]It has been widely speculated that top MIS Managers are remiss in their use of the technology they provide to others. [8]Data preparation is a fundamental stage of data analysis. [8]While a lot of low-quality information is available in various data sources and on the Web, many organizations or companies are interested in how to transform the data into cleaned forms which can be used for high-profit purposes.[9]Data Mining Techniques thoroughly acquaints you with the new generation of data mining tools and techniques and shows you how to use them to make better business decisions.

Following importance can identify from studying relevant literature done by many researches.

Importance of MIS (Decision making managerial function, Reliable, Globalization)

Role of MIS (System ensure that an appropriate data is collected from various sources, MIS helps in strategic planning and Management control, MIS plays the role of information generation and communication.)

Objectives (List and describe the classic function of managers planning and staffing, Describe the purpose and components of MIS, Explain how computer networking and related software have flatted the classic management pyramid)

Advantages of MIS (Communication, Globalization, Cost Effective)

Disadvantages of MIS (Lack of Security, Dominant Culture, Privacy)

New perspective of Information (MIS = MI + S, MIS must provide MI to managers for decision making, Timeliness, Accuracy, Completeness, Adequacy)

Discussion

Management Information System is a considered system of planning, storing data in form of information needed to carry out the functions of management.Today management operations in all sectors rely on information technology to perform every day transactions. IT use has automated many of the key management activities.[10]By considering all requirements it has been proved that the need of MIS in an organization is highly essential. [10]MIS improves the quality of the production which preserves businesses in an unconventional grade.

An important trend in MIS is the facility for organizations to use data mining tools to collect information regarding consumer purchases and other economic trends. This allows management to translate this information into goals and directions for future business operations. Most MIS software also has trending or forecasting models that allow companies to project emerging consumer markets for profitable operations. Companies can use their internal figures in the MIS to measure the effectives of their external data mining techniques.

Conclusion

The key purpose of this chapter is to understand and clarify the reasons behind the employment of MIS. Therefore the chapter plans to develop a knowledge concerning the MIS importance and impacts to enhance the decision-making process via establishment and implementing of MIS. In addition the study also pays attention andgive brief background to information technology because all information systems applicationstoday rely on IT. Moreover, the study discuss the relation between MIS and the decision making process. Finally, the study show detailed discuss regarding MIS importance and impacts.

The role of information in decision making cannot be overemphasized. Effective decision making demands accurate, timely and relevant information. MIS provides accurate and timely information necessary to facilitate the decision-making process and enable the organizations planning, control, and operational functions to be carried out effectively. MIS also plays the crucial role of providing a wide range of streamlined options from which decision-makers are able to make their preferred choices and this ensures that whatever choices are made by decision

makers, the outcome, more often than not, becomes positive. This, as a matter of fact, is the reason why many decision makers tend to prefer using MIS tools when making tough organization choice..s. MIS as renowned concept, having good decision choices guarantees viable decisions in our businesses.

The key purpose of this article is to understand and clarify the reasons behind the employment of MIS. Therefore, the article plans to develop a knowledge concerning the MIS importance via establishment and implementing of MIS. In addition, the study also pay attention and give brief background to information technology because all information systems applications today rely on IT. Moreover, the study discusses the relation between MIS and the decision making process. Finally, the study shows detailed discuss regarding MIS importance.

Chapter 03

Methodology

3.1 Introduction

This chapter details the Techniques used to develop the system to solve the problem,and reason to select said techniques. Also describe how selected techniques be used to achieve objectives.

3.2 Development of Proposed MIS

The proposed MIS will contain two(02)main parts. First part contains Implementation of Data warehouse to visualize the aggregated outcome through graphical component using historical data. The other part is prediction for future years based on this historical data. Both components are intergraded into one software system to utilize the requirement. The proposed system is built through the steps called water fall system development life cycle,one of the common development frameworks. The main step of water fall method isdescribed in figure I. The present manual system is analyzed and investigated with use of standards in Object oriented analysis and design methodology, for the purpose of making up a systematic perspective to the proposed system. The documentations and designs are relevant to the standard of UML.Object Orientation analysis and Design must be the best analytical and design methodology which is suited with the UML standards. The following features describe why the proposed technology are more suitable for this solution.

- Object Oriented Programming (OOP) is an approach to program organization and development, which attempts to eliminate some of the pitfalls of conventional languages.It incorporates the best features of structured programming with several new features.

- UML standards are sound techniques useable diagramming tool any sort of Object Oriented Design.

- Technology (or package) must be comparable with the Object oriented Design Standards. The Dot Net Technology is vital for the implementation as now it is highly object oriented and capability of reusing of other platforms

While the development plat form becoming Dot NET (.NET) framework 4.5.the following are the main case tools that were used for requirement analysis and development.Visual Basic are programming languages designed for creating a variety of applications that run on the .NET Framework. These languages are powerful, type-safe, and object-oriented.

3.2.1 Development of Graphical Interfaces

Data visualizations are an indispensable tool in performance support. They communicate stories, help people explore data, and clarify complex information. The most attractive Graphical interface is always the right one for your data; being able to choose the best data visualization format. All graphical interfaces were developing inside Visual studio IDE environment and each of interface is implemented invisual basic programming language. The in-built standard graphical component defined in visual studio IDE were used to integrate and visualization as mentioned the requirement specification..NET Framework for desktop provides a comprehensive and consistent programming model for building data-centric applications that enable seamless and secure communication. Create engaging user interfaces for Windows Desktop Applications with Blend for Visual Studio, the premier professional design tool for XAML applications. Build beautiful transitions and visualizations using Blend's full suite of vector drawing tools, powerful template editing features, real-time animation, visual state management and more.

3.2.2 Data Mining Techniques Adapted

The prediction is based on the Multilinear regression analysis. The most popular model for making predictions is the multiple linear regression model encountered in most introductory statistics classes and textbooks. This model is used to fit a linear relationship between a quantitative dependent variable Y (also called the outcome or response variable) and a set of

predictors X1, X2, ...,Xp (also referred to as independent variables, input variables, regressors, or covariates).The data set is prepared yearly immigrations which becoming the dependent variable while age, salary and gender values in each year becoming independent variable. It was investigated that the variable age, gender and salary give considerable affect to the number of immigrations in each year. For more information refer to Appendix.

In order to implement the regression process several open source libraries from Accord.net statistical framework used. Those libraries are built on top of Dot net famework4.5.The The Accord.NET project provides machine learning, statistics, artificial intelligence, computer vision and image processing methods to .NET. It can be used on Microsoft Windows, Xamarin, Unity3D, Windows Store applications, Linux or mobile.After merging with the AForge.NET project, the framework now offers a unified API for learning/training machine learning models that is both easy to use and extensible. It is based on the following pattern:

- Choose a learning algorithm that provides a Learn(x, y) or Learn(x) method;
- Use the Learn(x, y) to create a machine learning model learned from the data;
- Use the model's Transform, Decide, Scores, Probabilities or LogLikelihoods methods.

3.2.3 Report generation

The system is capable to create reports relevant to the each of user views that produce from the system. The report consists with a tabular results filtered from the request input with the desired chart view. The report can be exported to common file format as desired. Predicted results are included with the predicted data with future years and the validity of the predicted results by generated Analytical statistics. The char component in Dot Net Framework 4.5 are suited to enhance any data results with customized arrangement of elements. It provide support for Bar charts that are handy for displaying and comparing categories of data side-by-side. The bars can be in any order. it can also arrange them from high to low or from low to high.Line charts show trends in data over time by calculating a summary statistic for one column for each value of another column and then drawing a line connecting the values.

3.3 Users

The system will help SLBFE top Management for their decisions on development of Migrant Workers who bring higher percentage of Inward remittances. And also with it will be help Management to optimize objectives to make changes on organization policies.

Not only for the Sri Lanka Bureau of Foreign Employment, but also for the other organizations and parties to make their quick effective decisions on the economy and the development of the country.

3.4 Chapter Summary

As briefed in this chapter developed MIS plays a vast role in the Bureau on decision making and prediction. The techniques and tools used in predictions proves that how to adapt advanced technology in making valuable developments in country.

Chapter 4

Design and Implementation

4.1 Introduction

This Chapter describes the design of the system. Detailed diagrams for system architecture will be presents.

4.2 System Design

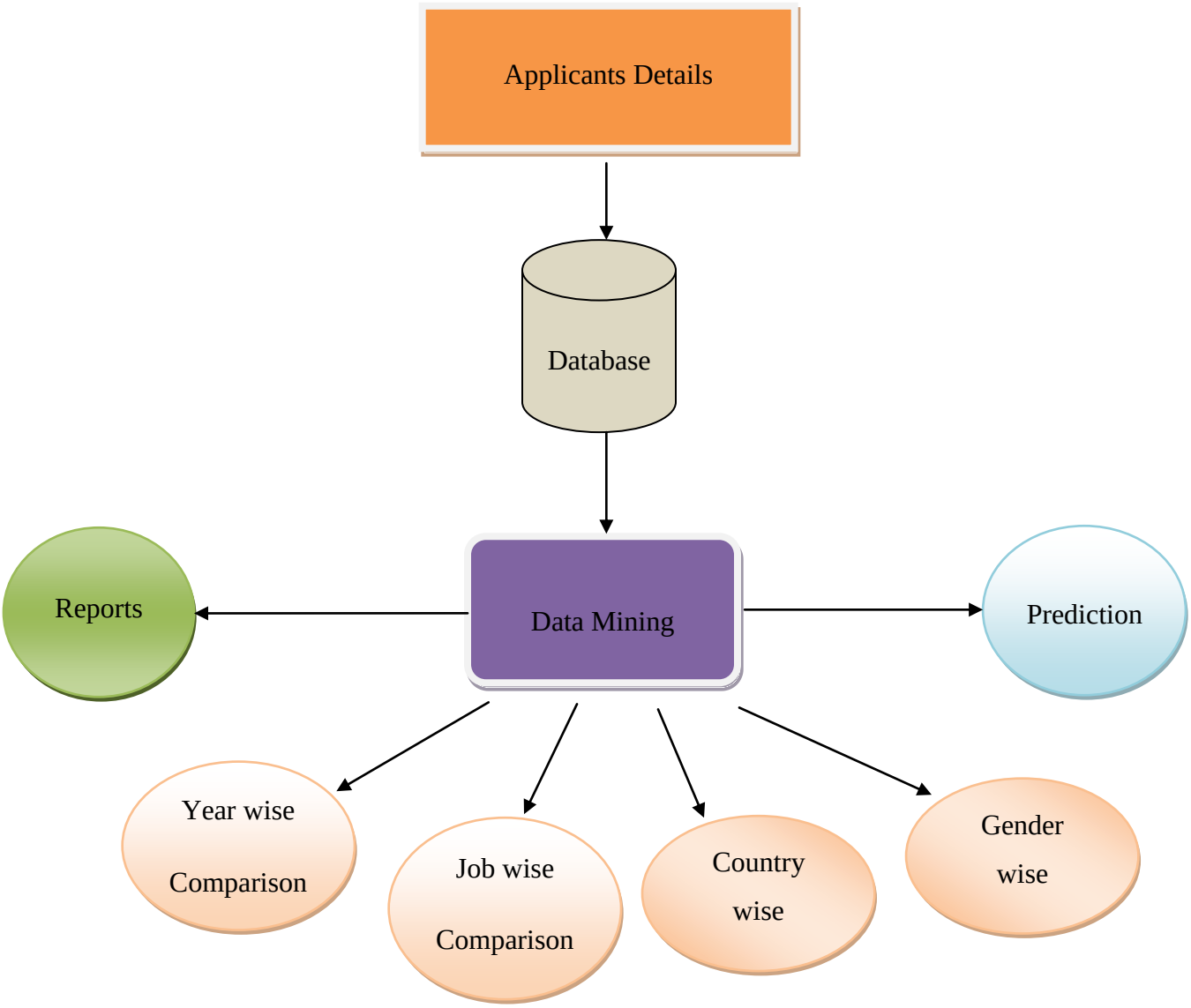


Figure 4: 1 System Design

4.2 System ER Diagram

An entity relationship diagram (ERD) shows the relationships of entity sets stored in a database. An entity set is a collection of similar entities. These entities can have attributes that define its properties.

By defining the entities, their attributes, and showing the relationships between them, an ER diagram illustrates the logical structure of databases.

ER diagrams are used to sketch out the design of a database.

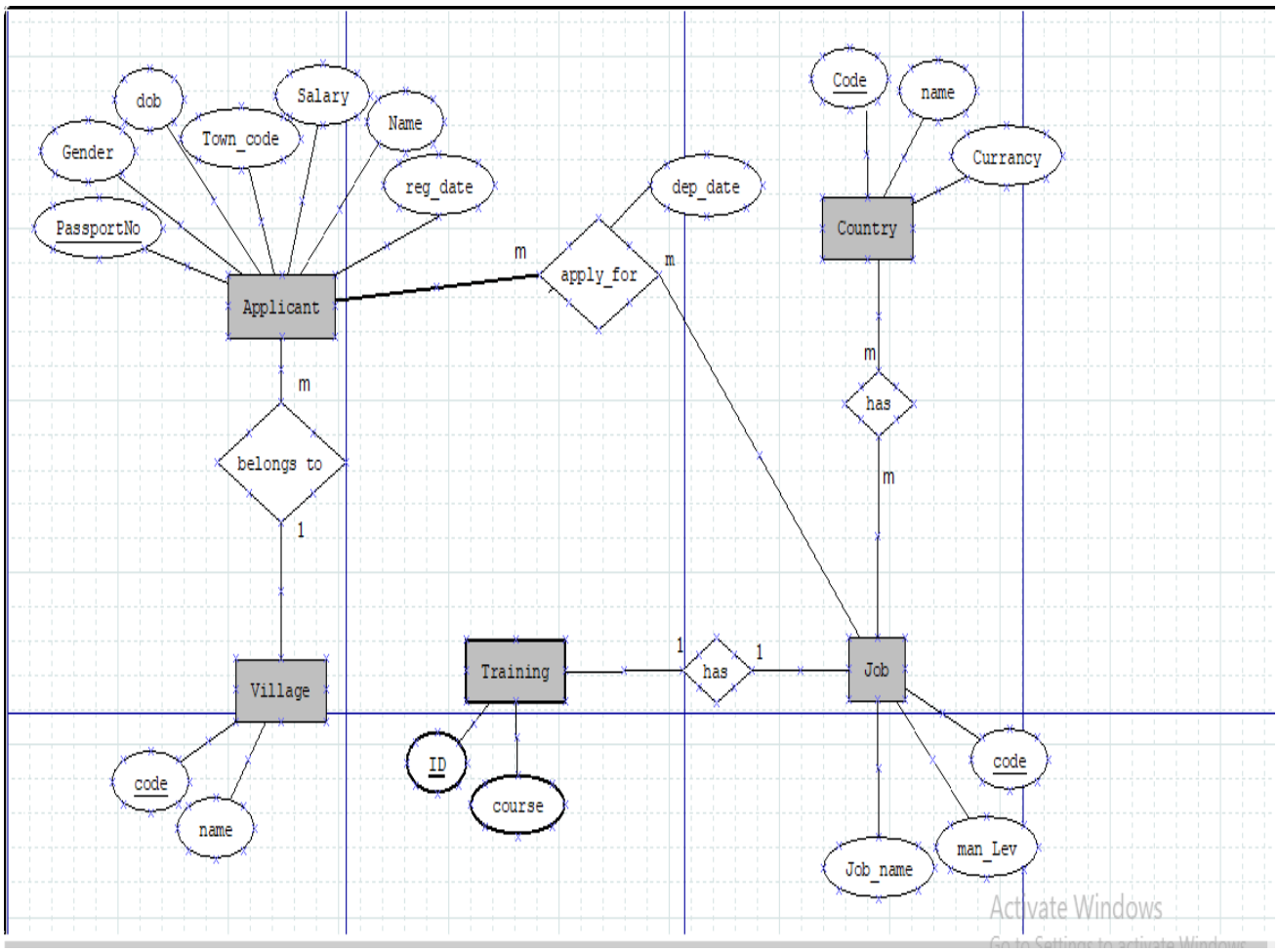


Figure 4: 2 System ER Diagram

4.2 Class Diagram

A class diagram in the Unified Modeling Language is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations, and the relationships among objects.

