Productivity Measurement System for Small and Medium-sized Enterprises (SMEs) using Balanced Scorecard Approach

By

Yee Chiea Hung

Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
(Business Information Systems)

SEPTEMBER 2012

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CERTIFICATION OF APPROVAL

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Approved by,

_____

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September 2012

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.

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YEE CHIEA HUNG

ABSTRACT

Productivity measurement is important in inculcating performance evaluation in Small and Medium-sized Enterprises (SMEs). Balanced Scorecard is undoubtedly one of the most widely recognized methods used in measuring productivity. When measuring productivity in SMEs, there is a lack of research in the usage of Balanced Scorecard approach. The objective of this project is to develop a productivity measurement system (PMS) for SMEs using Balanced Scorecard approach. This work presents a proposed application of Balanced Scorecard approach to a SME's PMS. The proposed model can be used to measure the productivity level of a SME based on the four Balanced Scorecard perspectives. The scope of this work was the findings regarding PMS and various methods used in measuring productivity. The methodology used in developing PMS was the Prototyping Method. Through this project, it is found that SMEs and large organizations have the similar design in process steps for Balanced Scorecard approach. However, the key difference is the duration of the process involved. Thus, Balanced Scorecard can be successfully implemented in SMEs when it adapts to the characteristics in SMEs. As a result, PMS for SMEs using Balanced Scorecard approach was being developed in order to demonstrate the application of the proposed model.

ACKNOWLEDGEMENT

I am delighted to have finally completed my two-semester Final Year Project in Universiti Teknologi PETRONAS. Nothing can be done without the God's blessing and will. Thus, I owe the God so much for giving me the strength and ability to complete my Final Year Project successfully.

My main supervisor, Mr. Khairul Shafee Kalid, was the vital backbone throughout the two-semester Final Year Project. Mr. Khairul Shafee Khalid's close supervision, advice and guidance tremendously contributed to my project and works. I would like to express my gratitude to Mr. Khairul Shafee Kalid and appreciate all the helps and supports given.

Reference and consultation I made was not restricted to the supervisor, but also to some lecturers in the Computer and Information Sciences Department such as Mr. Saipunidzam Mahamad, Miss Goh Kim Nee, Miss Ainol Rahmah as well as Mr. Mohamad Radzi Bin Zainol from the Department of Management and Humanities. They, with different expertise have played vital role by providing valuable comments, advices and guidance to this project.

Not forgotten are my family and fellow friends. They have given much support throughout my two-semester Final Year Project. Thousands of thanks again are given to those who have assisted me in making my two-semester Final Year Project a memorable and valuable one.

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ABBREVIATIONS AND NOMENCLATURES

SMEs	Small and Medium-sized Enterprises
UNDP	United Nations Development Programme
NSDC	National SME Development Council
SMIDEC	Small and Medium Industries Development Corporation
SDLC	System Development Life Cycle

CHAPTER 1
INTRODUCTION

1.1 Background of Study

Productivity measurement is important in Small and Medium-sized Enterprises (SMEs) in terms of strategic planning and managerial development (Patrizia *et al.* 2005). Over the years, different approaches such as Return on Investment (ROI), Cash Flow, Customer Relationship Management (CRM) and Balanced Scorecard (BSC) have been suggested and applied by SMEs in measuring their productivity. However, productivity measurement that uses financial measurement tools bear restrictions as they only measure past activities, which depicted the lag indicators versus leading indicator. Thus, among all the approaches, Balanced Scorecard is undoubtedly one of the most widely recognized methods used in measuring productivity (Neely *et al.* 2000). According to Patrizia *et al.* (2005), implementing a productivity measurement system could support the decision-making processes in SMEs and help them to improve their management processes and strategic controls. As mentioned by Tenhunen *et al.* (2001), they also supported some of the views from Patrizia *et al.* (2005) and added that a productivity measurement system using Balanced Scorecard approach could be an important support tool for SMEs as these companies need to increase their strategic managerial approach to align decision-making processes to strategic objectives. Hence, a productivity measurement system using Balanced Scorecard approach could be benefited for SMEs as SMEs tend to have poor strategic planning whereby they are often not clear of what their critical success factors are (Greatbanks and Boaden 1998). In addition, to sustain long term growth and profitability, SMEs must improve their productivity in a competitive environment. As a result, by using Balanced Scorecard approach in measuring productivity, it enables SMEs to adopt a balanced set of measures whereby a balanced approach that classified at strategic, tactical, and operational levels, and be financial and non-financial measures could be represented.

1.2 Problem Statement

1.2.1 Problem Identification

Productivity measurement system is important in supporting the managerial development required in Small and Medium-sized Enterprises (SMEs). This is because SMEs are improving their technical and technological capabilities to meet the market needs, but low formalized managerial practices are adopted. While many other forms of measurement have been used by SMEs in measuring productivity, however, there is still a lack of research in the usage of Balanced Scorecard approach in measuring productivity in SMEs. Besides, measuring productivity using Balanced Scorecard approach is tedious as organization will need to consider many different perspectives in the Balanced Scorecard. Hence, some Information Technology (IT) is used in developing the Productivity Measurement System in order to facilitate the task of SMEs in measuring their productivity and manage their increasing complexity.

1.2.2 Significance and Relevancy of the Project

The significance of this project is that, the system provides the Small and Medium-sized Enterprises (SMEs) with an assistance in measuring the productivity through the Balanced Scorecard approach. By applying the Balanced Scorecard approach, four groups of factors which include the customer factors, financial factors, internal process factors, and the factors of learning and growth are being assessed. Following this, management of the organizations will collect the companies' productivity data based on the four different factors, which are then stored in the productivity measurement system. With those data being collected, it would enable the SMEs to evaluate the productivity of the organizations so that reviews could be done periodically to enable suitable strategic planning, goal setting and resource allocation processes to be taken accordingly.

1.3 Objective

The objective of this project is, to develop a productivity measurement system that applies the approach of Balanced Scorecard as the unsurpassed approach for productivity measurement in small and medium-sized enterprises (SMEs).

1.4 Scope of Study

The scope of study of this project is encircled around the productivity measurement and various methods used by SMEs in measuring their productivity. Besides, the scope also included a study regarding the productivity measurement system in SMEs that uses the Balanced Scorecard approach. Thus, besides understanding methods used in productivity measurement, the scope of study for this project also involved the understanding of the productivity measurement in SMEs through the Balanced Scorecard approach. In addition, this project only covered the percentage part which involved the score given by the related manager, and it did not cater some calculations such as the calculation to translate the financial statement, the calculation to translate the survey from the customer, the calculation to translate the training courses, and the calculation to translate the business process and so on.

1.5 Feasibility of the Project within the Scope and Time Frame

Feasibility analysis was conducted to determine the development tools which would be used throughout the development of the productivity measurement system. Since there are several types of programming language such as C++, Java, VB.NET or even the scripting language for instance, PHP; and also various database such as MySQL and Microsoft Office Access that are available for system development, feasibility analysis was conducted so as to determine the programming language and database that are to be used in developing this system.

In addition, since final year project consist of part one and part two, it is important to ensure that sufficient research work have been done in the first part of the final year project and that the system can be successfully implemented within the stated timeline for the second part of the final year project.

In short, the deliverables for final year project one and final year project two should be ready upon the completion of both semesters of final year project, respectively.

CHAPTER 2
LITERATURE REVIEW

2.1 Small and Medium-sized Enterprises (SMEs)

According to Ebrahim N.A, Shamsuddin Ahmed and Zahari Taha (2009), SMEs are a major part of the industrial economies. SMEs play important roles in generating employment and supporting trade and their survival depended on their capability to market response, meeting performance and producing goods that could meet international standards. As mentioned by United Nations Development Programme (UNDP), Malaysia (2007), there was no standard definition of Small and Medium-sized Enterprises (SMEs) in use in Malaysia before the formation of the National SME Development Council (NSDC) in June 2004. Hence, different agencies defined SMEs based on their own criteria. For instance, the Small and Medium Industries Development Corporation (SMIDEC) defined SMEs as enterprises with annual sales turnover not exceeding RM 25 million and with full-time employees not exceeding 150 (UNDP, 2007). Apart from that, Bank Negara Malaysia (Central Bank), defined SMEs as enterprises with shareholders funds of less than RM 10 million (NSDC, 2005).

Since there was an absence of a standard definition of SMEs, the collection and compilation of uniform SME data for assessment of development needs and business performance across the economic sectors was unable to be conducted accurately. Hence, in 2005 a new definition for SMEs was introduced by NSDC. According to NSDC (2005), SMEs are enterprises with annual sales turnover between RM 200,000 to RM 5 million and with full time employees between 5 to 50 people. In addition, SMEs cover various industries such as healthcare, food and beverages, ICT, tourism, business and professional and so on. Hence, with this clearly defined definition of SMEs, it assisted the identification of SMEs across all the sectors (NSDC, 2005).

2.2 Productivity Measurement System

Productivity measurement system is a balanced and dynamic system used to support the decision-making process by gathering, elaborating and analyzing information (Neely *et al.* 2002). According to Patrizia *et al.* (2005), productivity measurement system is particularly important in managerial development in order to manage the organization's increasing complexity. However, Neely *et al.* (2000) argued that, one of the key weaknesses of productivity measurement systems applied by most of the firms is that they have traditionally adopted cost accounting principles, which focuses only on past activities. Productivity measurement systems could be done through many different kinds of models. Those models include Performance Measurement Matrix (Keegan *et al.* 1989), Organizational Performance Measurement (Chennell et al. 2000) and Integrated Performance Measurement for Small Firms (Laitinen 1996, 2002). However, Neely *et al.* (1995, 2000) opined that, although productivity measurement system that applies Performance Measurement Matrix helps a company to define the strategic objectives and translate those objectives into productivity measures that combine cost and non-cost perspectives with external and internal perspectives, it is just a balanced model that is cited in the literature for its simplicity and flexibility. Therefore, the simplicity is sometimes criticized as it does not consider some perspectives and relationships that are made explicit in other models such as Balanced Scorecard (Neely *et al.* 1995, 2000). On the other hand, in terms of productivity measurement systems that applied Organizational Performance Measurement and Integrated Performance Measurement for Small Firms, these two forms of productivity measurement systems for SMEs are less emphasizing on depth and breadth dimensions, probably because of the need for an easier approach to measuring productivity. As mentioned by Patrizia *et al.* (2005), one of the most popular approaches used in productivity measurement systems is the Balanced Scorecard approach. In addition, Patrizia *et al.* (2005) added that, Balanced Scorecard model is very popular in both the literature and in practice as this model provides management with balanced measures based on four perspectives, which are Financial Perspective, Internal Process Perspective, Customer Perspective and Innovation and Learning Perspective. Thus, with the Balanced Scorecard approach, each of these perspectives is linked to different organizational objectives, measures and activities that support the improvement. As a result, this shows that productivity measurement system is a guide used in developing and implementing strategy, and

also to find the suitable method that can be used in order to improve the strategy continuously.

2.3 Balanced Scorecard Approach

Balanced Scorecard was originated by Robert Kaplan and David Norton as a performance measurement framework that added strategic non-financial performance measures to traditional financial metrics in order to give the organization a more 'balanced' view of organizational performance. As stated by Anderson, H. *et al.* (2001), Balanced Scorecard provides managers with more detailed and relevant information with regard to the organizational performance, particularly related to the key strategic goals. Apart from that, Sinisammal J. *et al.* (2012) mentioned that, Balanced Scorecard is a performance measurement system developed on the principles of goal oriented operation management. Bhagwat R. and Sharma M.K. (2007) on the other hand added that, Balanced Scorecard acts as means to evaluate corporate performance from four different perspectives: the financial, the internal business process, the customer, and the learning and growth.

According to the QuickMBA.com, the Balanced Scorecard translated the strategy of the organization into four perspectives, with a balanced between internal and external measures, between objective measures and subjective measures, and also between performance results and the drivers of future results. **Figure 2.1** below shows the Balanced Scorecard framework.