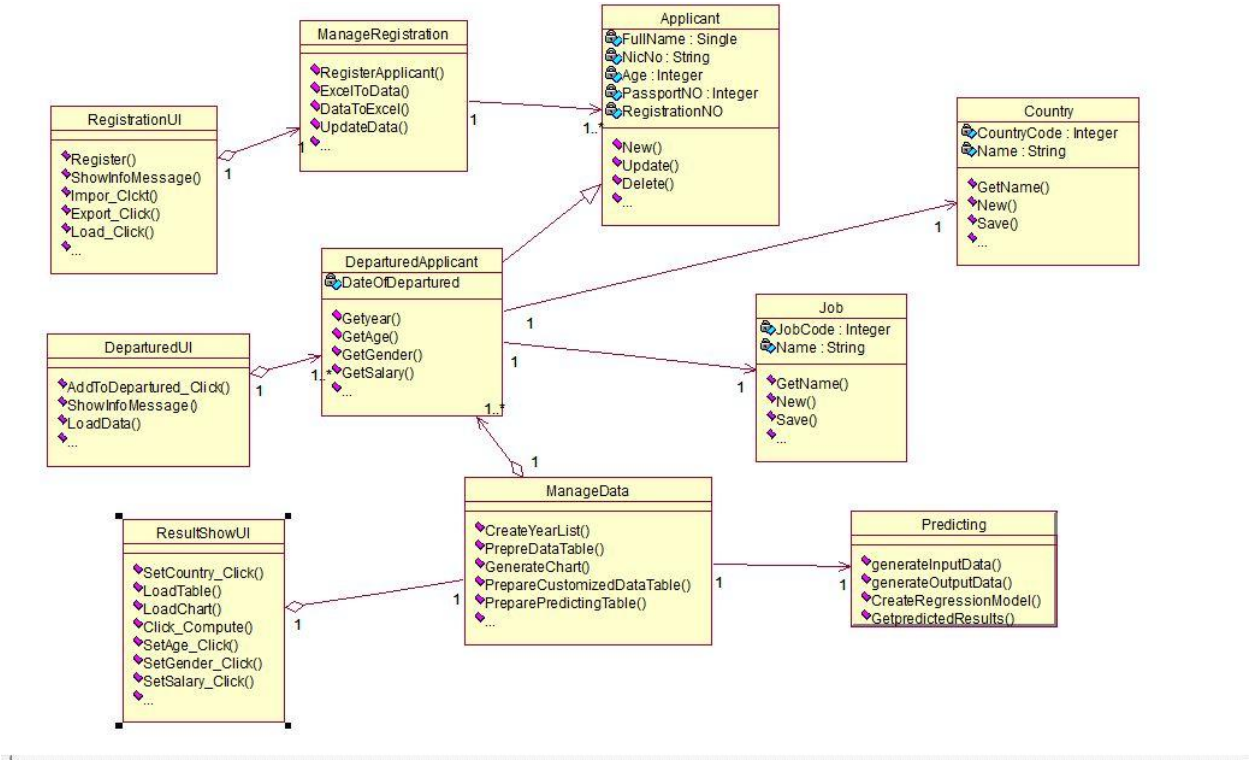


Figure 4: 3 Class Diagram

4.3 Component Diagram

A component diagram depicts how components are wired together to form larger components or software systems. They are used to illustrate the structure of arbitrarily complex systems.

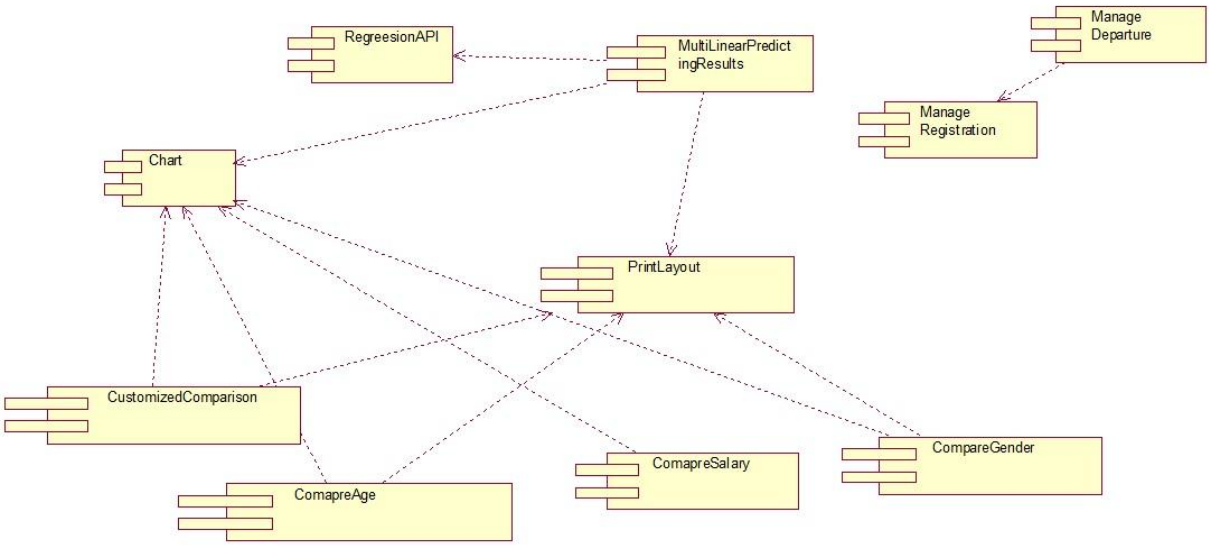


Figure 4: 4 Component Diagram

4.4 Sequence_Add_depature_details

A sequence diagram shows object interactions arranged in time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario.