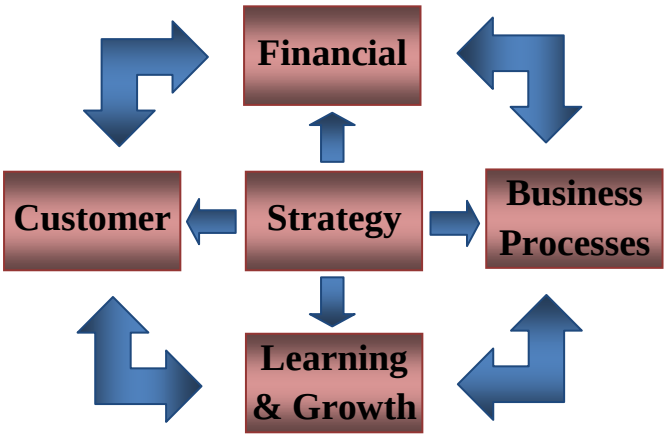

Figure 2.1: Balanced Scorecard framework

As depicted in **Figure 2.1**, Balanced Scorecard goes beyond standard financial measures to include three other additional perspectives such as the customer perspective, the internal process perspective, and the learning and growth perspective. Each perspective has own measures. For example, financial perspective deals with how the company looks to the shareholders. Under financial perspective, it includes the typical financial goals such as cash flows, return on assets, return on capital employed, profitability, operating income, growth and maximizing shareholder's value.

Besides, customer perspective deals with how the customers see the company. Customer perspective covers the measures such as customer satisfaction, customer retention, and market share in target segments. Therefore, under this perspective, customer's loyalty and satisfaction are also important as they always linked to the long term growth and survival of the company. Apart from the importance of customer's loyalty and satisfaction, the customer perspective is also a way to enable the company to differentiate itself from the competitors, thus allowing it to attract new customers at the same time retain the existing ones. As a result, under customer perspective, quality, reliability as well as customer service is vital for the company in maintaining good relationship with the customers.

Business process perspective on the other hand looks into the area of internal business processes that the company must excel. This internal business processes perspective includes measures such as improving resource utilization, creating value adding products, asset management, and so on. Thus, business process perspective is important for the company to focus and excel in the internal business processes so that the company is able to meet the customer's need.

In addition, learning and growth perspective is about the capability owned by the company in order to continue to grow, improve as well as create value. The learning and growth perspective plays important roles in enabling the company to constantly move, evolve, improve and innovate. Learning and growth perspective includes measures such as employee satisfaction, skill sets and others. Besides, learning and growth perspective has also become very crucial as advancement in technologies have made customer's preferences to change rapidly. As a result, products often easily become obsolete. In addition, the availability of information on

the internet has also further made the customers to be more aware of the choices that they have and giving them the idea regarding the best products that they should pursue in the market. Therefore, learning and growth perspective is useful in enabling the company to constantly learn and improve growth as well as survival so that they can survive in the intensely competitive market.

Hence, these showed that all these four perspectives are interrelated, whereby learning and growth lead to better business processes, which in turn lead to increased value to the customer, which finally leads to improved financial performance. As a result, Balanced Scorecard allows better measurement of a company's capabilities to create long-term value by indentifying the key drivers of this value. The drivers are then translated into four different categories of measures as explained above. Thus, balance Scorecard provides effective management for the implementation of the organization's strategy.

2.4 Implementation of Productivity Measurement System using Balanced Scorecard Approach in Small and Medium-sized Enterprises

According to Barnes et al. (2008), implementation of productivity measurement system could support the decision-making processes in SMEs and help them to improve their management processes and strategic control. Besides, Patrizia *et al.* (2005) supported the views from Barnes et al. (2008) and added that, productivity measurement system is also important in supporting SMEs to manage uncertainty, to innovate their products and services, and also to sustain evolution and change processes. In addition, Patrizia *et al.* (2005) also mentioned that Balanced Scorecard approach stresses the alignment between strategy and productivity measurement system. Nevertheless, as mentioned by Anderson, H. *et al.* (2001), the design for Balanced Scorecard in SMEs would include the similar process steps to those required in large organizations. However, they added that, they key difference is the duration of the process involved. As a result, the process in SMEs would be quicker as compared to larger organizations because SMEs have fewer employees and generally less complex organizational structures.

In order to understand the Balanced Scorecard approach applied in SMEs, Martins, A. (2005) has conducted a research to investigate the implementation of Balanced

Scorecard approach in SMEs. Through the research, he found that a Florida SME that produces fruit drinks has successfully implemented the Balanced Scorecard approach. Based on that study, Martins, A. (2005) mentioned that Balanced Scorecard approach can be successfully implemented in SMEs when it adapts to the characteristics in SMEs.

In short, most of the articles mentioned about the benefits of implementing Balanced Scorecard in productivity measurement system, the changes towards the organization as well as how they build the Balanced Scorecard. However, there is none of the article that mention about how they do it through the system. Apart from that, there are some articles that mentioned that one of the difficulties in Balanced Scorecard productivity measurement system is that there is no weighing given to the measures of Balanced Scorecard. Hence, based on those articles, they suggested that weighs should be assigned to each measure depending on their importance to the organization. However, it is said to be not an easy task to be carried out. In addition, there are articles that stated that the implementation of Balanced Scorecard productivity measurement system in big and small organizations are the same, however, their only difference is due to the scope of the organization. This is whereby for the bigger organizations, they are having wider scope. In contrary, small organizations would only have a smaller scope.

CHAPTER 3
METHODOLOGY

3.1 System Development Methodology

The methodology that has been used in developing this system was the Prototyping Methodology as shown in the **Figure 3.1** below.

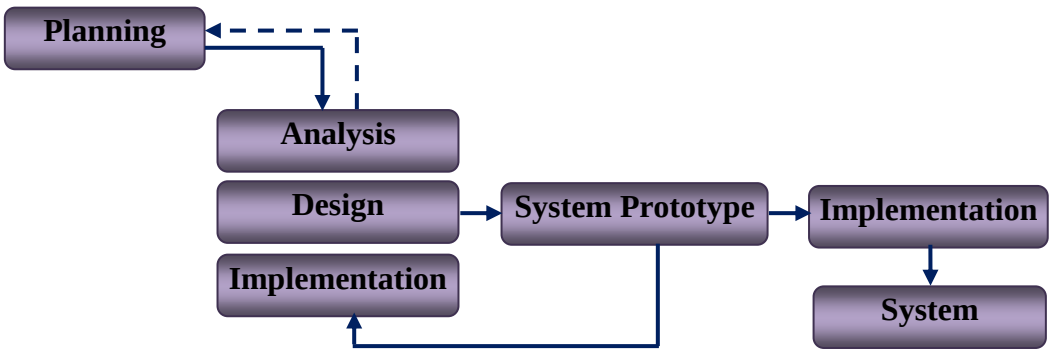

Figure 3.1: System development life cycle for Prototyping Method

The main reason for choosing the Prototyping Methodology is that, it enables the steps in the System Development Life Cycle (SDLC) to be performed at the same time and repeated during the system development process until the development is done. This methodology enables the developer to quickly provide a prototype module for users to interact with, even though it is not ready for widespread organizational use. This means that, the developer can first develop a prototype with minimal features to be try-out by the user so as to gain their feedback. Following this, through the feedback that has been gained, it assists the developer to get new ideas for requirements and also the strength and weakness of the prototype. Thus, through this methodology, it allows a working though limited system to demonstrate feasibility and usefulness of the application to the organization before a system is actually built. System specifications may also be modified to reflect changes in the understanding of requirements. In addition, developing a prototype module also ensure that each prototype module interface, mechanism and coding are working well in the real scenario, thus, it helps the developer to identify the system problem

earlier before developing the actual system. Therefore, this might then results in less time and effort needed by the developer to fix the system problem in the later phase of the system development. By increasing the transparency of the project, errors can be corrected throughout the steps in SDLC before the actual system is built. Through this, the overall process of SDLC can be done smoothly and more efficiently. As a result, Prototyping Methodology has been chosen since this methodology allows developers to produce more stable and reliable system.

3.2 Research Methodology Method

The research methodologies used in data collection were quantitative method and qualitative method. Therefore, in performing data collection, quantitative survey which was through online survey questionnaire has been used. Apart from that, qualitative survey has also been done through email. Thus, through these two survey methods, they enabled feedback regarding the productivity measurement used in SMEs to be obtained.

3.3 Project Activities

Project activities as shown in the following are performed in each phase of the Prototyping Methodology:-

Phase 1: Planning

In planning phase, some researches have been done in order to understand the overall project before the project is being initiated, managed and developed. Hence, in this phase, researches have been conducted and feasibility study has been done.

Phase 2: Analysis

In analysis phase, surveys have been carried out in order to understand the user requirements. The surveys can be from different SMEs. This process is very important as it helps in analyzing the requirements for the system. Apart from that, it is also to ensure that the system is suitable for the user in the future.

Phase 3: Design

The design of the system will be based on the result of the survey to ensure that the system meets the user requirements. Hence, in this phase, system architecture, system functionality, user interface design and components have been put into consideration in order to demonstrate the usefulness of the system to the organization once the actual system is built.

Phase 4: Implementation

In implementation phase, several testings of the system have been done. In addition, the installation of the system has also been carried out. Thus, the process of testing the system has been conducted repeatedly until the system meets the exact user requirements.

The project activities for each phase can be summarized as below:-

Phase 1: Planning

- Project initiation and management
- Conduct research
- Feasibility study

Phase 2: Analysis

- Study on relevant approaches
- Determine approaches to be used
- Data collection – survey

Phase 3: Design

- System architecture
- System functionality
- User interface design and components

Phase 4: Implementation

- Developing system prototype
- Testing and installation

3.4 Key Milestone

The developer will carry out the feasibility study as well as to identify the business value in the project initiation and management process. This is to enable the developer to gather the information regarding the user requirements. Following that, the developer will focus on the system architecture, system functionality, and user interface design and also components that need to have in the system that is going to be developed. Lastly, testing and installation of the system will be done in order to gain the feedback from the user.

3.5 Gantt Chart

3.5.1 Gantt Chart for Final Year Project I

ID	Task Name \ Week	1	2	3	4	5	6	7	8	9	10	11	12
1	Selection of Project Topic												
2	Preparation of Proposal												
3	Submission of Proposal												
4	Preliminary research work												
5	Research on Theory of Productivity Measurement												
6	Research on Approaches or Methods Applied in Productivity Measurement System in SMEs												
7	Consideration and Selection of System Development Methodology												
8	Update on Research Project Gantt Chart												
9	Preparation of Extended Proposal												
10	Submission of Extended Proposal												
11	Continue Research Project Work												
12	Research on Applying Balanced Scorecard Approach in Measuring Productivity in SMEs												
13	Continue Research Project Work												
14	Preparation of Oral Proposal Defence												
15	Oral Proposal Defence Presentation												
16	Preparation of Interim Report												
17	Submission of Interim Report Final Draft												

Figure 3.2: Timeline for Final Year Project I

3.5.2 Gantt Chart for Final Year Project II

ID	Task Name \ Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Continue Research Methodology for Data Collection (Survey)														
2	Analysis of Data and Present Findings														
3	Identify Requirements and Aspects to be Evaluated in Productivity Measurement System using Balanced Scorecard Approach														
4	Determine the Standard Used in the Productivity Measurement System														
5	Design User Interface for System Prototype														
6	Submission of Progress Report														
7	Continue User Interface Design for the System														
8	Development of System														
9	Preparation of Pre-EDX														
10	Pre-EDX														
11	Continue Development of System and System Testing														
12	Preparation of Dissertation														
13	Submission of Dissertation														
14	Preparation of Viva														
15	Viva														
16	Preparation of Technical Paper														
17	Preparation of Final Dissertation														
18	Submission of Final Dissertation and Technical Paper														

Figure 3.3: Timeline for Final Year Project II

3.6 Tools

The tools that are being used to develop this system include the hardware and software. For the hardware, it involves computer, CPU, and mouse. In contrast, the software would include the use of Microsoft Visual Basic 2008 Express Edition, Microsoft Office Picture Manager and also Microsoft Office Publisher 2007. Microsoft Visual Basic 2008 Express Edition enables the developer to write visual code for the system while Microsoft Office Picture Manager is used to resize and modify images so that creative picture design can be made. In addition, Microsoft Office Publisher 2007 is software that enables the developer to create images in Splash Screen and About Box.