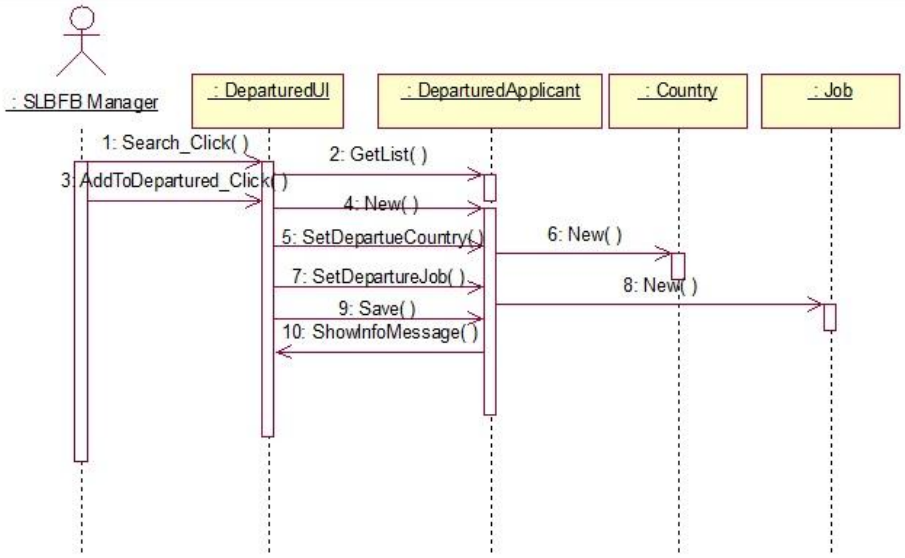


Figure 4: 5sequence diagram - Add_depature_details

4.5 Sequence_compare_with_age

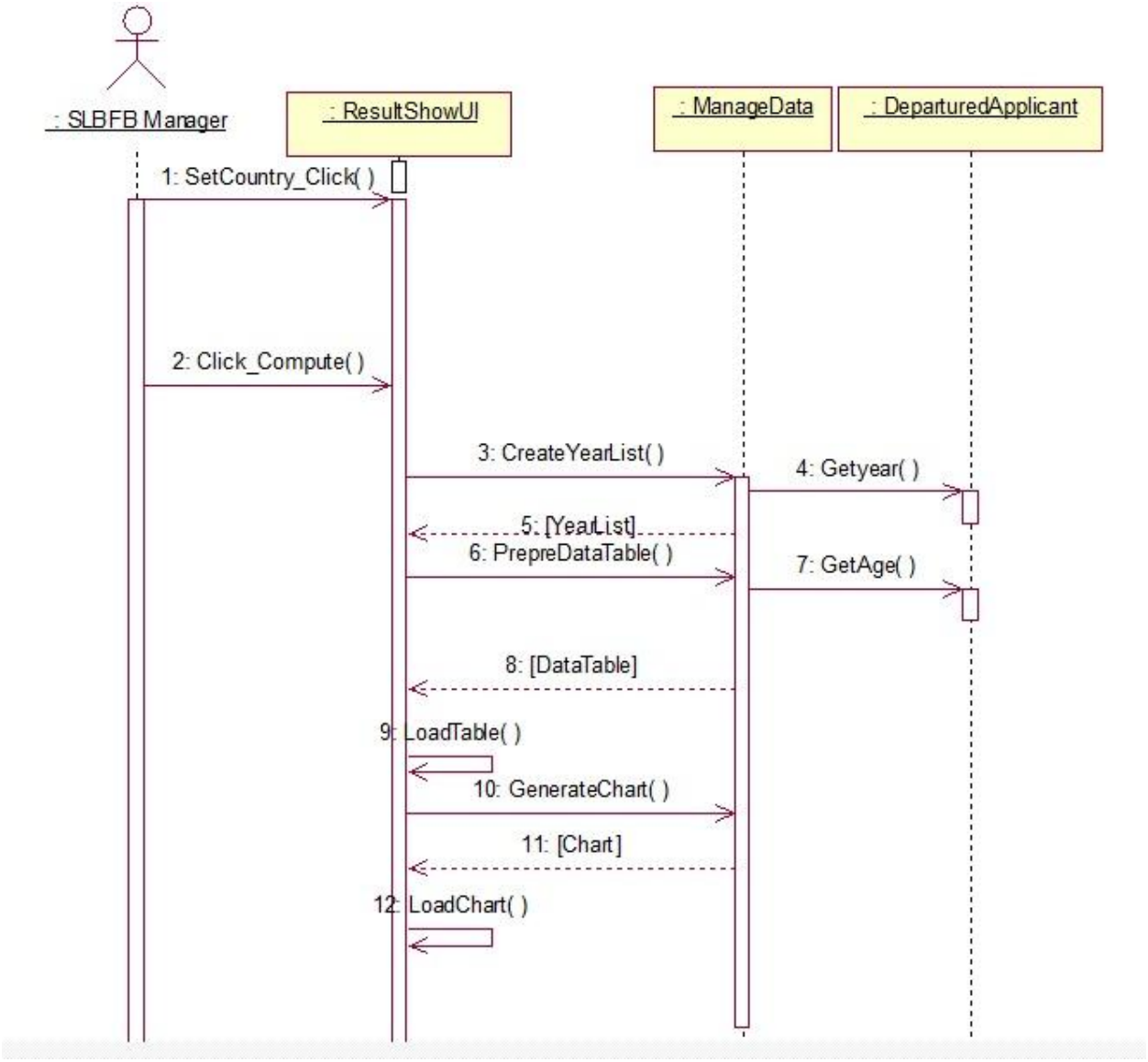


Figure 4: 6sequence diagram - compare_with_age

4.6 Sequence_compare_with_Gender

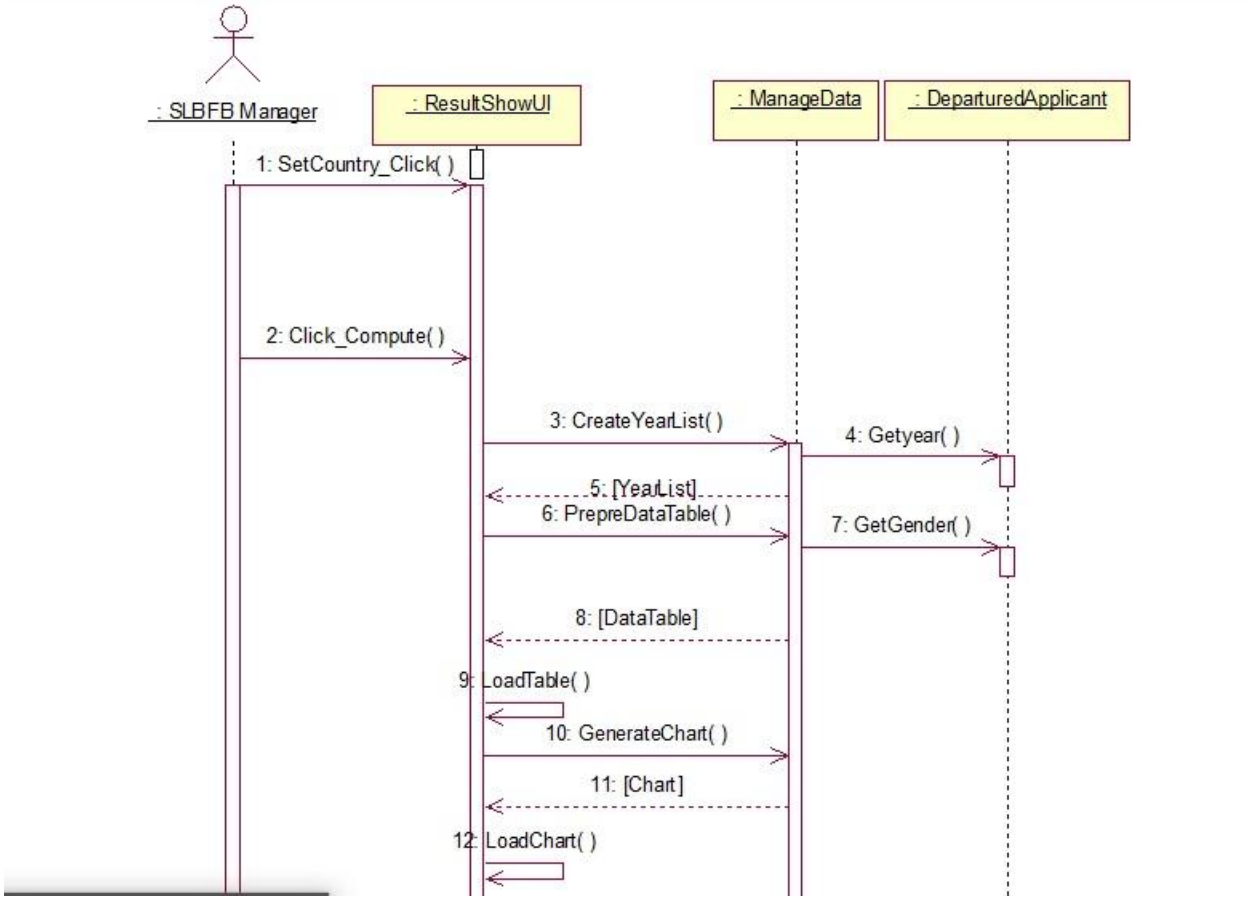


Figure 4: 7sequence diagram - compare_with_Gender

4.7 Sequence_compare_with_salary

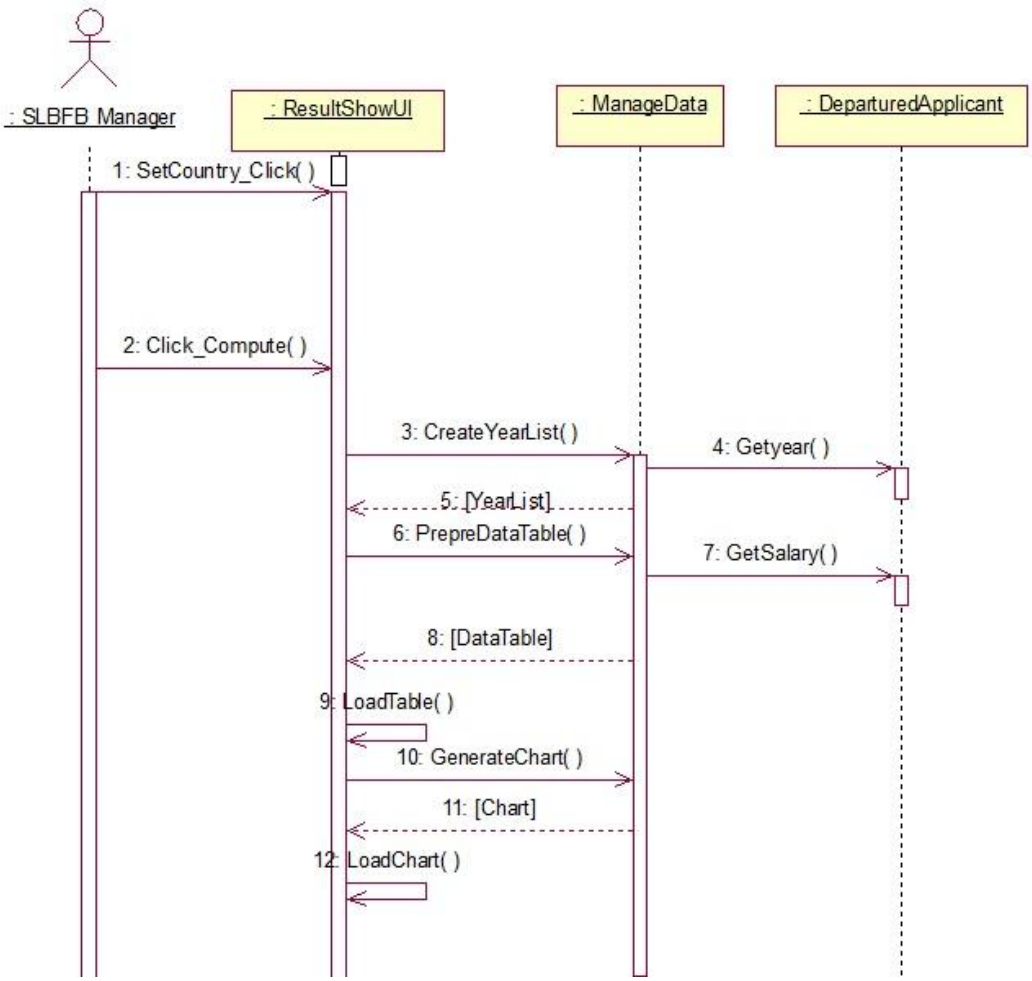


Figure 4: 8sequence diagram - compare_with_salary

4.8 Sequence_cutomized_compare

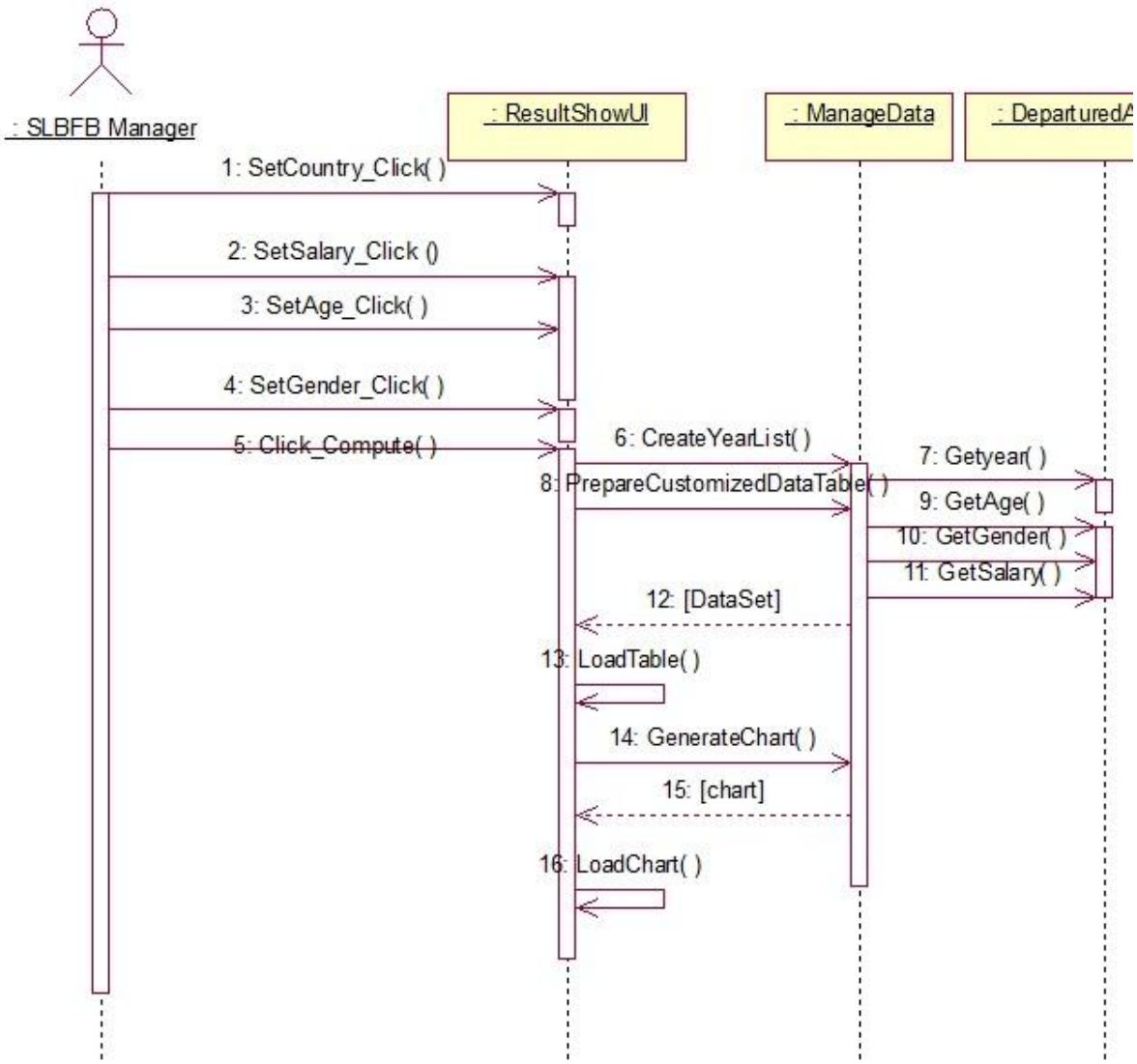


Figure 4: 9sequence diagram - cutomized_compare

4.9 Sequence_diagram_prediction

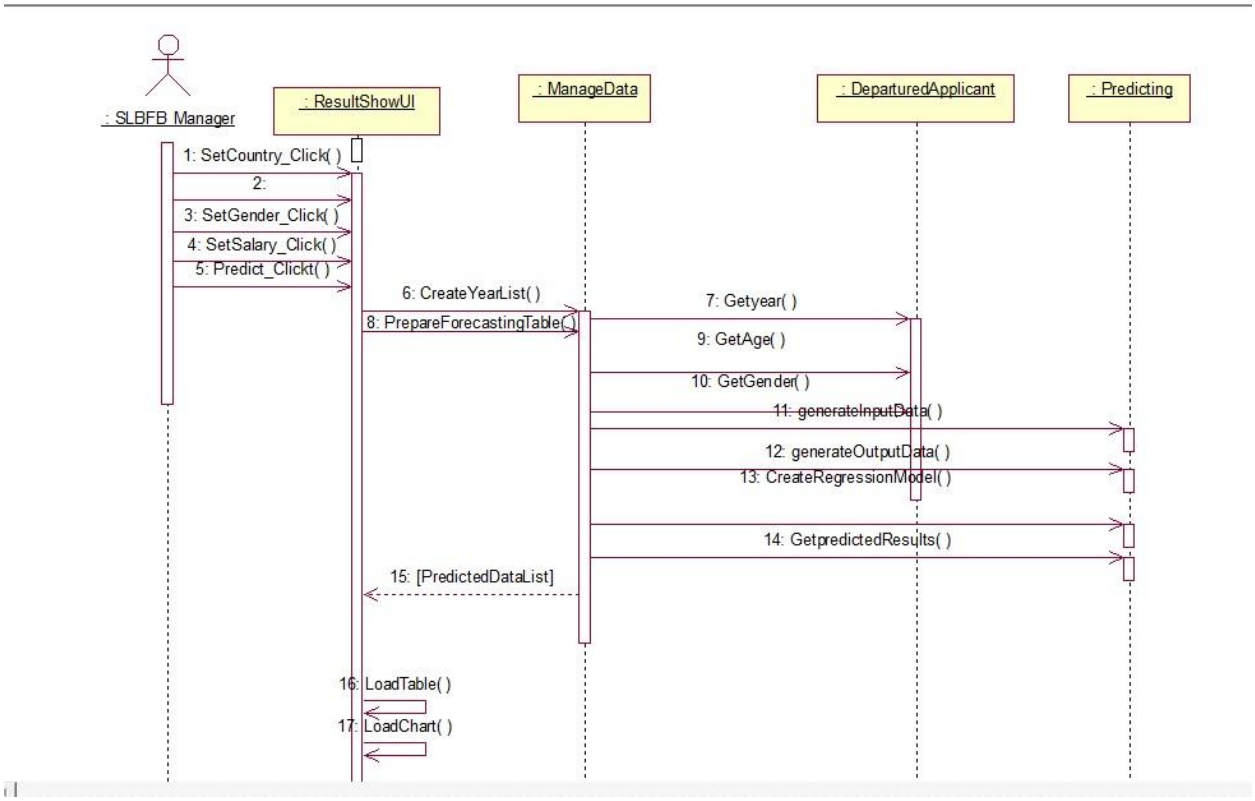


Figure 4: 10sequence diagram- prediction

4.10 Sequence_register_a_Applicant

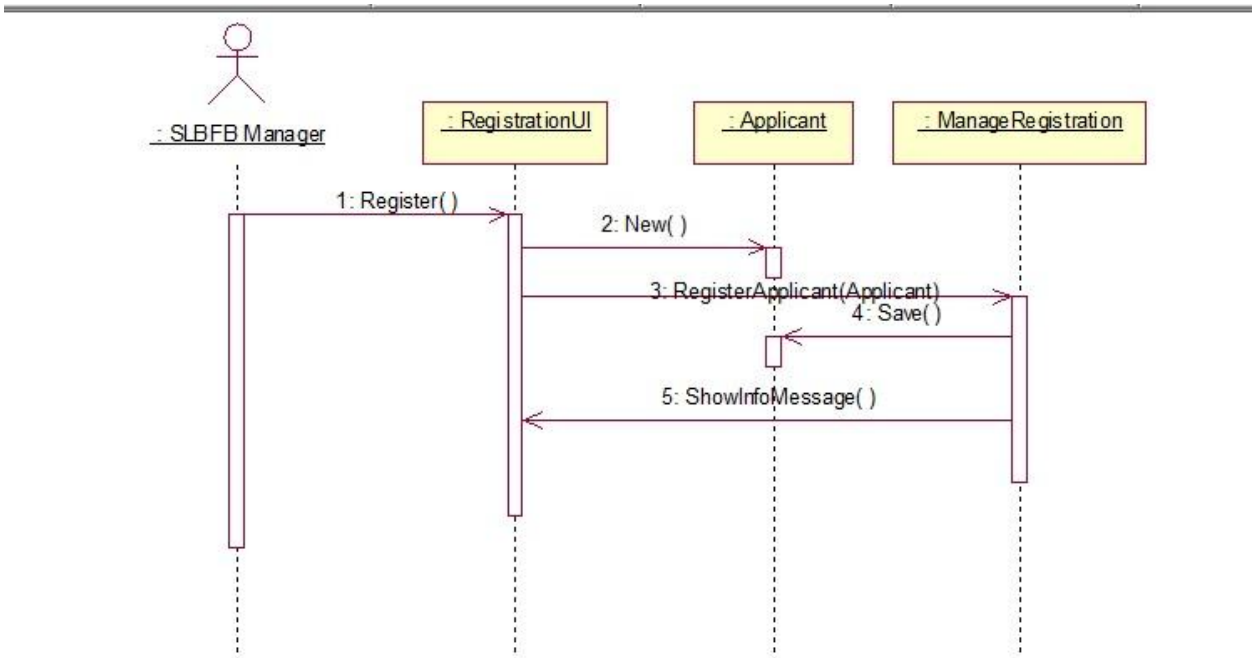


Figure 4: 11sequence diagram - register_a_Applicant

4.11 Use Case Diagram

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved.

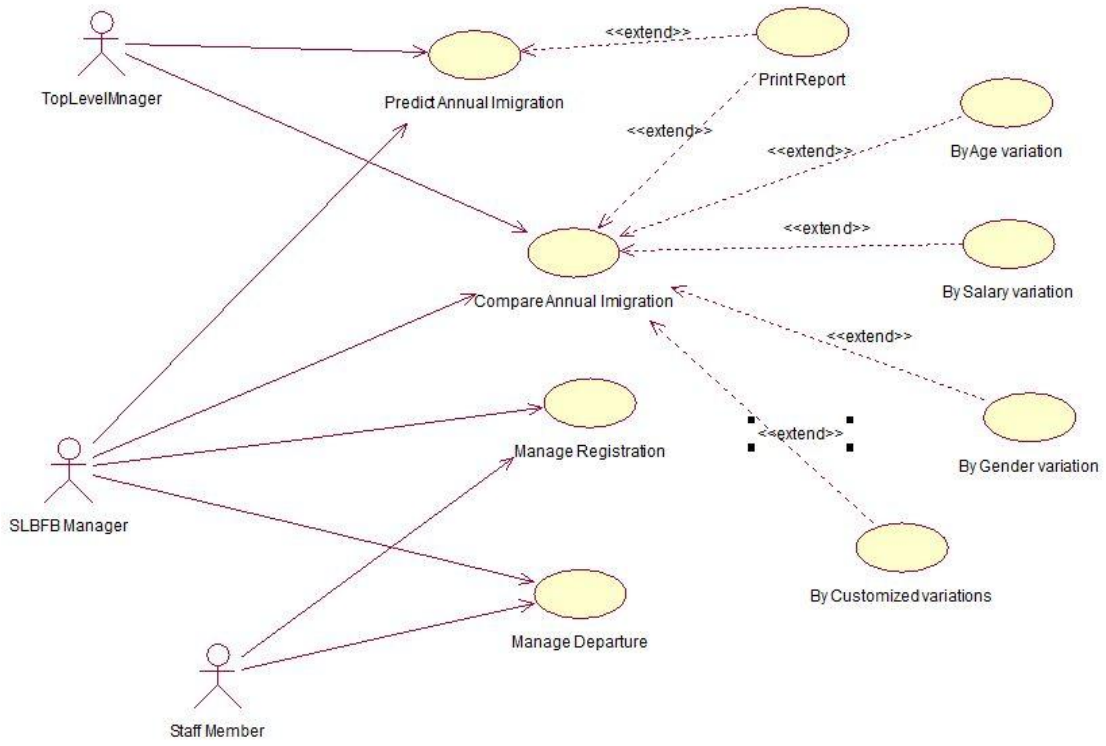


Figure 4: 12sequence diagram - Use Case Diagram

Chapter 05

Implementation

5.1 Introduction

This chapter discusses the implementation of the system. Chapter provides the technical information about the system, including the system and software design decisions taken. It covers detailed view of each component designed above and the technical environment. Development environment was done on corei7 8th generation high speed computer with high windows 10 pro operating system environment. Since the system is a integration of each component on a Dot framework development environment. The Dot network framework 4.5 is a must run time component for functioning the system thefollowing describes the basic system component functions that were focused on development. The final deliverable of this phase was an integrated installation cabinet file which is suitable to install and run onabove mentioned technical specification.

5.2 Implementation of Interfaces

All the user interface (UI) software components are considered in this part. According to the component design each user interface component behaves as major inputs to the system. As mentioned in the methodology the set of the built-in UI component in Visual studio IDE cooperated in the developmentof the based component. Separate visual basic (.vb) file for each UI component with implemented functionally to manage the required functionality and to deliver the relevant output for the other dependency component. The following describes the summarize information about each UI component.

5.2.1 Compare Age

The main function of this component is to calculate annualforeign employments with respect to the defined age range. No inputs were prompted to the user as this is a default computation. The out put will visualize in two ways as tabular and graphical. This component depend on the chart component. As any implementation change of the chart will need to change the implementation

in this component. The users are given an option to take print of this two visual out put into report view.

5.2.2 Compare Salary

The main function of this component is to calculate annualforeign employments with respect to the defined salary range. No inputs were prompted to the user as this is a default computations. The out put will visualize in two ways as tabular and graphical. This component depend on the chart component. As any implementation change of the chart will need to change the implementation in this component. The users are given an option to take print of this two visual out put into report view.

5.2.3 Compare Gender

The main function of this component is to calculate annual foreign employments with respect to gender. No inputs were prompted to the user as this is a default computations. The output will visualize in two ways as tabular and graphical. This component depend on the chart component. As any implementation change of the chart will need to change the implementation in this component. The users are given an option to take print of this two visual out put into report view.

5.2.4 Customized Comparison

This component include the functionality of all above components, but with more user customized ways rather than default. The component is built with provided input interface for user to change age, salary or gender separate or as a combined to generate annual foreign employments. The output will visualize in two ways as tabular and graphical. This component depend on the chart component. As any implementation change of the chart will need to change the implementation in this component. The users are given an option to take print of this two visual out put into report view.

5.2.5Manage registration

This component include the functionality for storing new applications to the system. Any new applicant has a defined information to be filled and the relevant input components are added for the users to be filled up with necessary validations. The validations is essential as the data is used

to mining for future predictions. The component is provided with necessary input sub component to take data of the applicants as individual or additional function was developed to import data from excel sheet and store into the system directly. The component has a separate tabular component that is to be visualized the present applicant details.

5.2.6 Manage Departure

This component is used to manage the departure information. This depends on the manage registration component as the details are based on the registration. Each departure of an applicant the additional data is needed to be added to the present records.The component is provided with necessary input sub component to add required data was developed to import data from excel sheet and store into the system directly. The component has a separate tabular component that is to be visualized the present departure details.

5.3 Implementation of Reports

Separate component for generating a report on each calculated outputs. The in-built chart component was used to visualize the chart by sending the generated values.

5.4 Implementation of Prediction

This component is used to predict the future immigrants with the user customized option to change the age, salary ranges and the gender to calculate the future immigrants. Separate sub components are used to change the user inputs. The implemented functions of Regression API are used to send the annual immigrants and the generated the regression functions. The regression functions is used to calculate the future values based on the above mentioned range values. The output will visualize in two ways as tabular and graphical. This component depend on the chart component. As any implementation change of the chart will need to change the implementation in this component. The users are given an option to take print of this two visual out put into report view.

5.6 Other implementations

The system is functioning on a present local area network and a separate server machine is installed and configured with MSSQL database which is a relational database management

system (RDBMS) that runs as a server providing multi-user access to a number of databases. SQL can execute queries against a database , retrieve data from a database, insert records in a database, update records in a database, delete records from a database, create new databases and tables in a database and stored procedures in a database and views in a database, set permissions on tables, procedures, and views. The Main database was implemented in this server.

5.5 Chapter Summary

This chapter provided a description of the technical side of the project, including its software engineering base and design decisions. As with many projects, the development process was a mixture of top down and bottom up. This was necessary due to the fact that it was a new technology. Along the way, once the possibilities of the technology had been better understood, modifications and enhancements were made. The actual courseware contents were presented, with images of the various screens shown.

Chapter 06

Result of the Study

6.1 Introduction

This Chapter provides the Result of the system from user perspective components that optimize objective described in the Chapter 01.This include fact based description on how the adopted methodology is applicable to the requirements as expected in requirement specification and detailed explanation of usage of the components.

6.2 Achievement of Comparison

Since the main measurable variable of this problem is based on the annual foreign employments and its variations based on other attributes. As in the component diagram the mentioned below user interface provides thecomparison overview about the annual immigrants based on defined age,salary range and male vs female. The component shows the results in a tabular and graphical visualization. Asan additional option, the user can filter the information country wise.

6.2.1 Gender wise comparison

The following UI component developed for get the male vs female annual foreign employments in tabular and graphical view.

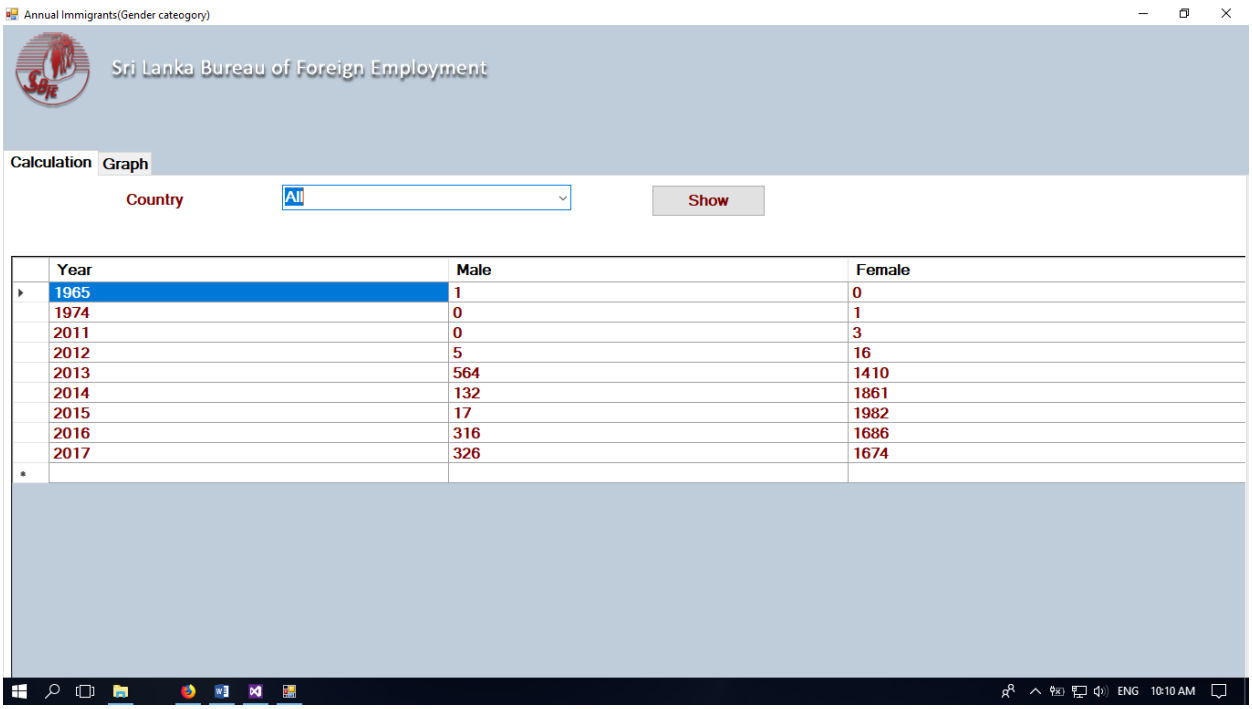


Figure 6: 1Gender wise comparison 1

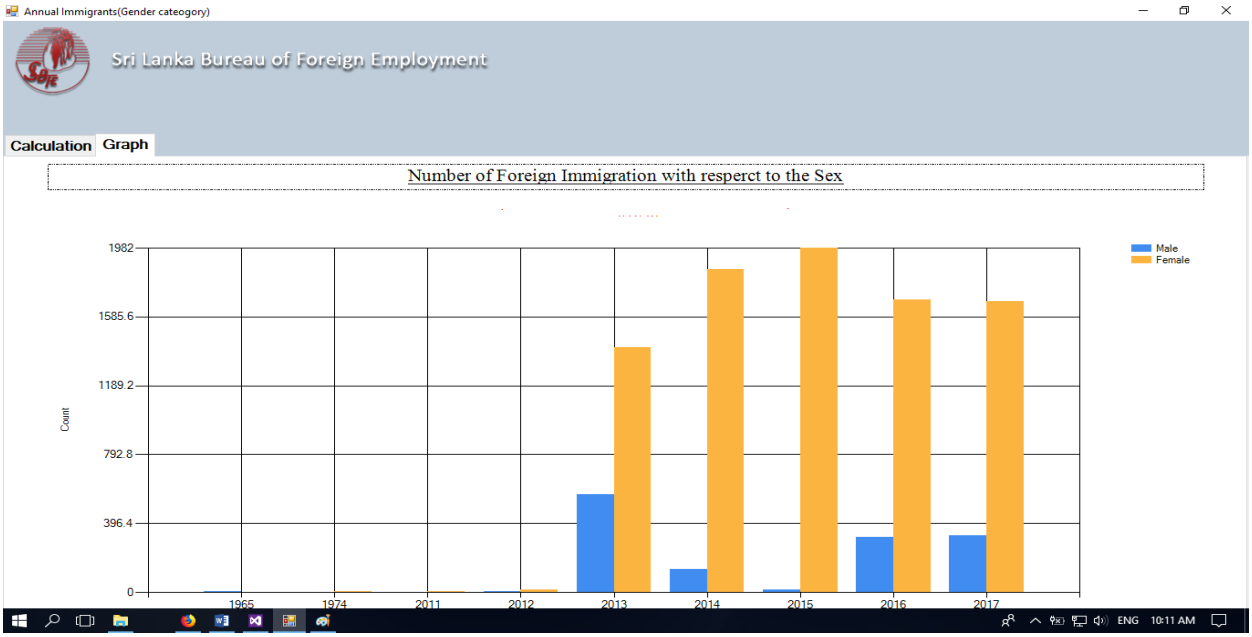


Figure 6: 2 Gender wise comparison 2

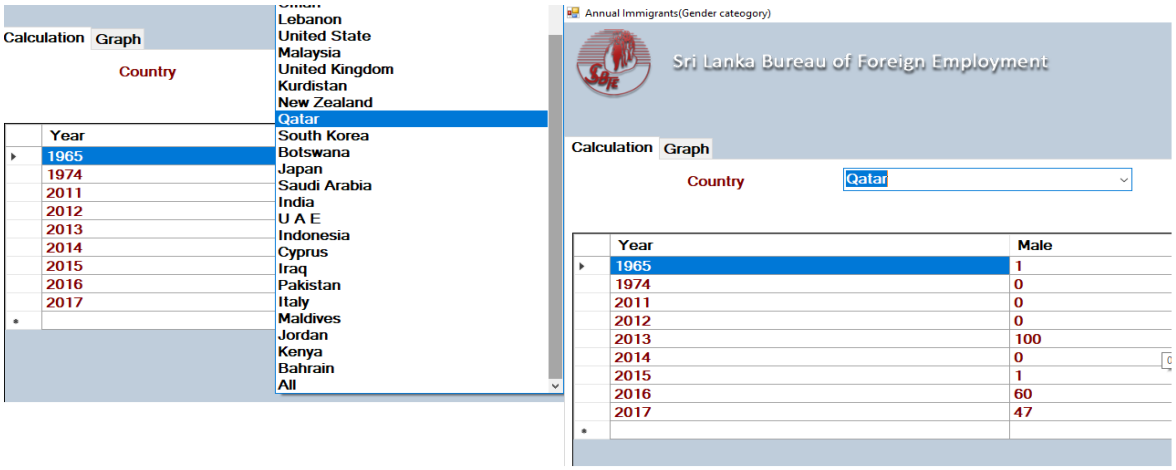


Figure 6: 3 Gender wise comparison 3

The user can choose a country from the drop down list and visualize the output by pressing "show" button. Rather than developed a separate results for each gender, putting then in a one scenario will cover the requirements for compare the number of foreign employments between two genders.