Apart from that, Microsoft Office Access 2007 is a database used by the developer to connect to the system. Hence, the database will help to store the data whenever the user keyed in the data into the system.

CHAPTER 4
RESULT AND DISCUSSION

4.1 Data Gathering and Analysis

Before the system is designed, all the information about what is required in the system needs to be gathered. Besides, what is expected in the system also need to be known. Hence, several steps that need to be taken in this phase include requirement gathering and also requirement analysis.

4.1.1 Data Gathering Techniques

- Quantitative survey - Questionnaire

Before the system is developed, quantitative survey is done whereby an online survey is created and sent through email to the employees in several SMEs in order to get the feedback from them. Through the online survey, respondents' feedback regarding the kind of approach that SMEs normally use in measuring their productivity could be obtained.

The total feedback from the online survey was around 50 respondents. Since it is an online survey, the questionnaire cannot be too long or else the respondent would lose their interest in answering the questionnaire and just close the page. Therefore, several multiple choice questions and also polar questions which are also known as the yes-no questions are chosen in designing the online survey form. Quantitative survey questionnaire is shown in **Appendix A**.

- Qualitative survey - Email

In addition, qualitative survey has also been conducted through email in order to gather the feedback regarding the productivity measurement used in SMEs. This is whereby the survey questionnaire is sent to several SMEs through email. In the survey, it includes a mix of close-ended questions and also some simple open-ended

questions. This is to further understand how SMEs normally measure their productivity, and to understand whether they know the approach of Balanced Scorecard. Apart from that, the email survey is also done in order to understand more on whether SMEs know the importance of applying each of the components of Balanced Scorecard in measuring the productivity in SMEs. Thus, through this survey, it enabled the survey response to be collected. Qualitative survey questionnaire is shown in **Appendix B**.

4.1.2 Data Analysis

- Quantitative survey - Questionnaire

The results obtained from the online survey were depicted in the following graphs and are being analysed.

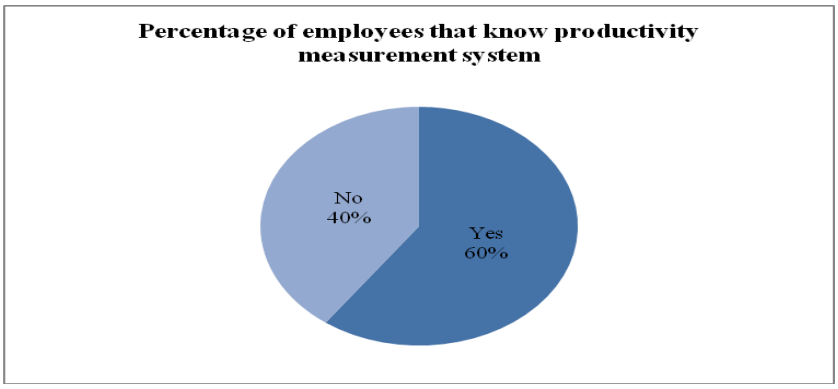

Figure 4.1: Pie chart showing the percentage of employees that know productivity measurement system

Based on the pie chart shown in **Figure 4.1**, there are 40% of the employees in SME organizations that do not know what productivity measurement system is as compared to 60% of the employees that understand what productivity measurement system is. This also shows that there are still more employees that understand what the productivity measurement system is about.

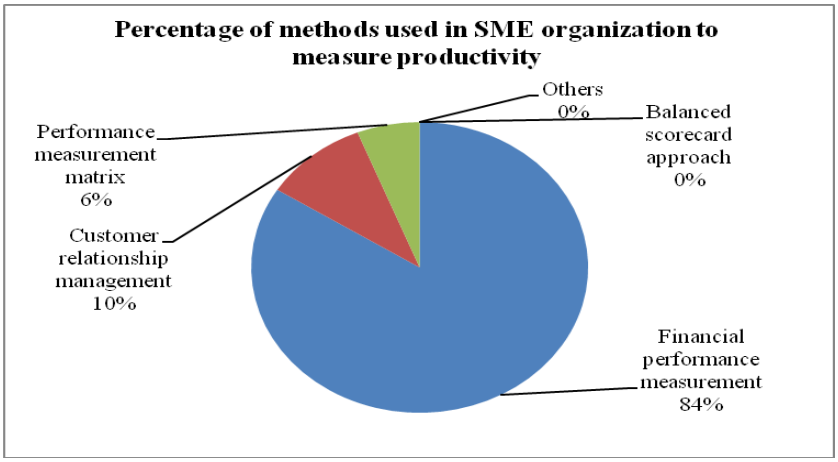

Figure 4.2: Pie chart showing the percentage of methods used in SME organization to measure productivity

Based on the pie chart shown in **Figure 4.2**, there are 84% of SME organizations that use financial performance measurement, 10% use customer relationship management, 6% with performance measurement matrix and 0% for balanced scorecard and others. This shows that most of the SME organizations still measure their productivity through financial performance. In addition, it also shows that there is still a lack in the usage of Balanced Scorecard approach in measuring productivity in SME organizations.

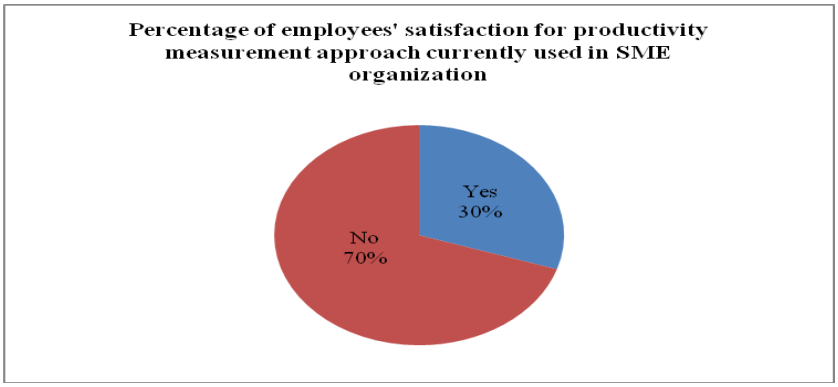

Figure 4.3: Pie chart showing the percentage of employees' satisfaction for productivity measurement approach currently used in SME organization

Based on the pie chart shown in **Figure 4.3**, there are 30% of employees in SME organizations that are satisfied with the productivity meausurement approach currently used in the SME organizations as compared to 70% of employees that are not satisfied with the productivity meausurement approach currently used. This also shows that there are more employees that are not satisfied with the productivity measurement method being used as compared to the amount that are satisfied.

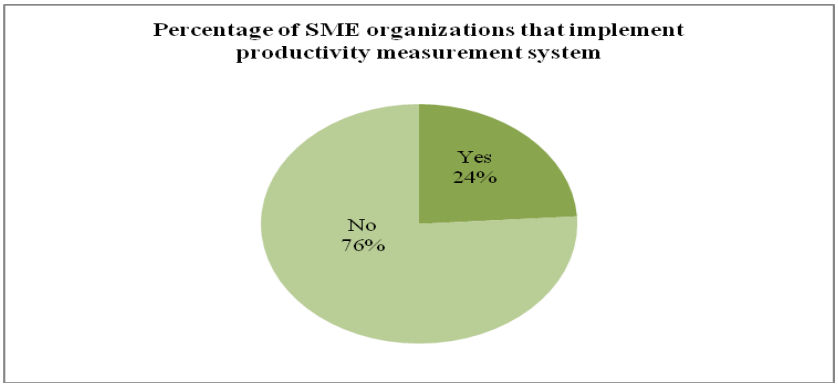

Figure 4.4: Pie chart showing the percentage of SME organizations that implement productivity measurement system

Based on the pie chart shown in **Figure 4.4**, there are only 24% of the SME organizations that implement the productivity meausurement system as compared to 76% that do not implement such productivity meausurement system in their organizations. This also shows that there are still many SME orgnizations that do not have productivity measurement system in place.

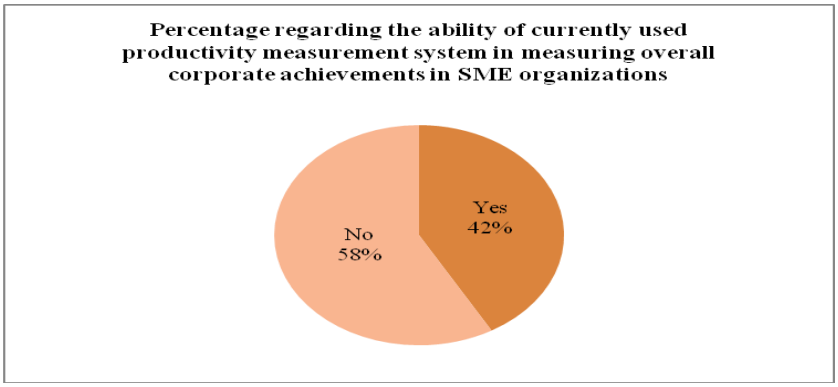

Figure 4.5: Pie chat showing the percentage regarding the ability of currently used productivity measurement system in measuring overall corporate achievements in SME organizations

Based on the pie chart shown in **Figure 4.5**, there are only 42% of the employees in SME organizations that think that productivity meausurement system being used is able to measure the overall corporate achievements. Besides, 58% of the employees think that productivity meausurement system being used is not able to measure the overall corporate achievements. Thus, this shows that most of them opined that the productivity measurement system being used is not able to measure the overall corporate achievements.

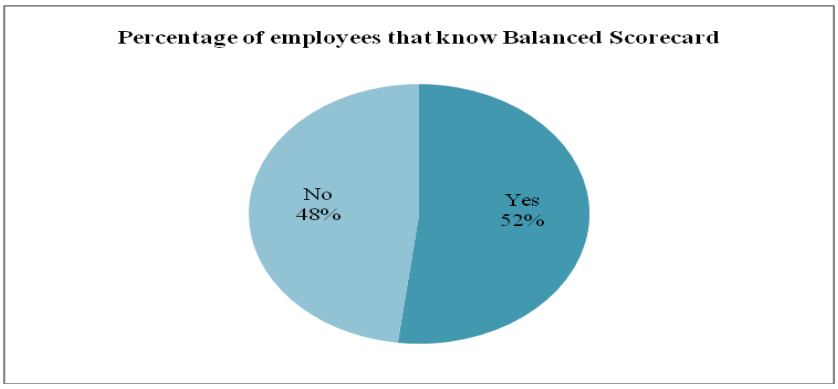

Figure 4.6: Pie chart showing the percentage of employees that know Balanced Scorecard

Based on the pie chart shown in **Figure 4.6**, there are 52% of employees in SME organizations that know what Balanced Scorecard is as compared to 48% of them

that do not know about Balanced Scorecard. This also shows that there are still more employees in SME organizations that realise and know about the Balanced Scorecard approach.

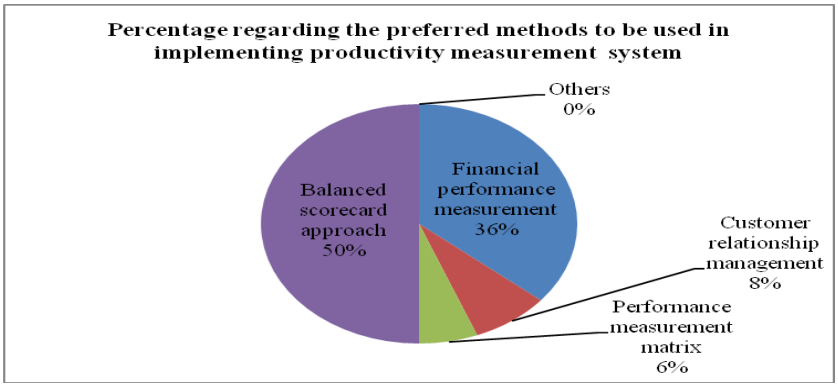

Figure 4.7: Pie chart showing the percentage regarding the preferred methods to be used in implementing productivity measurement system

Based on the pie chart shown in **Figure 4.7**, there are 50% of the employees in SME organizations that prefer Balanced Scorecard approach to be used in implementing the productivity meausurement system, followed by 36% who still prefer the financial performance measurement, 8% who prefer customer relationship management and 6% who prefer performance measurement matrix. This also shows that many of them understand the benefits of using Balanced Scorecard approach in measuring productivity although this productivity measurement system that applies the Balanced Scorecard approach is not being implemented in their SME organizations.