6.2.2 Age wise comparison

The following UI component developed for get the annual foreign employments in tabular and graphical view for defined age range.

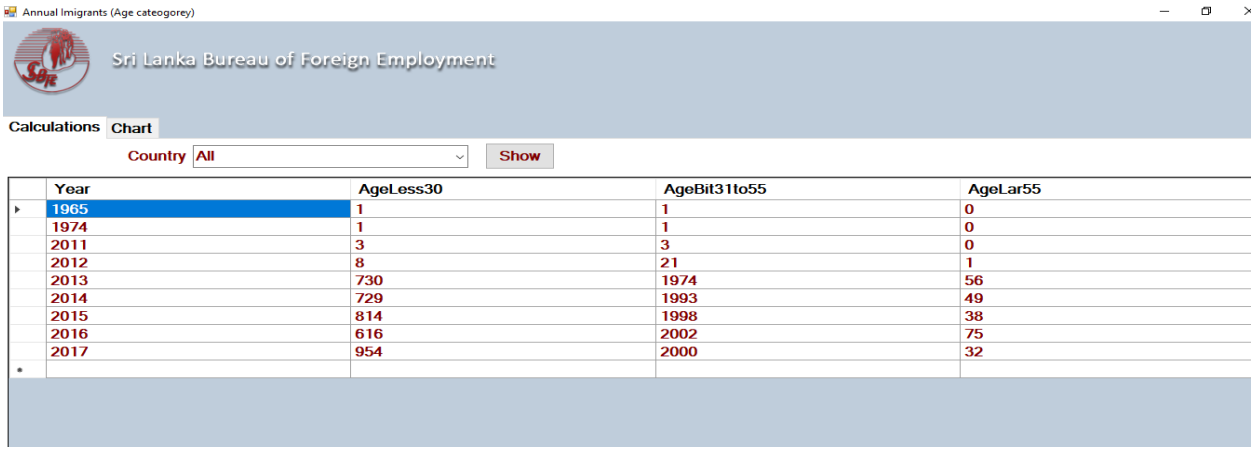


Figure 6: 4Age wise comparison

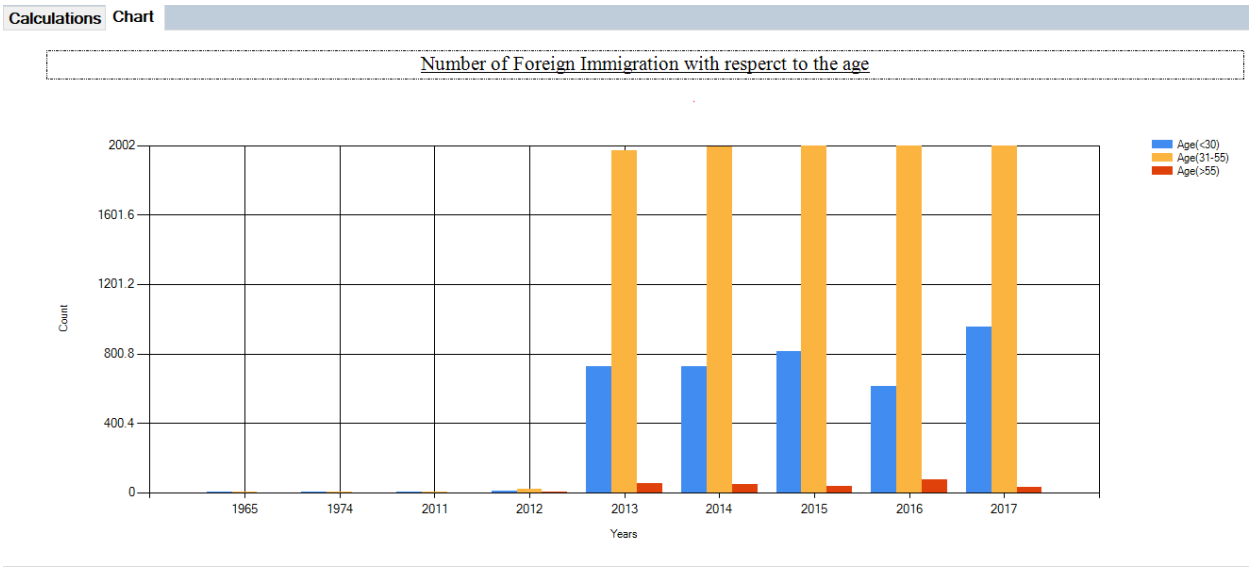


Figure 6: 5Age wise comparison for Number of Foreign Immigration 1

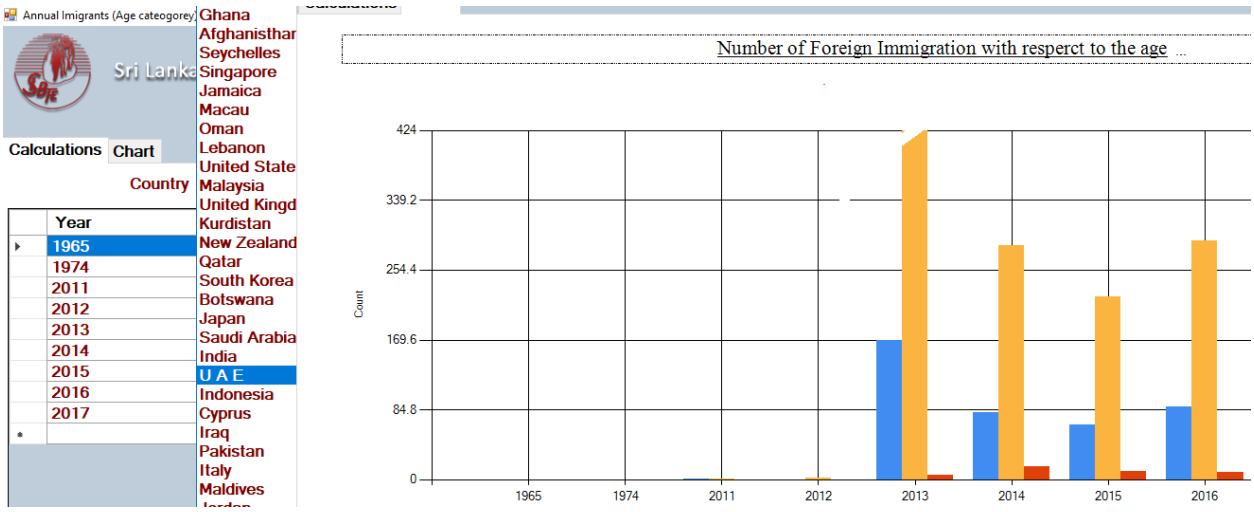


Figure 6: 6 Age wise comparison for Number of Foreign Immigration 2

The user can choose a country from the drop down list and visualize the output by pressing "show" button. Rather than developed a separate results for given age , categorizing them (age less than 30,age between 30 and 55 and age more than 55) in a well-defined range would give better variation in age and the annual immigrants.

6.2.3 Salary wise comparison

The following UI component developed for get the annual foreign employments in tabular and graphical view for defined salary range.

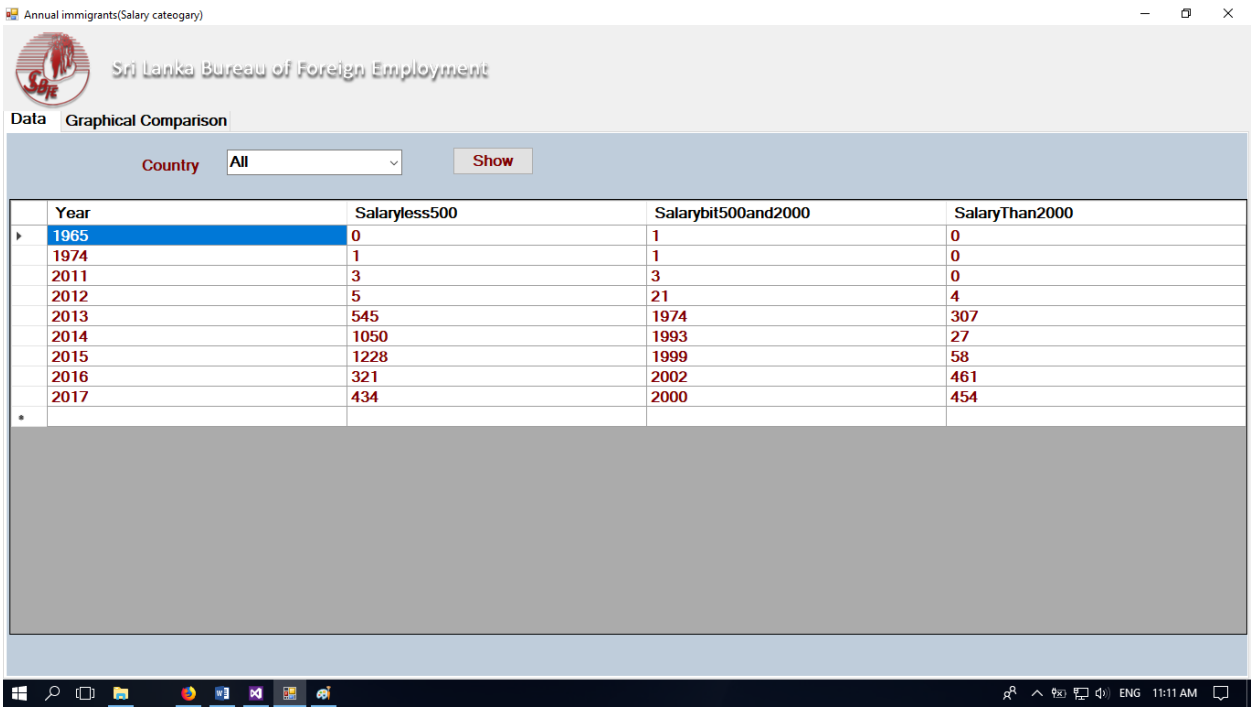


Figure 6: 7Salary wise comparison

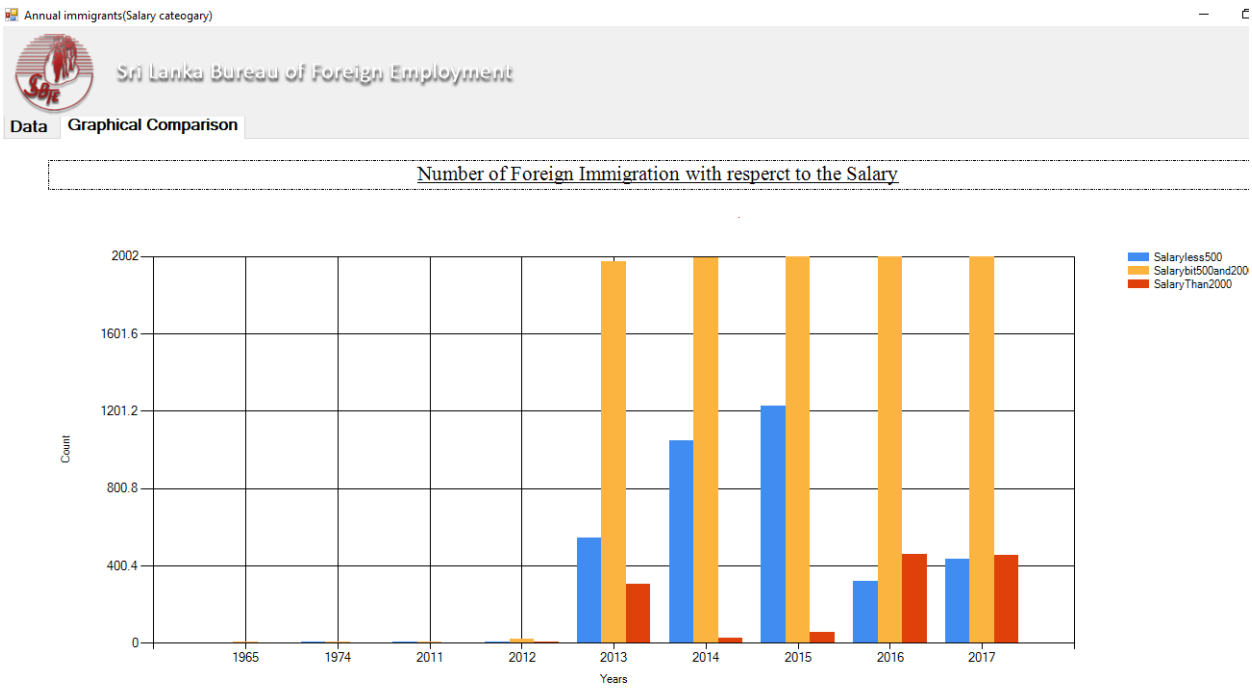


Figure 6: 8Salary wise comparison for Number of Foreign Immigration

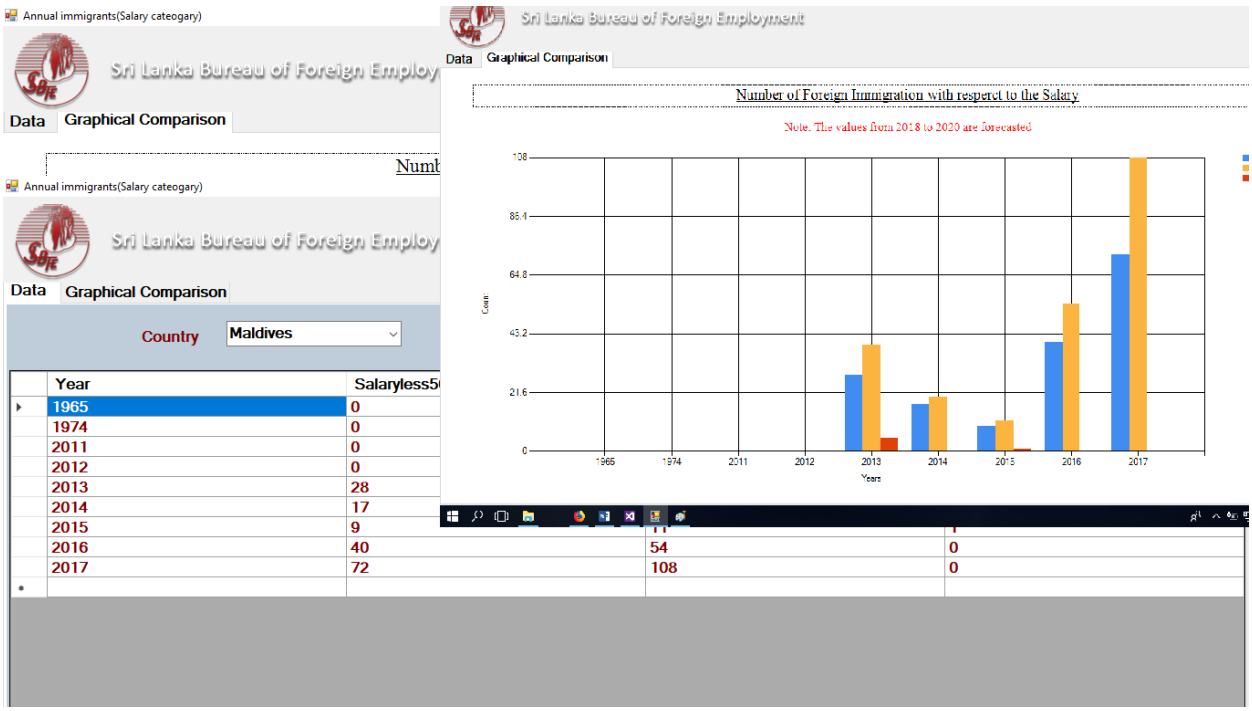


Figure 6: 9Salary wise comparison for Number of Foreign Immigration 2

The user can choose a country from the drop down list and visualize the output by pressing "show" button. Rather than developed a separate results for given salary , categorizing them

(salary less than $500,salary between $500 and $2000 and salary more than $2000) in a well-defined range would give better variation in salary and the annual foreign employments.