- Qualitative survey - Email

Based on the survey conducted through email, although there are employees that know about the Productivity Measurement System, most of the employees in SMEs still show that they who do not understand what Productivity Measurement System is about.

Besides that, through the survey, it showed that SMEs do measure their productivity and the most common type of measurement that most of the SMEs use in measuring

their productivity is the financial performance measurement. However, there are also some of the SMEs that use the customer relationship management method to measure their productivity.

In addition, through the survey response, although there are some SMEs that know about Balanced Scorecard, there are majority of the SMEs that still have not heard about the Balanced Scorecard.

However, many of the SMEs do agree that financial outcome is useful in measuring the productivity of SMEs. The reason that they gave was that, financial outcome is part of the performance measurement of an entity, and it is a direct measurement to ascertain the entity's performance, for instance the profit for the year or certain period. Moreover, they also added that the more money that the SMEs earn also means that the more people that are willing to do business with the SMEs. Apart from that, there is also SME that states that, high financial outcome indicates that the company is in high productivity and profit, and that is the reason that makes the SME opines that, the financial outcome is useful in measuring the productivity in SMEs.

In terms of learning and growth, SMEs do think that employee training, skill development and cultural attitudes are important in affecting the productivity measurement in SMEs. This is because they are the components that contribute to the productivity of the SMEs. Without those components, the employees would not be able to perform well as they never know or learn anything regarding employee training, skill development and cultural attitudes. Based on their feedback, they also opined that, employee training is important as it enables the employees to apply what they have learnt. Employee training will indirectly ease the jobs and business process, prevent loss of money or clients; at the same time lessen the problem that might occur. Besides that, skill development enables the employees to have more skills, thus helping them to carry out their jobs more smartly and enabling them to excel in most of the tasks given to them. On the other hand, cultural attitudes will produce more corporate employees that help the SMEs to do business professionally. As a result, these are the reasons to support their view that employee training, skill development and cultural attitudes are important in measuring the productivity in SMEs.

As for the internal operational goals and process performance, those SMEs also agree that these are the helpful components that could be used when measuring productivity in SMEs. This is because operational goals and process performance would enable the SMEs to achieve the goals that have been set. Besides that, once the goal has been set by the company to their employees, the employees would try their best or work hard in order to achieve the goal.

Based on the survey response, the SMEs also agree that customer satisfaction is another important criterion that should be taken into consideration when measuring the productivity in SMEs. One of the reasons is that customer satisfaction is important in helping the SMEs to retain and attract more existing and new customer. Therefore, by fulfilling customer satisfaction, this could help to improve the productivity of the SMEs as well.

In term of the concerns regarding the Productivity Measurement System, some of them stress on the importance of data protection of the system and also state that the system should be a user-friendly system.

4.1.3 System Flow

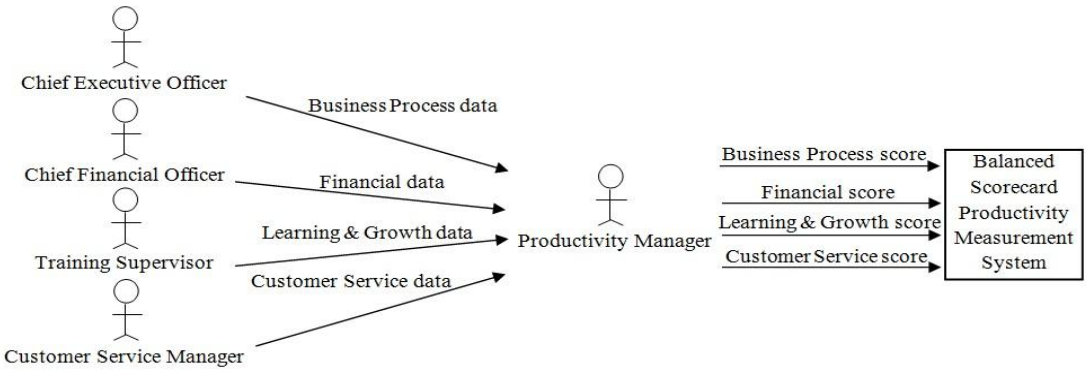

Figure 4.8: System Flow

4.2 Finding of Surveys

Based on both of the survey analysis, there are some SME organizations that are able to understand what a Productivity Measurement System is. However, there is also some other that does not know what Productivity Measurement System is about. Besides, most of the SME organizations are still using the traditional financial performance measurement method to measure their productivity. However, through

the survey, it also showed that many employees are not very satisfied with the current productivity measurement approach being used probably because they believed that there is still other better productivity measurement method that could be applied in measuring productivity. Many SME orgnizations still do not use productivity measurement system. However, for the SME organizations that have the productivity measurement system in place, most of them think that the productivity measurement system that currently in use are unable to measure the overall corporate achievements. Many of the SMEs do not know about the Balanced Scorecard method used in measuring productivity. However, when asked about the components of the Balanced Scorecard, they realise and do agree that besides financial aspect, other aspects such as learning and growth, internal business processes and also customer satisfaction are also important elements that should be taken into consideration when measuring the productivity in SMEs. Therefore, different activities such as employees training, skill development, setting organizational goals and so on should always be done effectively and efficiently so that the productivity of SMEs can be improved. Hence, if they are given a chance to choose, majority of them would prefer the Balanced Scorecard method to be applied in the Productivity Measurement System in order to measure the productivity in SMEs. In addition, they even emphasis that the system should be able to protect data and is a user-friendly system.

4.3 Productivity Measurement System using Balanced Scorecard Approach

4.3.1 Requirements

Based on the survey response, the respondents state that financial outcome is the most commonly used type of measurement in measuring productivity following by the customer relationship management. However, when being asked about other perspectives such as learning and growth, internal business processes and customer satisfaction, they do realize the importance of those components when measuring the productivity in SMEs. This showed that beside the commonly used financial perspective components, productivity measurement system in SMEs should also include other important components such as learning and growth, internal business processes and customer satisfaction when measuring productivity in SMEs. In terms of the security requirement of the system, there was feedback mentioning that the

system should be data protected so that the data is secured and that certain data could only be assessed by the authorized user. In addition, they also stressed on the user-friendliness of the system to ease the process of measuring the productivity in SMEs and to enable the productivity measurement in SMEs to be done more effectively and efficiently.

4.3.2 Aspects to be evaluated in Productivity Measurement System

There are four aspects when evaluating the productivity of SMEs. These four aspects include:-

(1) Financial perspective
(2) Learning and Growth perspective
(3) Internal business processes perspective
(4) Customer perspective

From the four different perspectives, each of them carries 25 percent out of the total 100 percent respectively. Besides, there are also different criteria being assessed under each of the different aspects. After all the criteria are being assessed for each of the perspective, a productivity measurement scale is provided accordingly under each of the perspective. This scale is to assist in identifying the productivity level that SME has based on the different perspective. Hence, the productivity level would be indicated beside the scale in the productivity measurement system.

Aspect 1: Financial Perspective

Under this aspect, it includes the two criteria such as Profit and Cash Flow. Profit is the criterion that describes how much wealth that the SME has created (profit) or consumed (loss) over a certain period of time. On the other hand, cash flow is the criterion that describes the difference between the amounts of cash that the SME ends up with at the end of a certain period of time as compared to the amount of cash that the SME started with. Hence, more positive cash flow would also indicate the better productivity of the SME. For example, if the SME manages to achieve 65% out of the goal for the profit level that has been set, then productivity level would fall under the Scale of “4” in the “Satisfied” level. As a result, different scale would

directly indicate different level of SME achievement based on the goals or targets that have previously been set.

Scaling for the Aspect of Financial Perspective – Aspect 1

LEVEL	SCALE	EXPLANATION
Very Satisfied	5	The financial aspect highly exceeds the maximum level which has been stated. (81% - 100%)
Satisfied	4	The financial aspect exceeds the maximum level which has been stated. (61% - 80%)
Neutral	3	The financial aspect meets the maximum level which has been stated. (41% - 60%)
Dissatisfied	2	The financial aspect partially meets the minimum level which has been stated. (21% - 40%)
Very Dissatisfied	1	The financial aspect rarely meets the minimum level which has been stated. (Below 0% - 20%)

Aspect 2: Learning and Growth perspective

In learning and growth perspective, it reflects the contribution and activeness of the SMEs in participating in events that have been organized. In this aspect, activities joined by the SMEs are all been listed. Hence, whenever the employees go for a certain event, for example, a technical course such as ways to maintain a network, then, a test will be given to the employees after the course to test their understanding regarding that particular matter. As a result, the overall score achieved by the employees is analyzed. Hence, different scales are given based on the overall performance of the employees in each of the test given after attending the related events. For instance, consider that there are total of 5 tests given to the employees, with each test contributes 100%. Therefore, if the overall score that the employees manage to get is 425 marks out of the total score of 500%, then the SME is said to achieve 85% level of productivity in this Learning and Growth aspect. As a result, the scale that the SME get would be Scale “5” with the level of “Very Satisfied”.

Scaling for the Aspect of Learning and Growth – Aspect 2

LEVEL	SCALE	EXPLANATION
Very Satisfied	5	The performance of employees is excellent. (81% - 100%)
Satisfied	4	The performance of employees is good. (61% - 80%)
Neutral	3	The performance of employees is moderate. (41% - 60%)
Dissatisfied	2	The performance of employees is weak. (21% - 40%)
Very Dissatisfied	1	The performance of employees is very weak. (0% - 20%)

Aspect 3: Internal business processes perspective

Under the internal business processes perspective, it determines the business processes an organization must excel. Besides, in this perspective, it includes satisfying not only shareholders but customers as well. Hence, in this internal business processes perspective, several SME goals such as 20% of sales for product X and 50% increase in the number of customers handled on a service call need to be set in order to satisfy both the shareholders and customers. Thus, based on the productivity of SME in achieving the targets being set, the level of SME productivity is also shown based on the productivity level as indicated in the following.

Scaling for the Aspect of Internal Business Perspective – Aspect 3

LEVEL	SCALE	EXPLANATION
Very Satisfied	5	The goal(s) achieved highly exceeds the maximum level which has been stated. (81% - 100%)
Satisfied	4	The goal(s) achieved exceeds the maximum level which has been stated. (61% - 80%)
Neutral	3	The goal(s) achieved meets the minimum level which has been stated. (41% - 60%)
Dissatisfied	2	The goal(s) achieved partially meets the minimum level which has been stated. (21% - 40%)
Very	1	The goal(s) achieved rarely meets the minimum level

Dissatisfied		which has been stated. (0% - 20%)

Aspect 4: Customer perspective

In customer perspective, it covers the customer objectives, for instance, the customer satisfaction. Thus, in measuring customer satisfaction, survey is given to the customers at the time product or service is delivered. Thus, this would enable the satisfaction feedback to be obtained. Therefore, satisfaction feedback from different customers would also have different kind of percentage based on the response that they give. For instance, if overall in a year, the total customer is 100 people and the overall score for the survey response gained from all the 100 customers is 70%, then the customer satisfaction is said to be in the Scale of "4" with the "Satisfied" level.

Scaling for the Customer Perspective – Aspect 4

LEVEL	SCALE	EXPLANATION
Very Satisfied	5	The customers are very satisfied with the product or service. (81% - 100%)
Satisfied	4	The customers are satisfied with the product or service. (61% - 80%)
Neutral	3	The customers are moderately satisfied with the product or service. (41% - 60%)
Dissatisfied	2	The customers are dissatisfied with the product or service. (21% - 40%)
Very Dissatisfied	1	The customers are very dissatisfied with the product or service. (0% - 20%)

4.3.3 Standard Used in Determining the Productivity of SMEs

After doing the rating for each of the perspective, the overall average ratings that the SME would get would be calculated. Thus, the overall average ratings obtained would also represent the productivity of the SME in that particular year. As a result, if the overall average rating is above 80%, then the SME is considered to be having "High" productivity level. If the overall average rating is between above 50% and below 80%, then the SME is considered to be having "Average" productivity level.

In addition, if the overall average rating is below 50%, then the SME is said to be having “Low” productivity level.

Thus, if the SME is having “High” productivity level, the organization should be glad with the result and try to maintain it in times to come. If SME is having “Average” productivity level, the SME should try think of ways to improve their productivity level. However, if the SME productivity level is “Low”, then, it is advised that the organization should take immediate action to think of better ways to improve the productivity level. Thus, with every different productivity levels, they clearly reflect different actions that the SME should take.

Scaling for the Overall Average Percentage

Overall Average Percentage	Productivity Level
Above 80%	High
More than 50% but less than 80%	Average
Below 50%	Low

4.4 Experimentation / Modeling / Prototype / Project Deliverables

The interaction and interactivity elements between the users such as the employees and Productivity Manager, and the system will be supported by Human Computer Interaction (HCI). Human Computer Interaction (HCI) layer design principles are applied in order to make the system as user-friendly as possible. Besides, the system will integrate by using suitable multimedia elements such as text and photos that will support interactive working environment for the use at the organization. As a result, the user interface of the system will be made to appear to be pleasing to the eye and simple to be used. This is to ease the employees to fill in their details into the system as well as to enable the Human Resource Manager to carry out the task in measuring the corporate productivity level.

In the System Interface Home Page, there is a “Create User Account” button to enable the new users to register themselves before they could log in to the system. Besides that, there is also a “Log In” button to enable the user that has been registered to key in the user id and password before they can log in to the system to

reach the Main Menu page. In the Main Menu page, there are two categories such as “Employee” and “Productivity Manager” to be chosen by the user so that they could reach to the related menu page. When reached the desired menu page, a set of system functionality (based on the related category which has been selected) will be presented to the user. For example, for the employee, once he or she has chosen the “Employee” category in the Main Menu page, he or she would be directed to the employee menu page. Thus, the employee menu page would enable him or her to add the personal details into the system. Besides, the system also provides a function to enable the employees to update their details whenever necessary. Hence, through this system, it enables the users from different categories to search, update, add, or view the related details based on the desired functionality which has been selected in the related menu page. The VB form presented to the user for him or her to search, update, add, or view the related details is part of the system output. Lastly, the user can click on the “Log Out” button to end the system. The system architecture of the system is shown in **Figure 4.9** in the following subsection while system prototype, some screen shots and also other project deliverables of the system will be shown in the remaining part of this chapter.

4.4.1 System Architecture

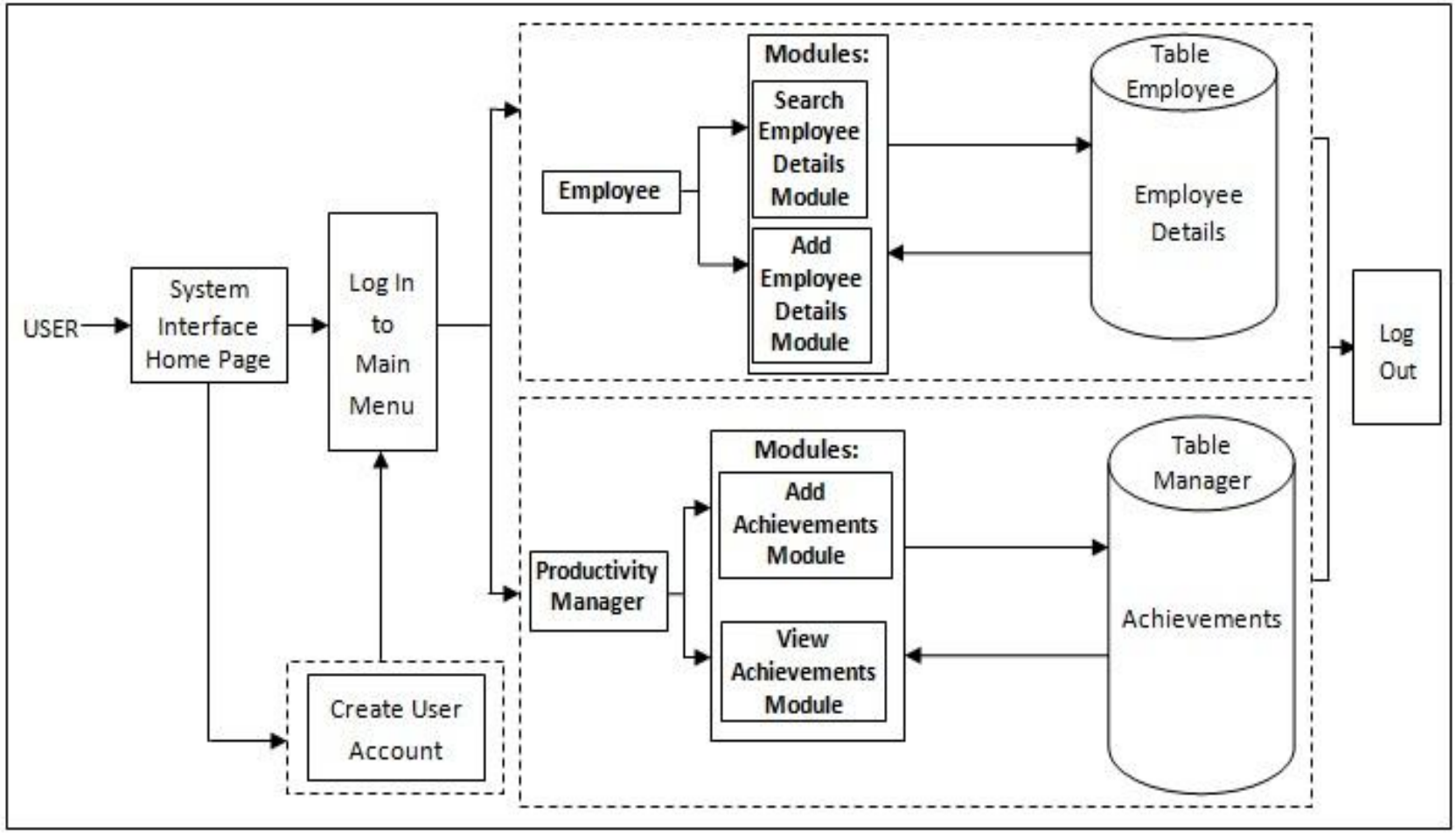

Figure 4.9: System Architecture of the system

Currently, Balanced Scorecard is done through several methods. One of the examples is that Balanced Scorecard is done through the questionnaires that involve polar questions (yes-no, true-false questions). Therefore, questionnaires are given to customers in order to obtain feedback from the customers. Following that, Customer Service Manager will then provide the Customer Service Data to the Productivity Manager to enable the Productivity Manager to have a customer service score to be inserted to the Productivity Measurement System. Besides, information related to financial data would be given by Chief Finance Officer (CFO) to the Productivity Manager so that the Productivity Manager would also have a financial score to be inserted to the system. In addition, information regarding organization and staff participation is taken from Training Supervisor so that the business process in organization and status of staff in joining different events and training that has been organized would be known. Thus, in developing this project, only rating method is put as the Balanced Scorecard method. This is whereby, once the score or percentage achieved for a particular aspect is being inserted by the Productivity Manager into the system, the system would automatically generate the rating that has been achieved for the particular perspective. Thus, after all the percentages achieved have been keyed in to the system, the overall average percentage would also be generated as the outcome of the system to depict the productivity level of the SME for that particular year.

4.4.2 System Prototype

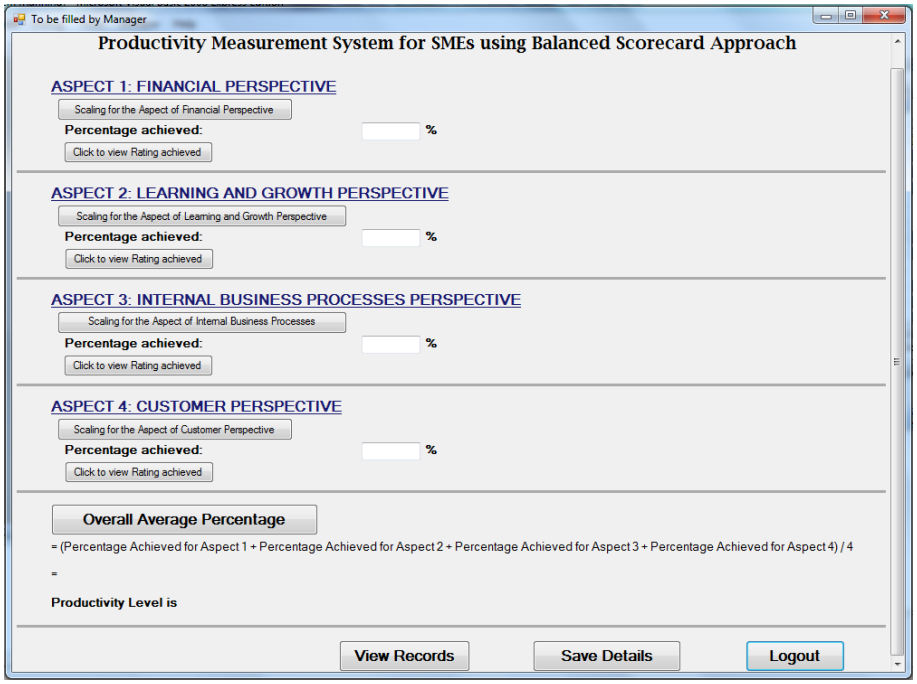

Figure 4.10: Productivity Manager menu page

Figure 4.10 shows the Productivity Manager menu page in the Productivity Measurement System.

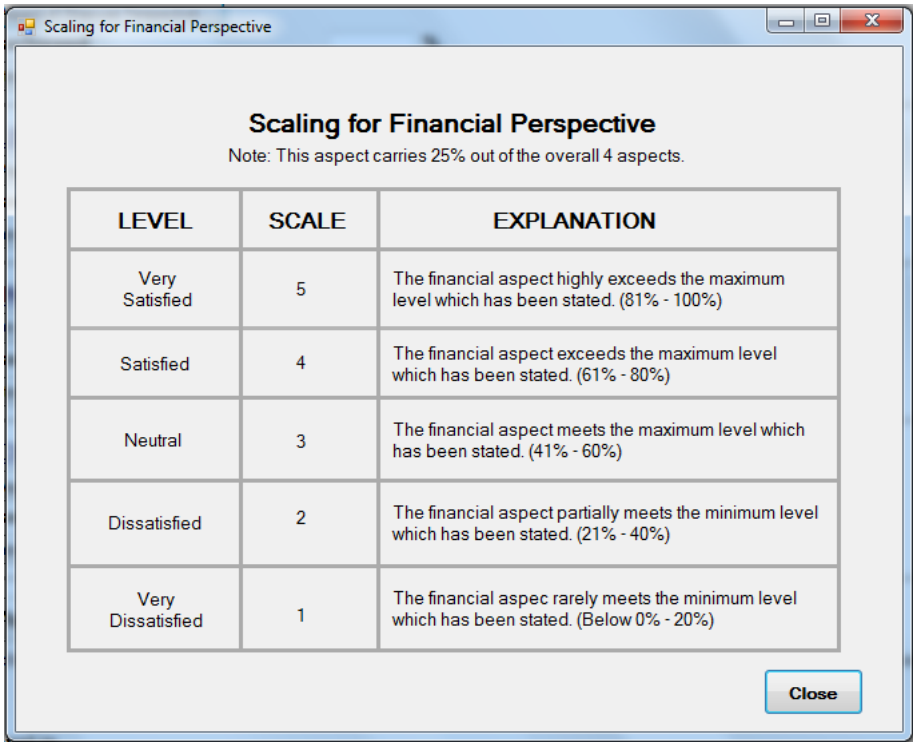

Figure 4.11: Scaling for Financial Perspective

Figure 4.11 shows the Scaling for Financial Perspective in the Productivity Measurement System.