6.2.4 Custom comparison

This special UI component was developed to overcome the requirement that the users can change any parameter and get the annual immigrants. From above mentioned components are based on the defined range rather than the user specific input.

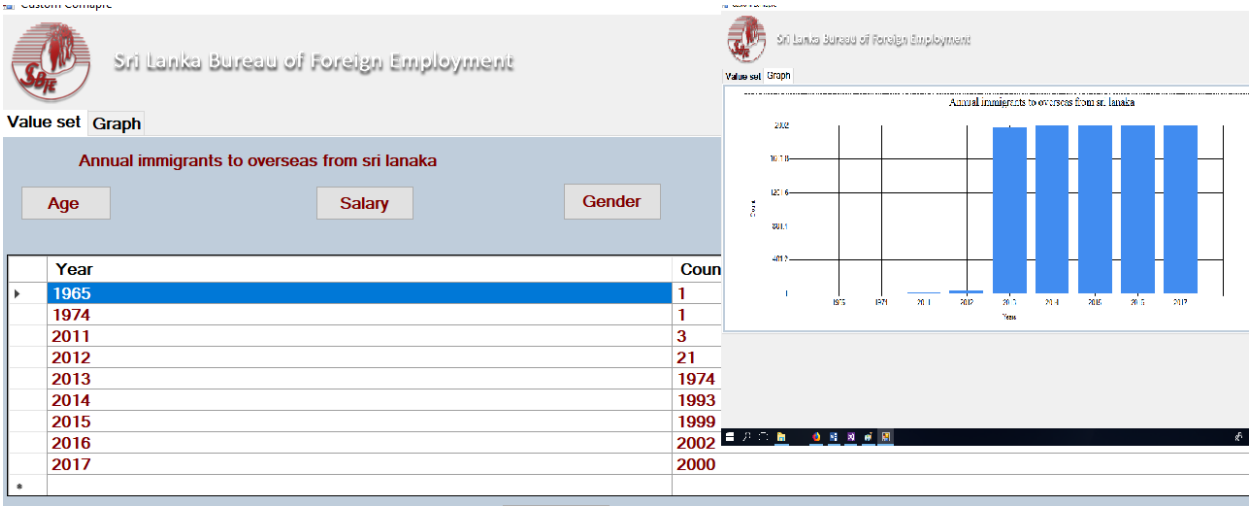


Figure 6: 10Custom comparison

In this case no setting from the user and the and generate the annual number of immigrants. This is worth users who are interested in getting overseas foreign employments annually

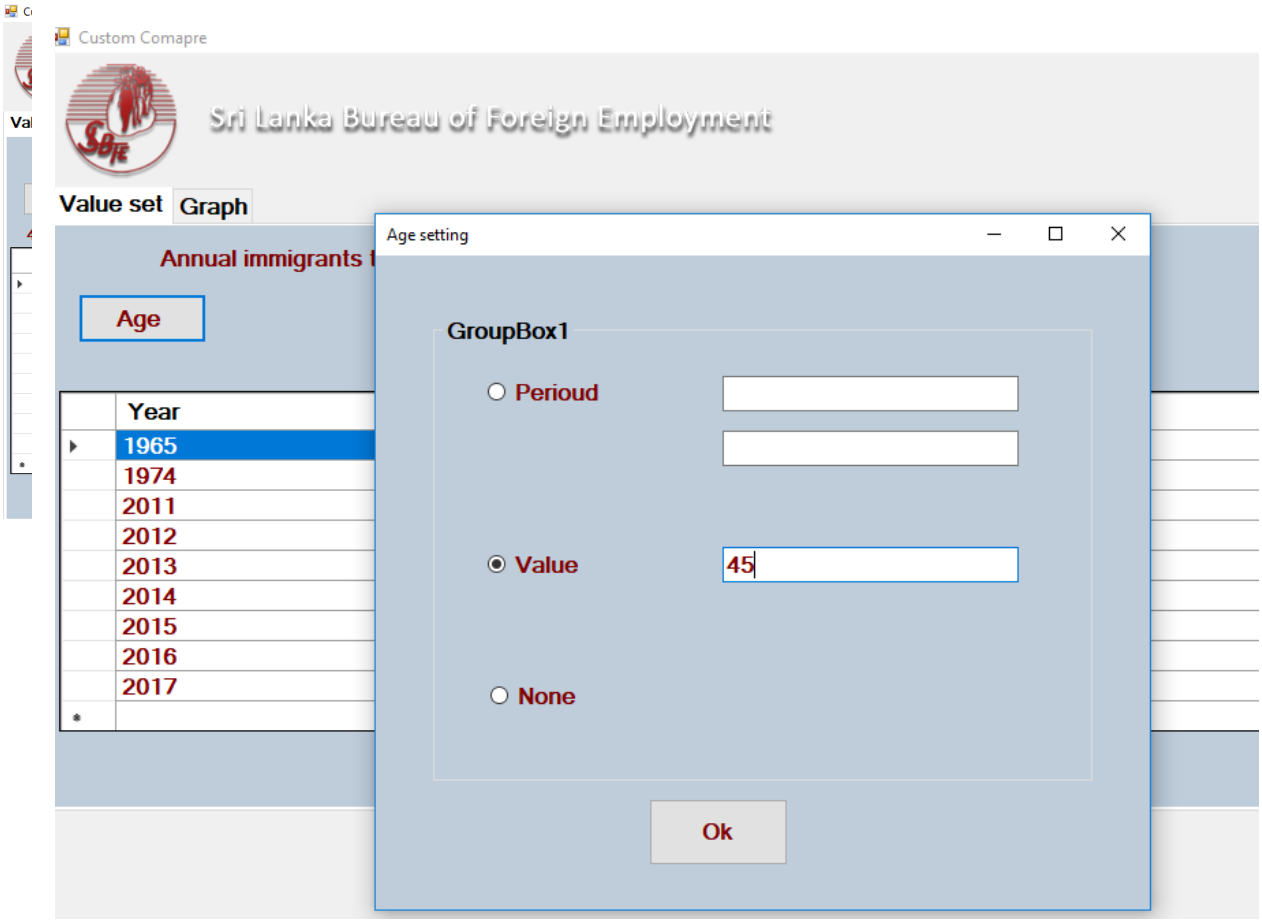


Figure 6: 11 System settings 1

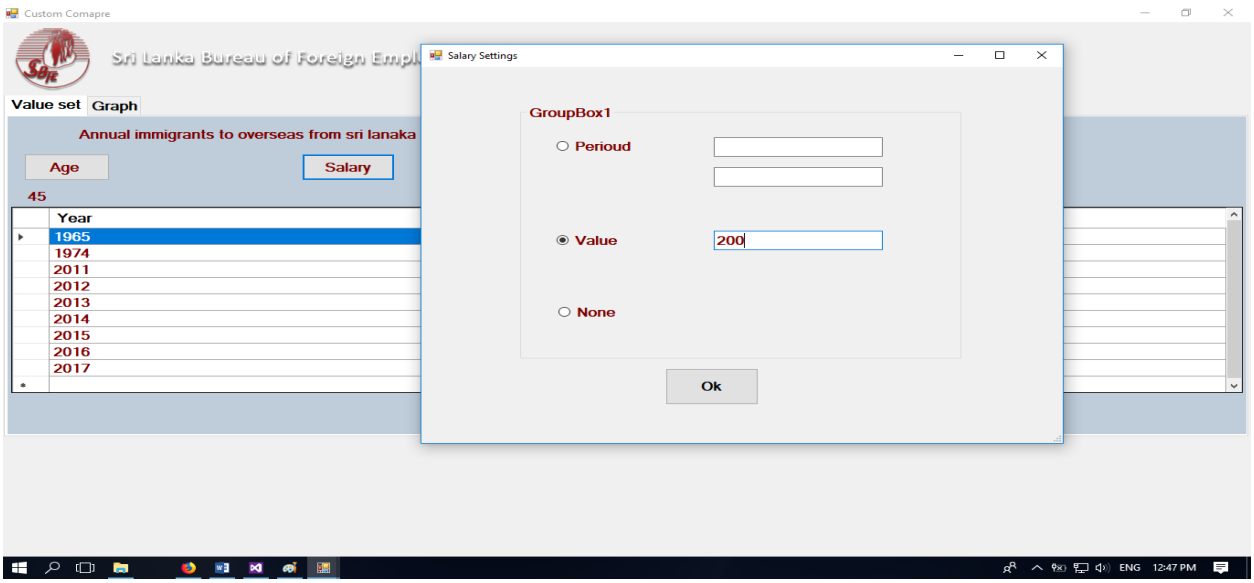


Figure 6: 12 System settings 2

The users can set age or salary to create the cubic to get the annual foreign employments as follows.

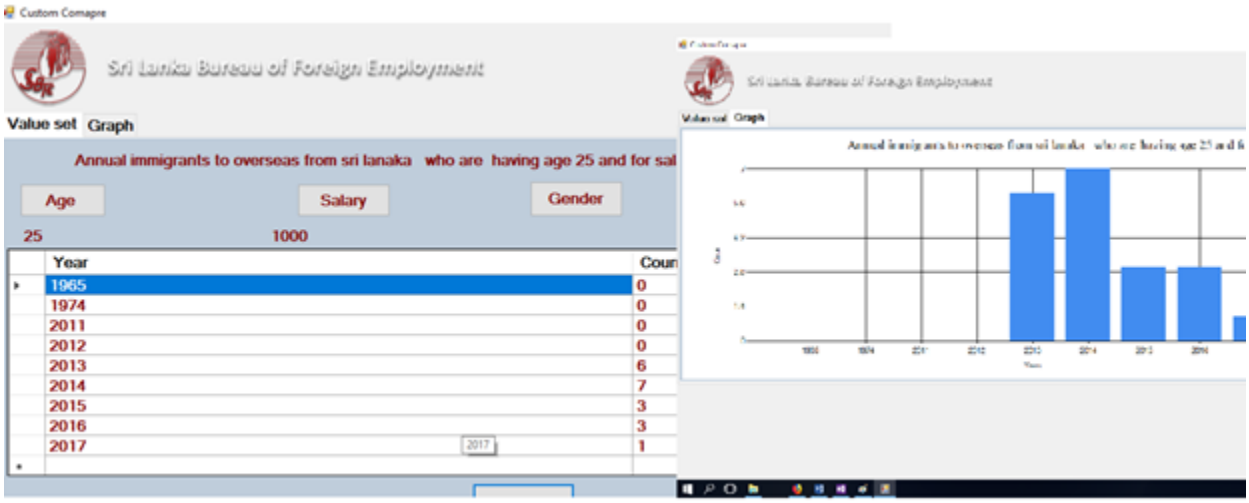


Figure 6: 13 Annual immigrants to overseas vs age -1

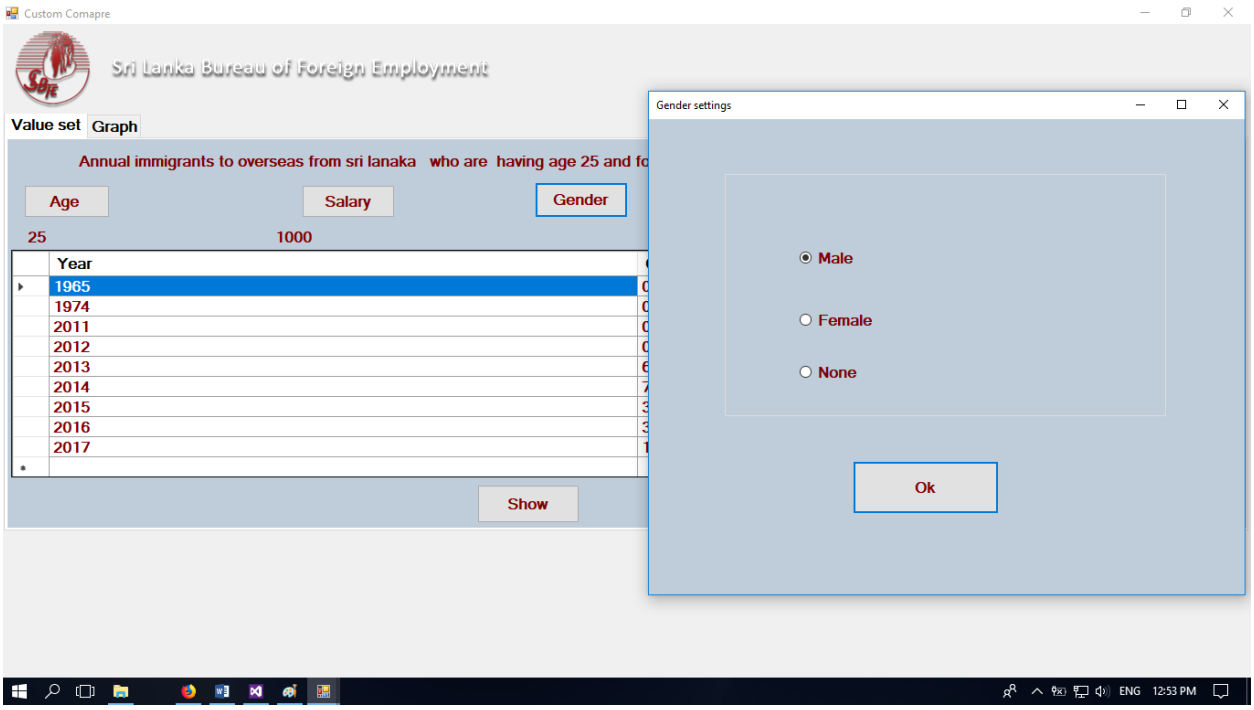


Figure 6: 14 Annual immigrants to overseas vs age -2

Additionally users are allowto generate the foreign employments by changing the gender.