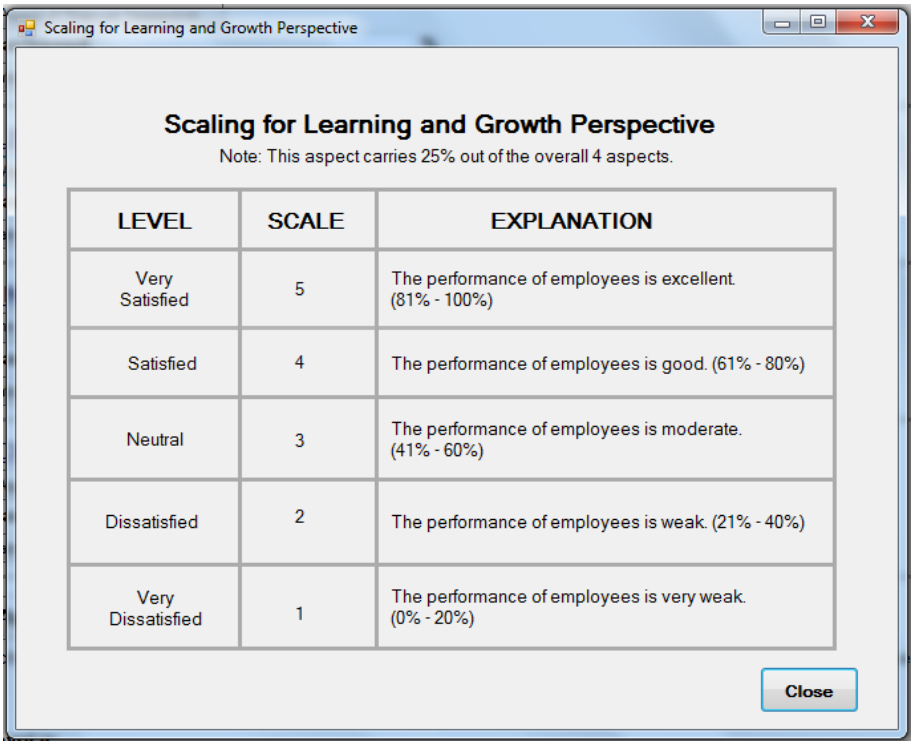

Figure 4.12: Scaling for Learning and Growth Perspective

Figure 4.12 shows the Scaling for Learning and Growth Perspective in the Productivity Measurement System.

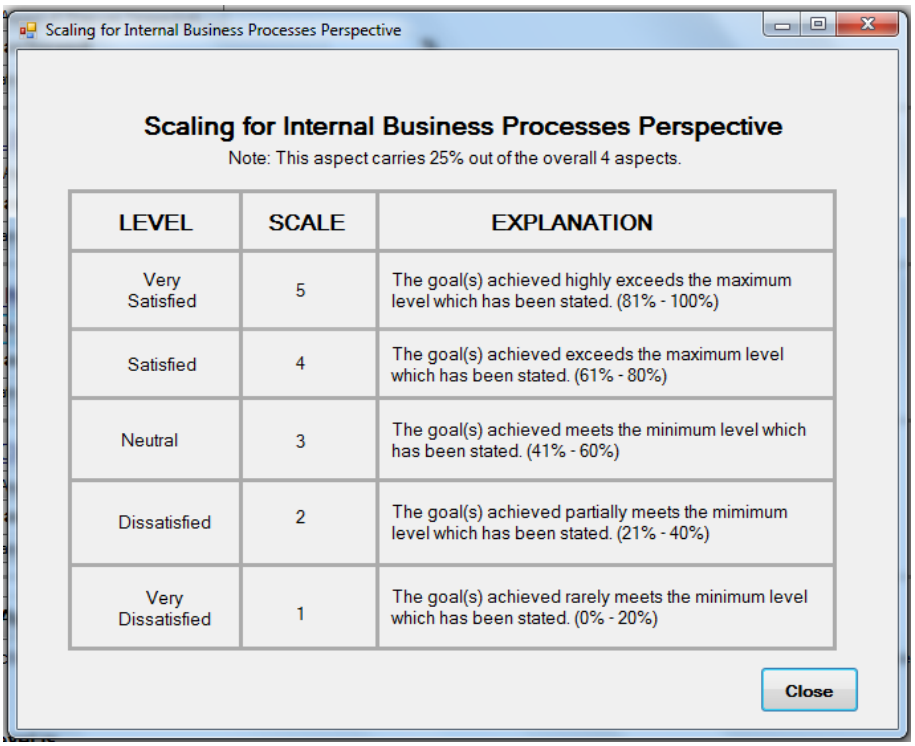

Figure 4.13: Scaling for Internal Business Processes Perspective

Figure 4.13 shows the Scaling for Internal Business Processes Perspective in the Productivity Measurement System.

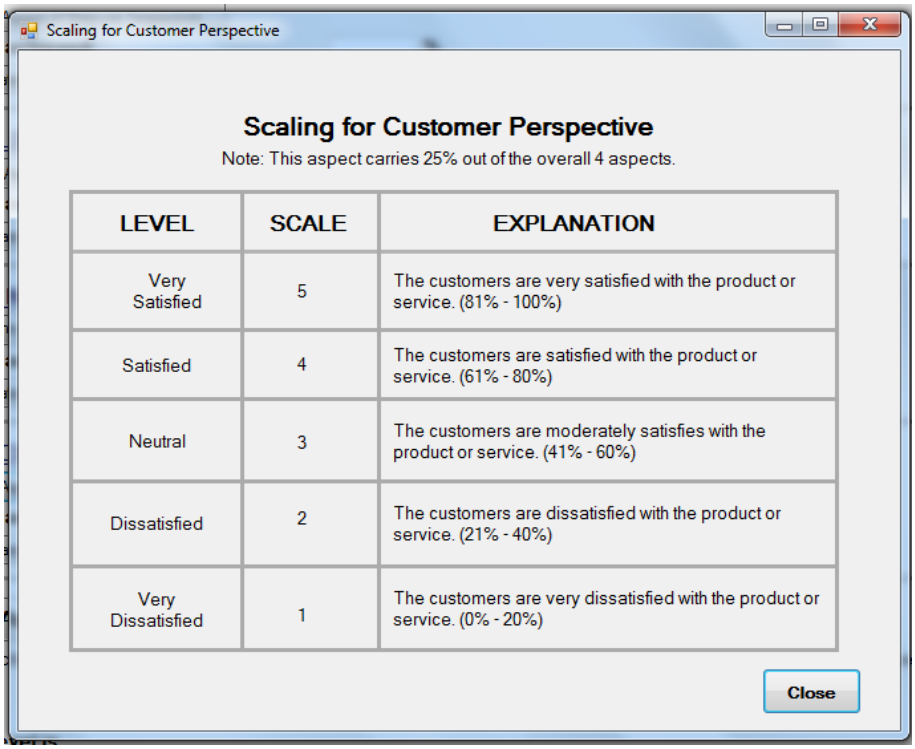

Figure 4.14: Scaling for Customer Perspective

Figure 4.14 shows the Scaling for Customer Perspective in the Productivity Measurement System.

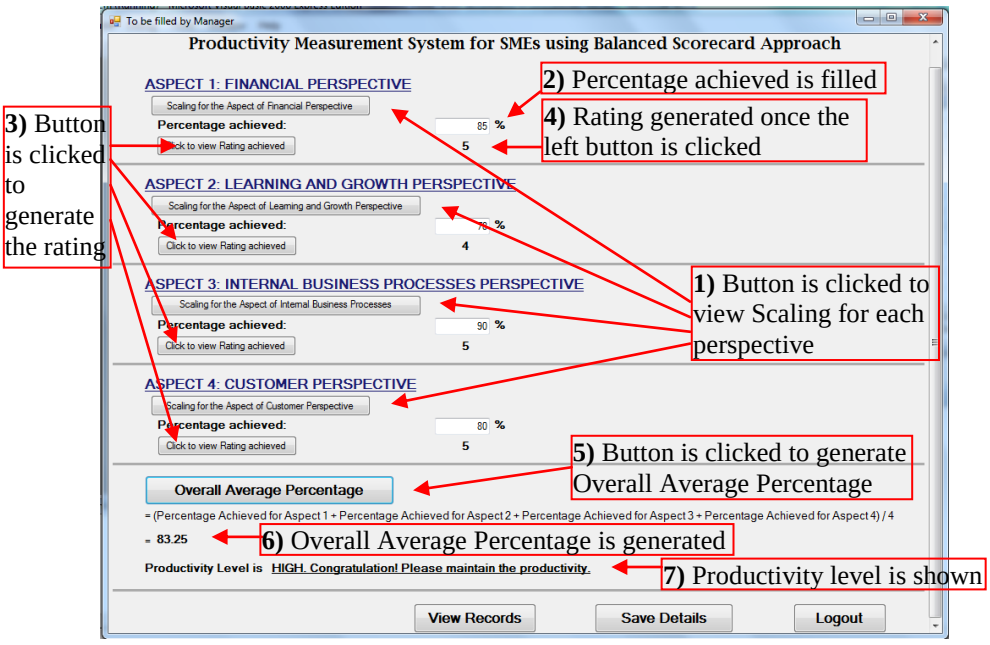

Figure 4.15: Process of filling in the HR Manager menu page

Figure 4.15 shows the process of filling in the form of the HR Manager menu page in the Productivity Measurement System.

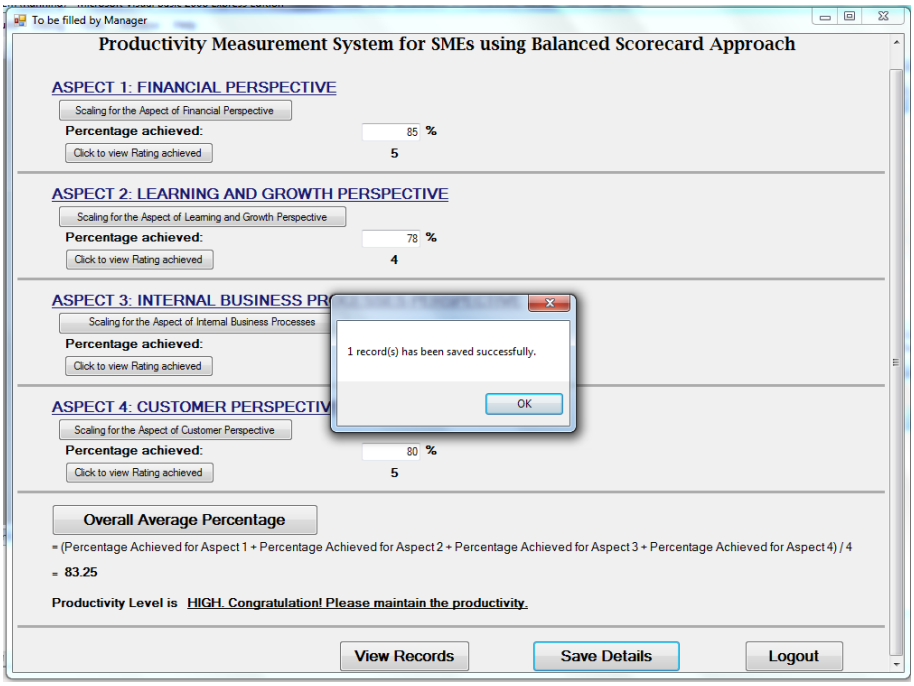

Figure 4.16: Records saved in HR Manager menu page

Figure 4.16 shows a message box indicating the records has been saved successfully into the system once the "Save Details" button in the HR Manager menu page is clicked.

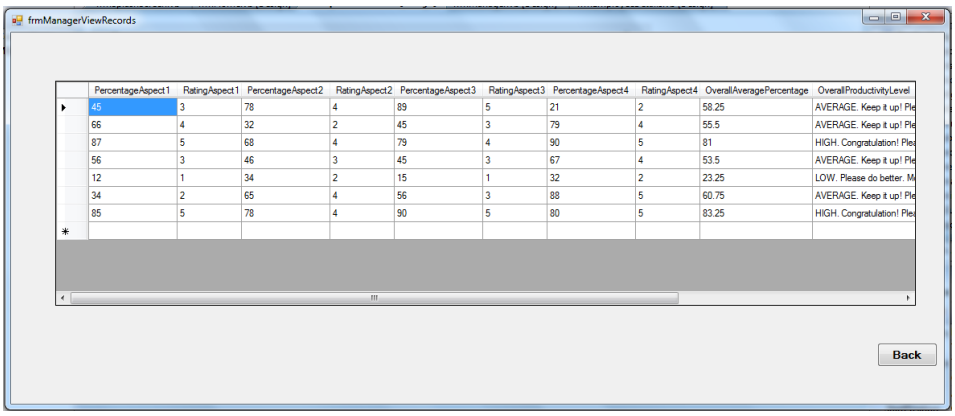

Figure 4.17: Records shown when "View Records" button is clicked

Figure 4.17 shows the record being shown from the database once the "View Records" button is clicked.

Some screen shots regarding the Productivity Measurement System have also been presented in **Appendix C**.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

Throughout the development of this project, the concept and approaches used in productivity measurement system have been studied. Besides that, effort has also been put in carrying out quantitative and qualitative survey so that the kind of approach that SMEs normally use in measuring their productivity could be obtained. Meanwhile, researches on productivity measurement system which have been used or implemented in other organizations or SMEs have also been done. In addition, study on productivity measurement system that utilizes Balanced Scorecard approach has also been conducted in order to identify the possibility to apply Balanced Scorecard approach in the productivity measurement system. As a conclusion, all the efforts that have been put during the development of this project will be able to achieve all the objectives as mentioned previously in Chapter 1. After conducted a series of research and studies as well as carried out surveys in the related area, a productivity measurement system that utilizes the Balanced Scorecard approach is developed. Thus, all the activities which have so far been done are relevant to the objective of this project.

Meanwhile, a recommendation has also been suggested as future work for expansion and continuation for this project. The recommendation involves some issues related to the technical area that need to be taken care of, for example, in terms of quality of the system. Therefore, to ensure the system has the essential quality, the system must achieve a certain standard before it is being fully implemented. Thus, it is necessary to make sure that the product always meets the standard set.

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APPENDICES

APPENDIX A: Quantitative Survey Questionnaire

APPENDIX B: Qualitative Survey Questionnaire

APPENDIX C: Some screen shots regarding Productivity Measurement System in Small and Medium-Sized Enterprises (SMEs) using Balanced Scorecard Approach

APPENDIX D: Technical Paper

APPENDIX A: Quantitative Survey Questionnaire

Survey for Productivity Measurement System in Small and Medium-sized Enterprises (SMEs) using Balanced Scorecard Approach

Your help in completing this survey is greatly appreciated.

1. Do you know what is Productivity Measurement System?
   - o Yes
   - o No

2. As an employee in SME organization, what method does your company use in measuring productivity?
   - o Financial performance measurement
   - o Customer relationship management
   - o Balanced scorecard approach
   - o Performance measurement matrix
   - o Others (Please specify): _____

3. Are you satisfied with the productivity measurement approach currently used in your SME organization?
   - o Yes
   - o No

4. Is your SME organization implementing Productivity Measurement System?
   - o Yes
   - o No (Please proceed to Question 6)

5. In your opinion, does Productivity Measurement System currently applied in your SME organization able to measure the overall corporate achievements?
   - o Yes
   - o No

6. Have you heard of Balanced Scorecard?
   - o Yes
   - o No

7. If you have a chance to choose, what kind of approach would you like your SME organization to use in measuring productivity in the Productivity Measurement System?
   - o Financial performance measurement
   - o Customer relationship management
   - o Balanced scorecard approach
   - o Performance measurement matrix
   - o Other (Please specify): _____

APPENDIX B: Qualitative Survey Questionnaire

1. Do you know what is Productivity Measurement System?

2. As an employee in SME organization, what type of method does your company use in measuring productivity? (e.g.: financial performance measurement, customer relationship management, balanced scorecard approach, performance measurement matrix), others)

3. Have you heard of Balanced Scorecard?

4. In your opinion, is financial outcome useful in measuring the productivity of SMEs?
   If yes, please elaborate.
   If no, please state the reason.

5. Do you think the components such as employee training, skill development and cultural attitudes are important in affecting the productivity measurement in SMEs?
   If yes, please elaborate.
   If no, please state the reason.

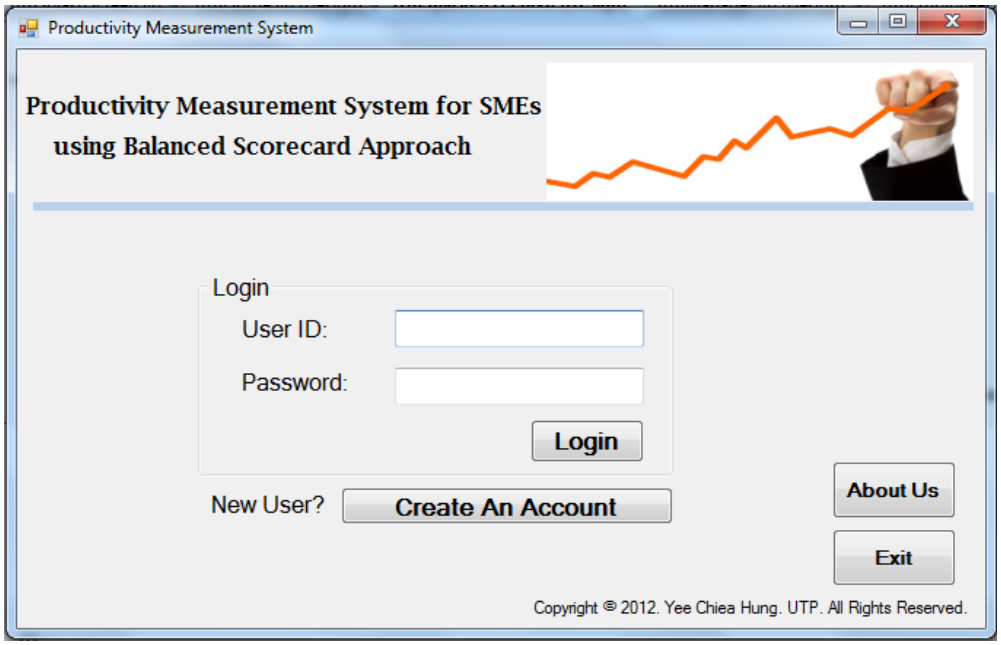
6. In your opinion, is internal operational goals and process performance helpful in measuring the productivity in SMEs?
   If yes, please elaborate.
   If no, please state the reason.

7. Do you think customer satisfaction is an important criterion that should be taken into consideration when measuring productivity in SMEs?
   If yes, please elaborate.
   If no, please state the reason.

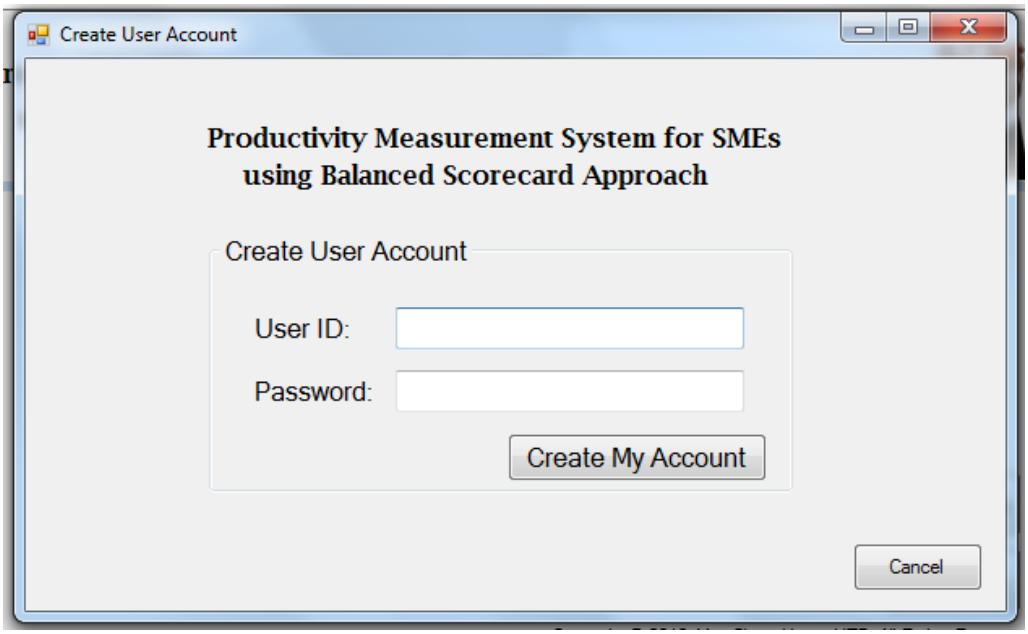
8. If you are to use a Productivity Measurement System, what would be your concerns about this system?

APPENDIX C: Some screen shots regarding Productivity Measurement System in Small and Medium-Sized Enterprises (SMEs) using Balanced Scorecard Approach

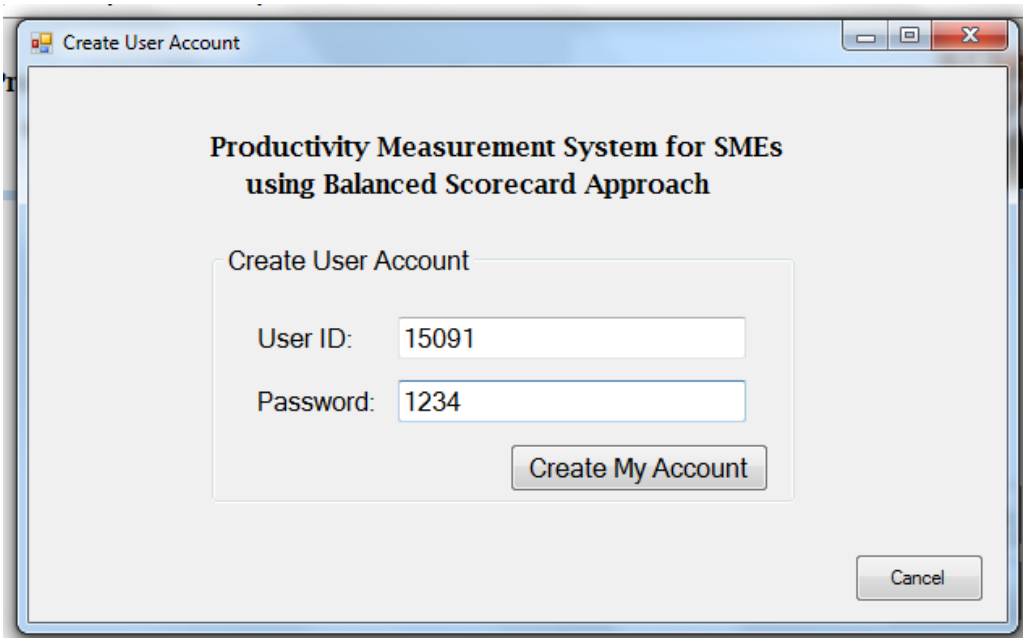
The figure above shows the loading of the splash screen in the Productivity Measurement System.