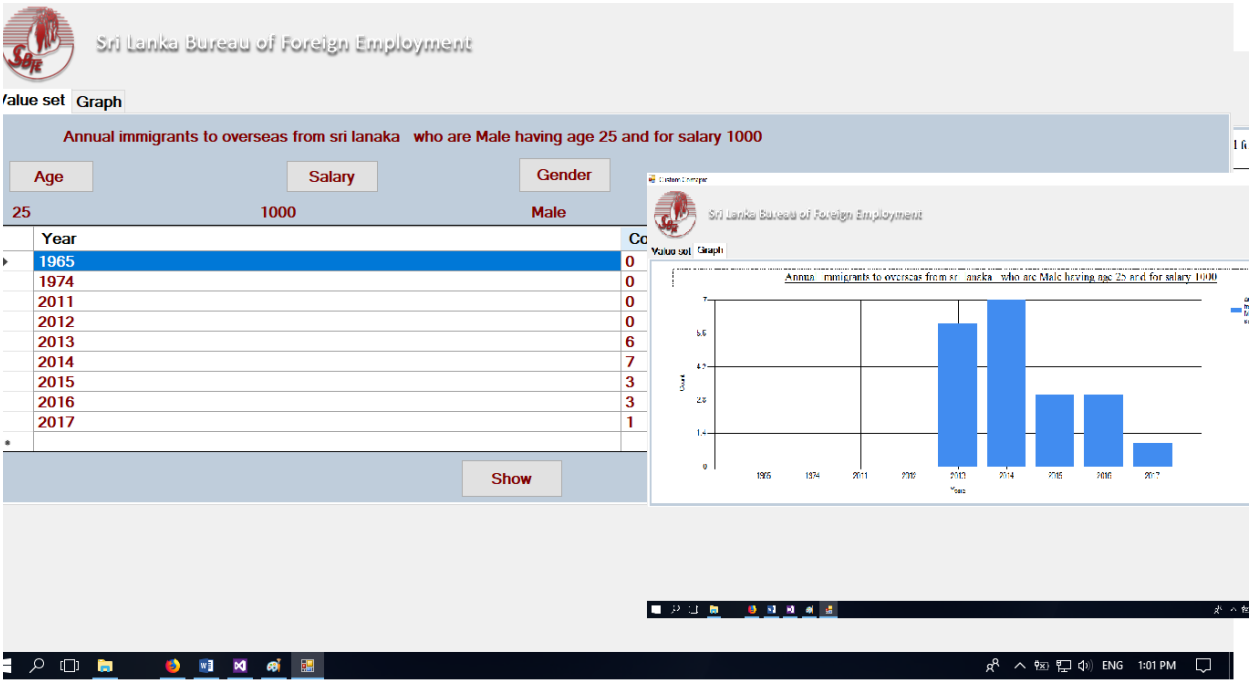
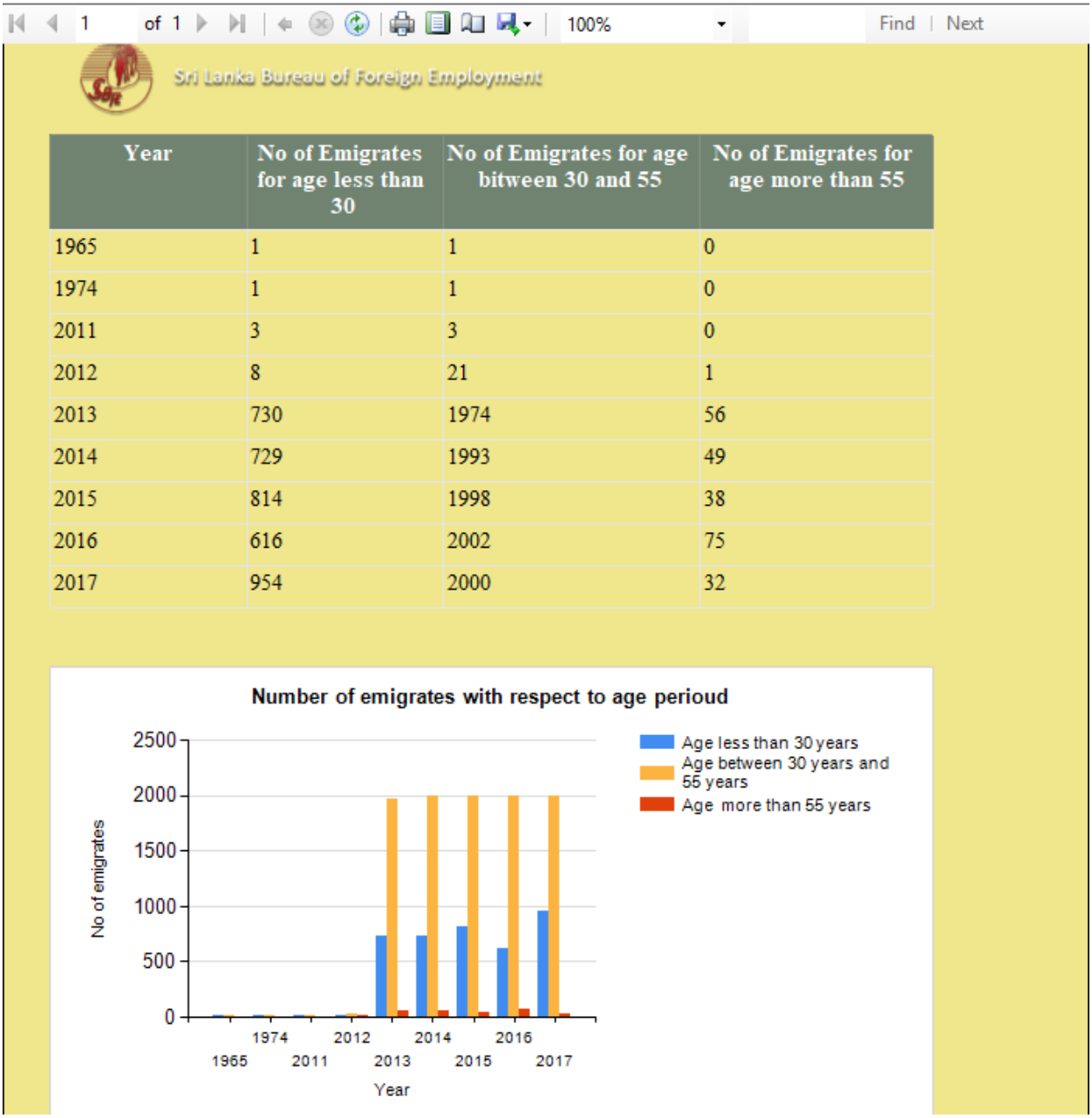


Figure 6: 15Annual immigrants to overseas vs age vs salary

Since having such a variation value from the user is worth to compare the annual foreign employments in desired way. Such comparison is much useful to make decision on future expected overseas immigrants and their variations with respect to the facts like age, salary and gender.

6.2.5 Report Generation

This is an additional component for users to get a hard copy of their analytical outcome. Users are given an option to get printable view for each of the above scenarios. For example the following is printable view of a how salary variations impact on foreign employments from Sri Lanka. The same layout for each of component.



Year	No of Emigrates for age less than 30	No of Emigrates for age bitween 30 and 55	No of Emigrates for age more than 55
1965	1	1	0
1974	1	1	0
2011	3	3	0
2012	8	21	1
2013	730	1974	56
2014	729	1993	49
2015	814	1998	38
2016	616	2002	75
2017	954	2000	32

Figure 6: 16 Report – Number of emigrants with respect to age

6.2.6 Prediction of future overseas immigrants from Sri Lanka

This component is based on regression analysis in data mining to obtain the predicted future overseas immigrants. In the custom comparison component it could be seen that there are some zero or null values for particular year.

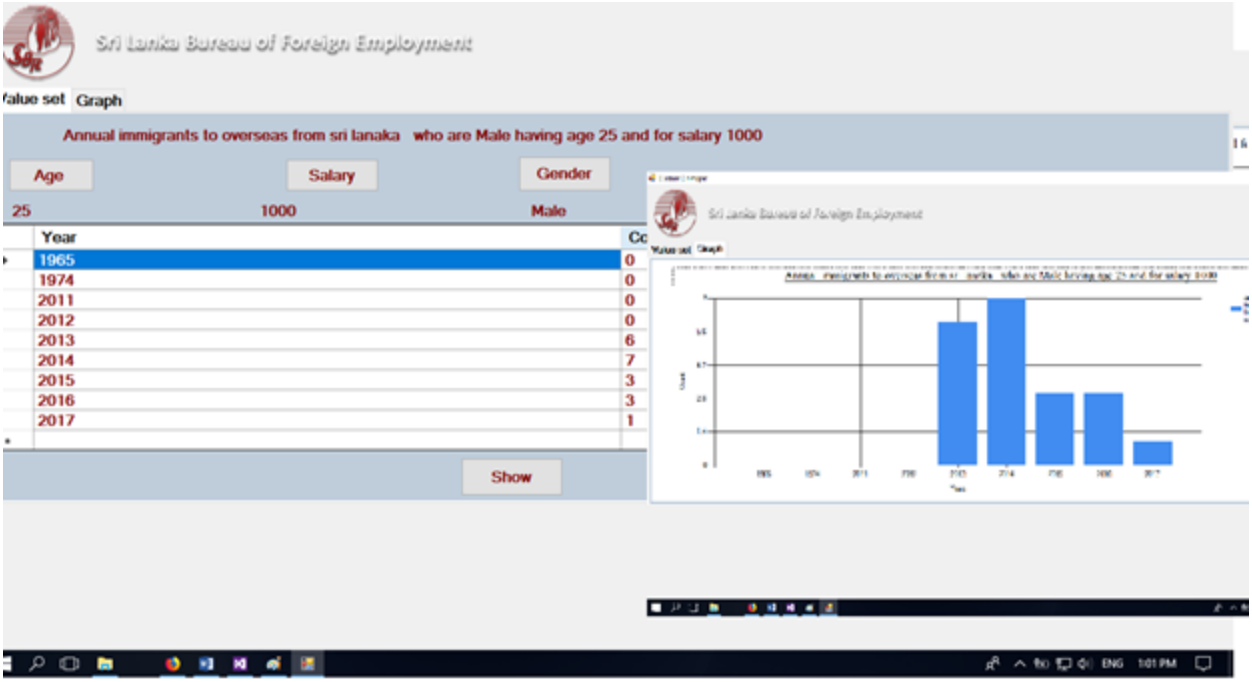


Figure 6: 17Prediction of future overseas immigrants from Sri Lanka

This because the values are based on historical data and this data won't cover the all aspects. As an additional way it can be considered as whole data set for forecasting. But the effect to the foreign employments from the facts are functionally different in each year. Instead of zero or null values, having a predicted value would provide more reasonable value when using in forecasting. It is vital to make a forecast which statistically significant confidently applicable. Therefore The regression function is suitable to generated annually consider each passed values affected from age, salary and gender. Considering individually rather than taking them in a one data set and generating a one trend line would generate trustable output rather using null or zero values. The fact that the dependent variable variants are different from year to year, would cause to develop multilinear regression functions to predict the foreign employments in any user desired circumstance. The original data are limited to particular value range therefore cannot get pure values for predicting. Through from multi linear predicting for each year independently gave the reasonable value that can be used for forecasting. The whole research is based on the facts of age, salary and the gender, to have reasonable value the best approach is to consider them as annually rather going as a whole. This function is based on custom comparison component, but it generates predicted values rather than original data and the output is just an estimated mean

overseas immigrant for each year. As in following figure all the generated values are predicted from the multilinear analytical model function.

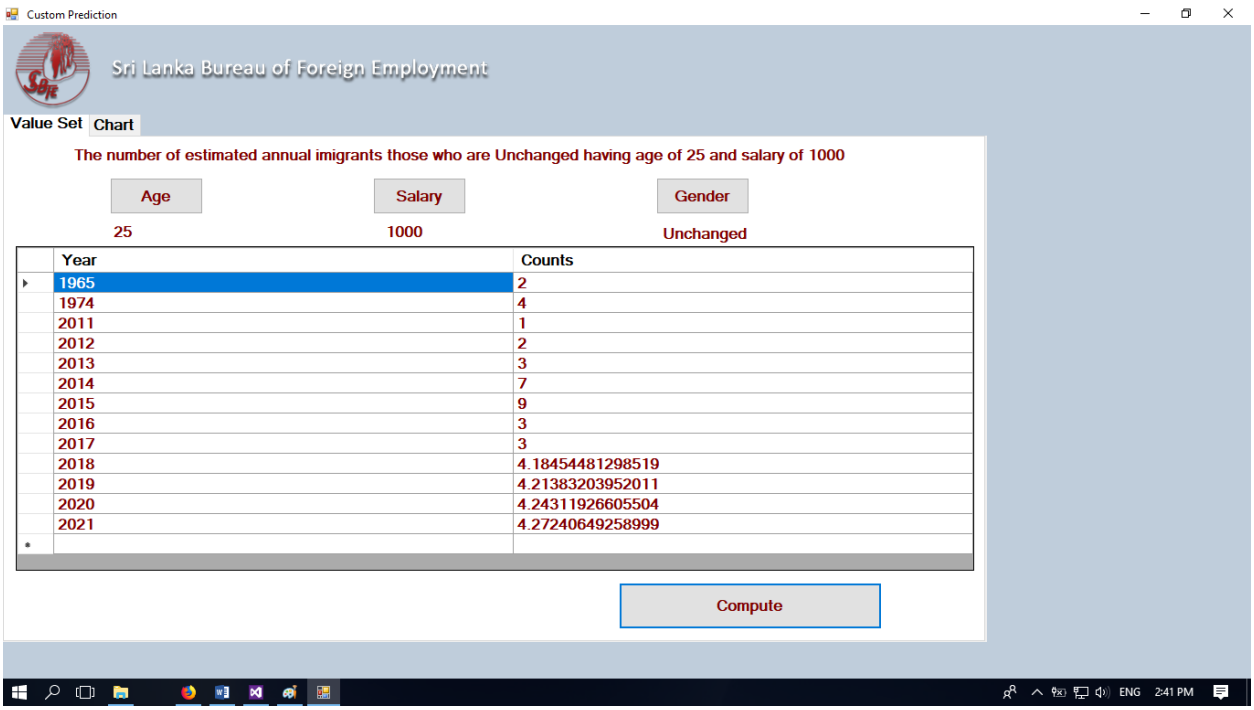


Figure 6: 18Prediction of annual immigrants from Sri Lanka

The values from year 2018 to 2021 are forecasted values by considering them as a time series data. Users are free to change the variables and check how the future foreign employments would change according to them. The following figure gives how the estimated overseas foreign employments from 2018 to 2012 for male 25 years of age expecting salary $1000

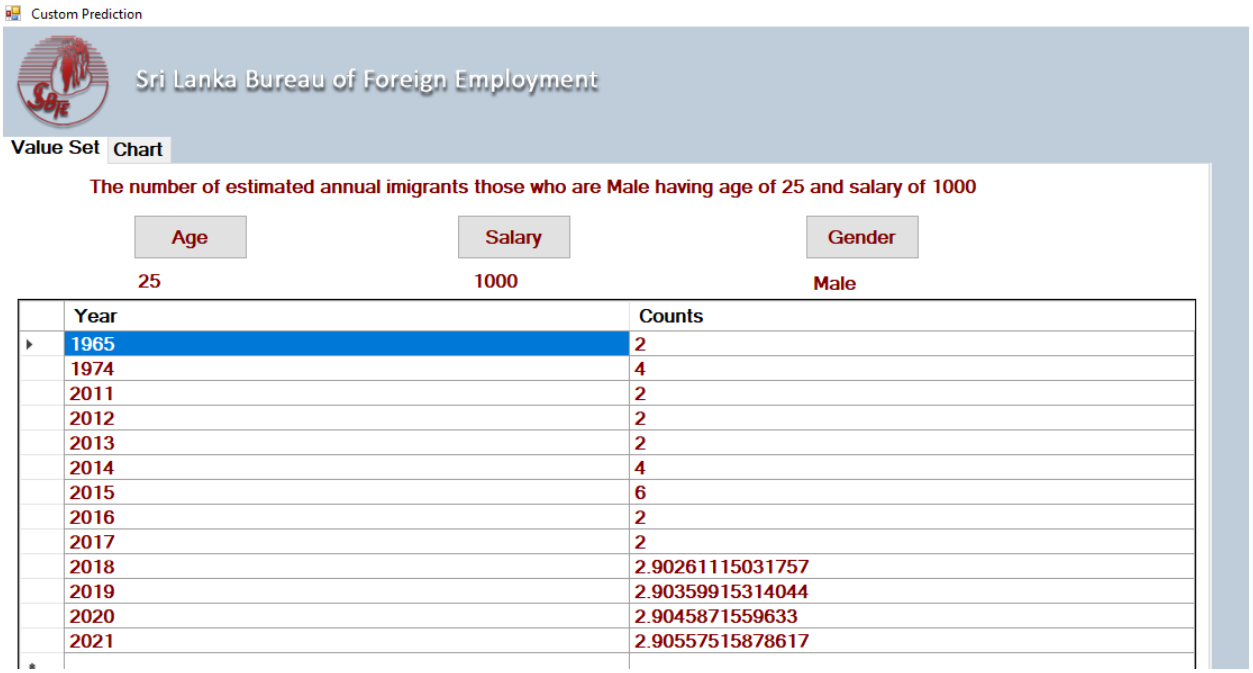


Figure 6: 19Prediction of annual immigrants with sex and salary scale

6.3 Chapter Summary

As brief in the chapter all the interfaces are developed according to UI principles and through the proposed system user will be able to go for their decisions quickly and in efficient way.

Chapter 07

Evaluation

7.1 Introduction

Software technologies have been evolving rapidly and for a given set of functional and non-functional requirements there usually exist several competing software products. Several software evaluation frameworks are used to make assessment of the developed software to suit the relevant requirements.It's quite different from evaluating printed materials. A good deal of the contents of a software package or website will not be immediately visible and will only appear if the user follows a particular route. In addition, there are factors such as screen design, user-friendliness and nature of the interaction to take into account.

7.2 Evaluation Methodology

The Following Main evaluation items were introduced as major attributes for the current solution

(i) System was target oriented
(ii) Usability of the System
(iii)Comprehensibility of Information
(iv)Clear Outcomes

Each Factor was given a set of Questionnaires with criteria for evaluation

Excellent (E),-10, Good (G)-8, Fairly Good (FG)-6 and Bad (B)-3 were considered as a basic evaluation factors.

Evaluation Format-1

Target oriented	
Criterion	
Does the system gives service as you need?	E/G/FG/B
Is it easy to get the service from the product?	E/G/FG/B
Does the outcome in clear format?	E/G/FG/B
Does the System gives all functions as in specification?	E/G/FG/B
Is some functionality conflicted with one another?	E/G/FG/B
Are you proposing some additional to the given functionalities	E/G/FG/B
Is it easy to understand the steps	E/G/FG/B

Table 7: 1Evaluation Format

Evaluation Format-2

Usability of The System	
Criterion	
Is it easy to start the program?	E/G/FG/B
Is the user interface easy to understand? (For example, is the screen layout clear and easy to interpret?)	E/G/FG/B
Is it easy to navigate through the program?	E/G/FG/B
Is it useable to manage activities for each modules	E/G/FG/B
Can you understand the design items functionalities (PRINT button indicates to print something etc)	E/G/FG/B
Are you proposing some additional to the given functionalities	E/G/FG/B
Is it easy to handle forms?	E/G/FG/B
Does the System explain what you expected?	E/G/FG/B
Does the System contain useful links?	E/G/FG/B
Does all Interfaces have proper layout?	E/G/FG/B

Table 7: 2Evaluation Format-2

Evaluation Format-3

Comprehensibility of Information	
Criterion	
Is the level of language that the program offers clearly indicated?	E/G/FG/B
Can you seek help and understand the guides easily	E/G/FG/B
Can you easily read the instructions on each menus and forms	E/G/FG/B
Is the current layout, font and foreground is applicable for your eyes.	E/G/FG/B
Is the level of language that the System offers suitable	E/G/FG/B

Table 7: 3 Evaluation Format-3

Evaluation Format-4

Clear Outcomes	
Criterion	
Do you get a valid outcome?	E/G/FG/B
Are You Satisfied with the current model output format?	E/G/FG/B
Is the Output Format is readable and Understandable?	E/G/FG/B
Do you think the suitable data format is applicable?	E/G/FG/B

Table 7: 4 Evaluation Format-4

There were about 5 members who are working in the organizations were selected in the selected Test. The final report for the evaluation is described at appendix E. See appendix E for more details.

- Number of Questions for Evaluation Item : Qi
- Number of Participation: P
- Number of Excellent Points given by the participants for Evaluation Item i=Ei
- Number of Good Points for Evaluation Item i=Gi
- Number of Fairly Good Points for Evaluation Item i=FGi
- Number of Bad Points for Evaluation Item i=Bi
- Average Points per Evaluation item i= (Ei*10+Gi*8+FGi*6+Bi*3)/P
- Ei+Gi+FGi+Bi=Qi*P
- Critical Line=40%

No of Participations	4

Evaluation	Weight	Target Oriented	Usuability of The System	Comprehensibility of Information	Clear OutComes
No Of Questions		7	10	5	4
Excellent	10	11	24	12	2
Good	8	16	12	4	12
Fairly Good	6	1	3	0	2
Bad	3	0	2	4	0
Average Points		61	90	41	32
Average Percentage		87%	90%	82%	80%

Table 7: 5Evaluation

The estimated presentations have been exceeded the critical line, so the system has approached to the desired standard.

7.3 Chapter Summary

Accurate evaluation is done to evaluate the system and received successful results to prove that the proposed system provides expected outcome which SLBFE requires.

Chapter 08

Conclusion and Future Work

8.1 Introduction

This chapter consists of two main sections. Conclusion briefs the achievements, observed through MIS. Future work describes developments related to project work.

8.2 Conclusion

8.2.1 Contribution of MIS to optimize organization objectives

Management Information System is a considered system of planning, storing data in form of information needed to carry out the functions of management. By considering all requirements it has been proved that the need of MIS in an organization is highly essential. MIS improves the quality of the production which preserves businesses in an unconventional grade. Many organizations or companies are interested in how to convert data into cleaned forms which can be used for high-profit purposes.

8.2.2 Role of Data Mining

An important trend in MIS is facilitating organizations to use data mining tools to collect information regarding consumer purchases and other economic trends. This allows management to translate this information into goals and directions for future business operations. Most MIS software's also has trending or forecasting models that allow companies to project emerging consumer markets for profitable operations. Companies can use their internal figures in the MIS to measure the effectives of their external data mining techniques.

The role of information in decision making cannot be overemphasized. Effective decision making demands accurate, timely and relevant information. MIS provides accurate and timely information necessary to facilitate the decision-making process and enable the organizations

planning, control, and operational functions to be carried out effectively. MIS also plays the crucial role of providing a wide range of streamlined options from which decision-makers are able to make their preferred choices and this ensures that whatever choices are made by decision makers, the outcome, more often than not, becomes positive. This, as a matter of fact, is the reason why many decision makers tend to prefer using MIS tools when making tough organization choices. MIS as renowned concept, having good decision choices guarantees viable decisions in our businesses.

8.2.2 Contribution of SLBFE in Sri Lanka Economy

As Foreign Employment is a vast upcoming factor in Sri Lanka economy the MIS provides an efficient service. Sri Lanka Bureau of Foreign Employment contributes to a vast percentage of remittance through migrant workers. MIS help all SLBFE stakeholders the valuable information for their future developments. That will be cause to increment of remittances as well as the total development of Country Sri Lanka.

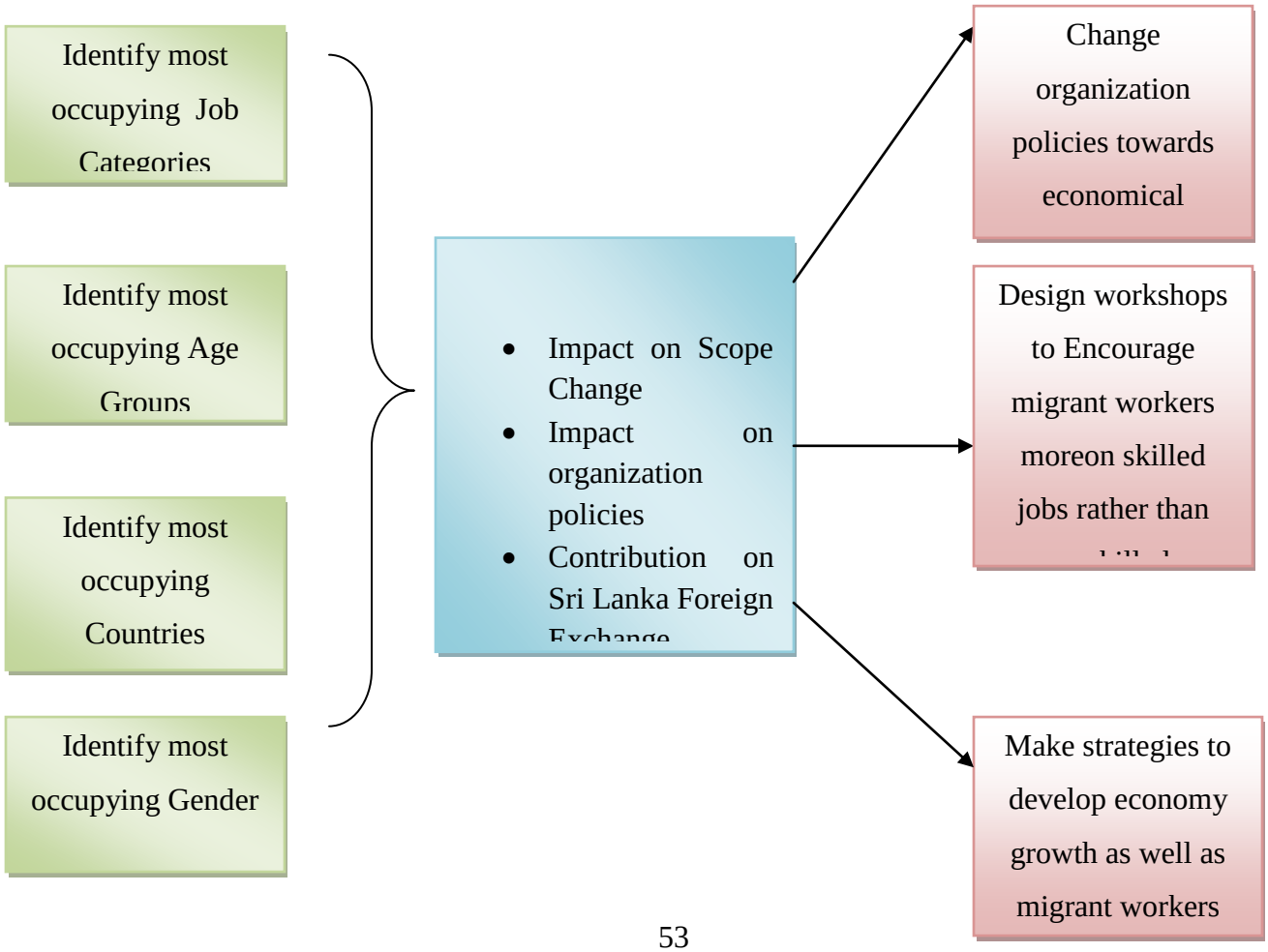


Figure 8: 1 Contribution of SLBFE in Sri Lanka Economy

8.5 Future Work

8.5.1Changes in Trainings provide by SLBFE

SLBFE provides several trainings to migrants workers in development of their employment. These trainings effects on migrant workers to do their work in efficient and effective ways.

With introduced MIS, management will be able to easily identify main factors, impact on foreign employment. This accurate results of MIS will make SLBFE management to enhance their plans towards development of foreign employment. The important thing is development of foreign employment increases the annual incoming foreign exchange which effect on growth of Sri Lanka's economy ultimately.

8.5.2 Development in Job Categories

Foreign earnings impact a country's economical growth significantly. As a government organization overseeing foreign employment, SLBFE always tries to develop Foreign Job Categories in skilled sector since generating more income than unskilled. As an example if Sri Lankan House Maid who goes to Kingdom of Saudi Arabia can be diverted as a Care Giver in Israel after providing a proper job training.

Training programs conducted by SLBFE requires continuous re-design to suit with ever changing foreign job market standards. The proposed MIS will provide information's aiding training department to adapt their programs meeting this requirements.

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