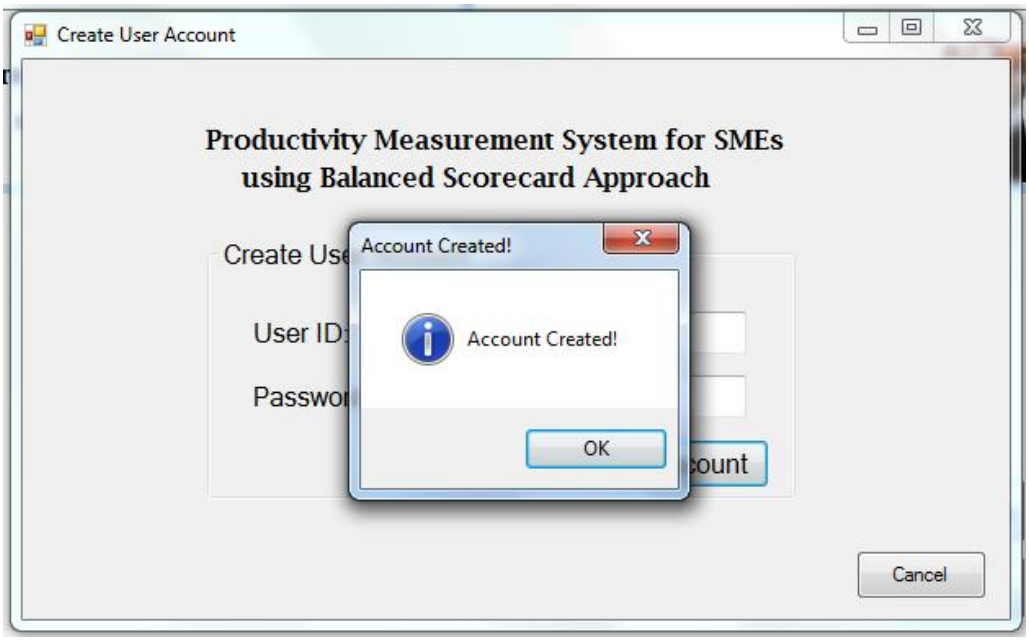
The figure above shows the System Interface Home Page or Login Page for the Productivity Measurement System.



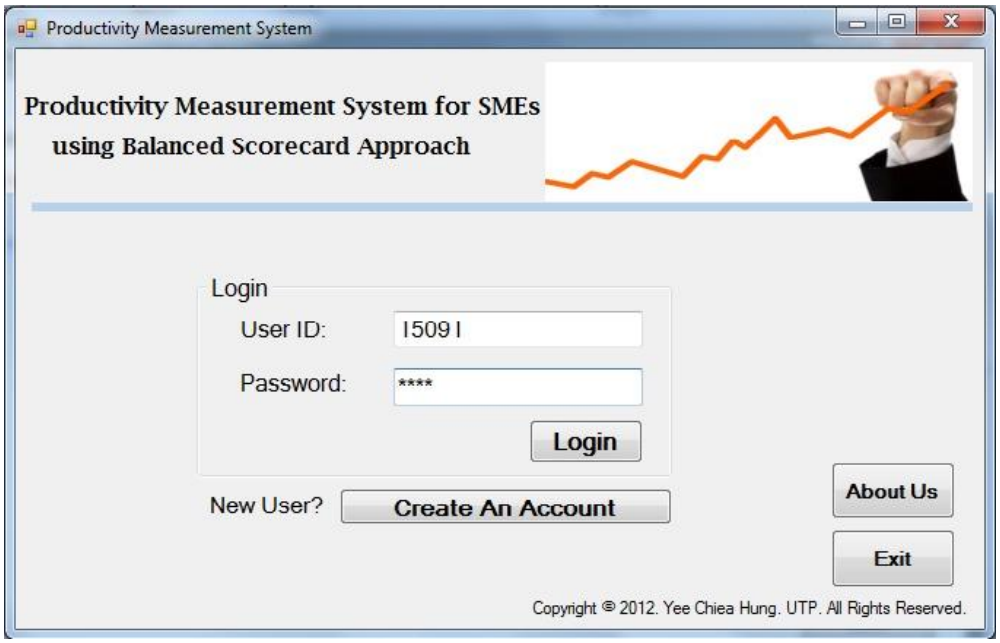
The figure above shows the Create User Account page for the Productivity Measurement System when the "Create An Account" button in the Login Page is clicked.



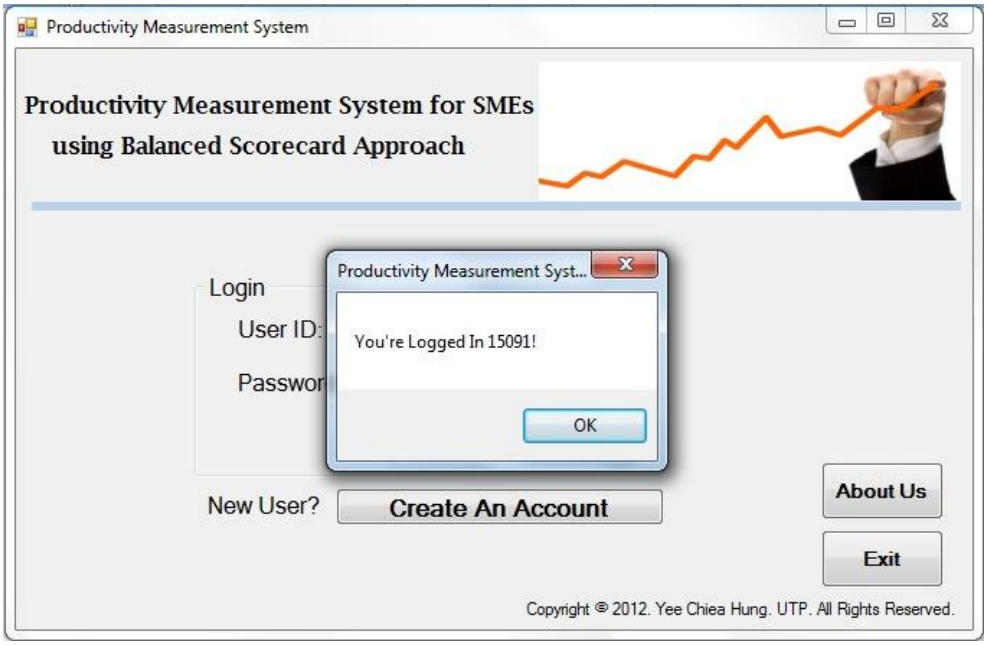
The figure above shows that the User ID and Password are being filled in the Create User Account page for the Productivity Measurement System before the "Create My Account" button is clicked.



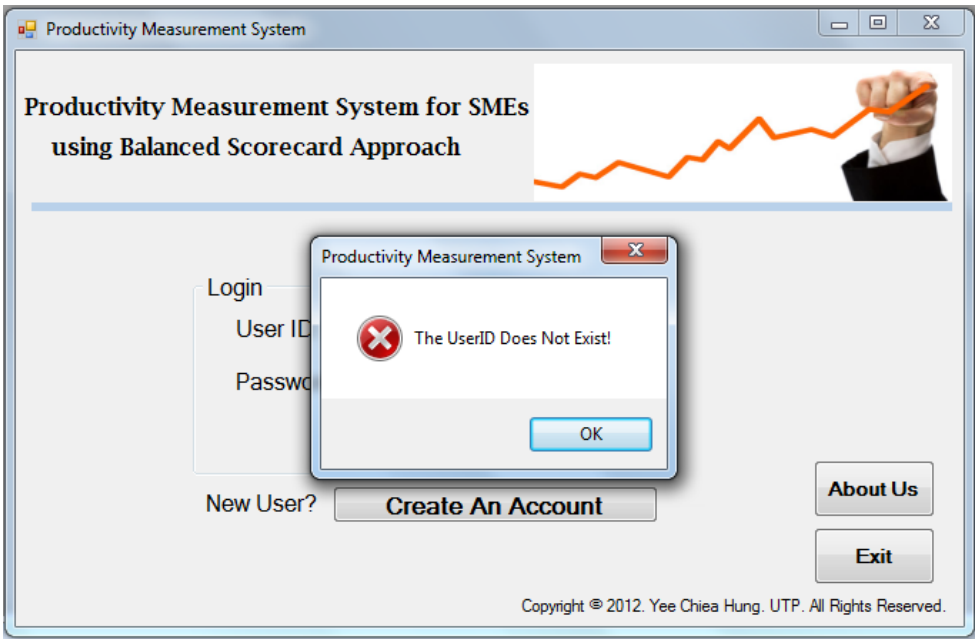
Once the "Create My Account" button is clicked, a message box as shown on the figure above will appear showing that the account has been created.



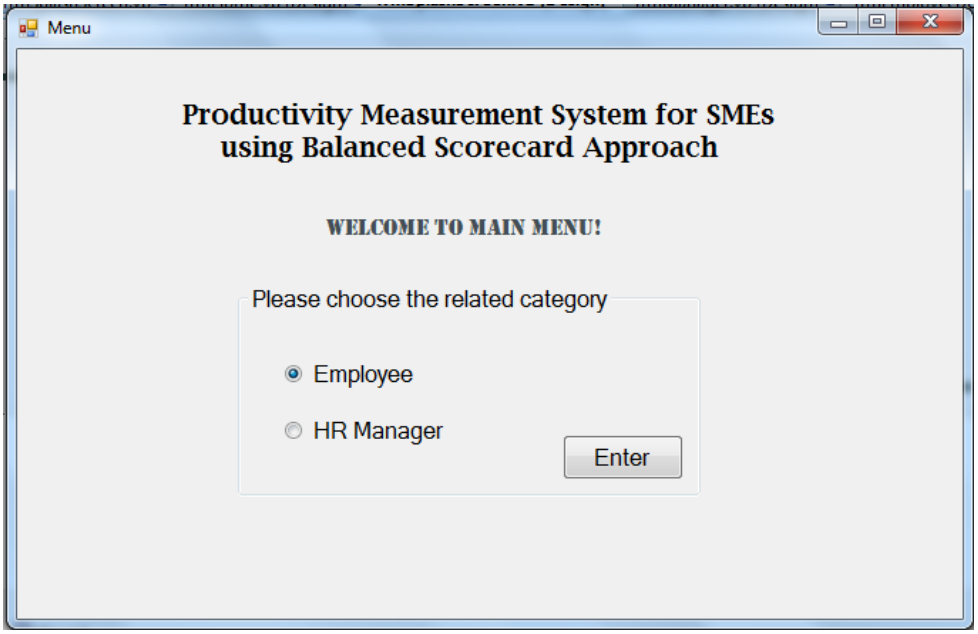
The figure above shows that the User ID and password are being filled in the System Interface Home Page or Login Page before the "Login" button is clicked.



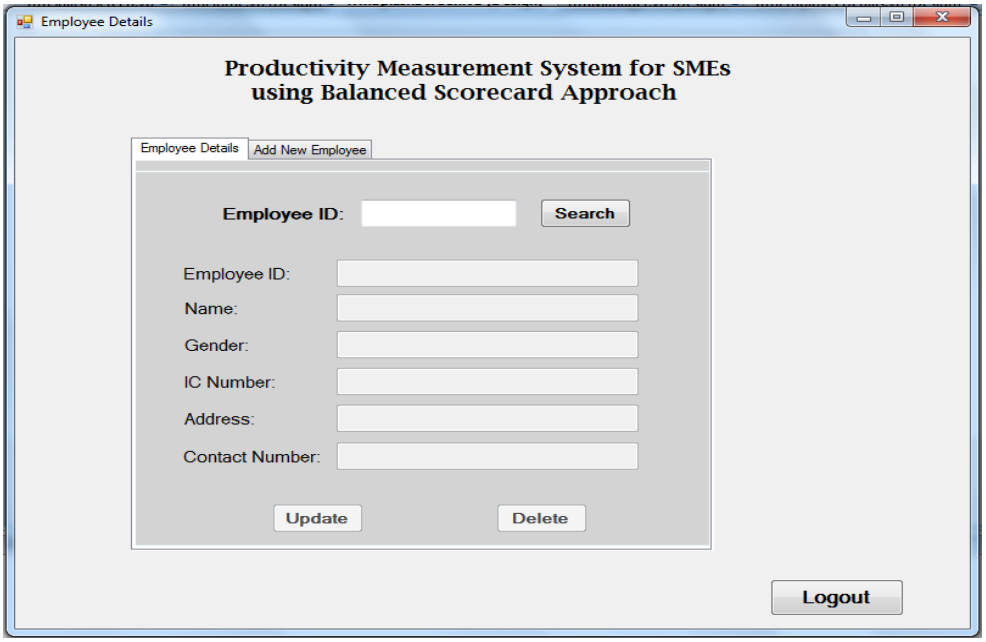
If User ID and Password being keyed in matched with the User ID and Password stored in the database of the system, a message box will appear showing that the user is logged in to the system.



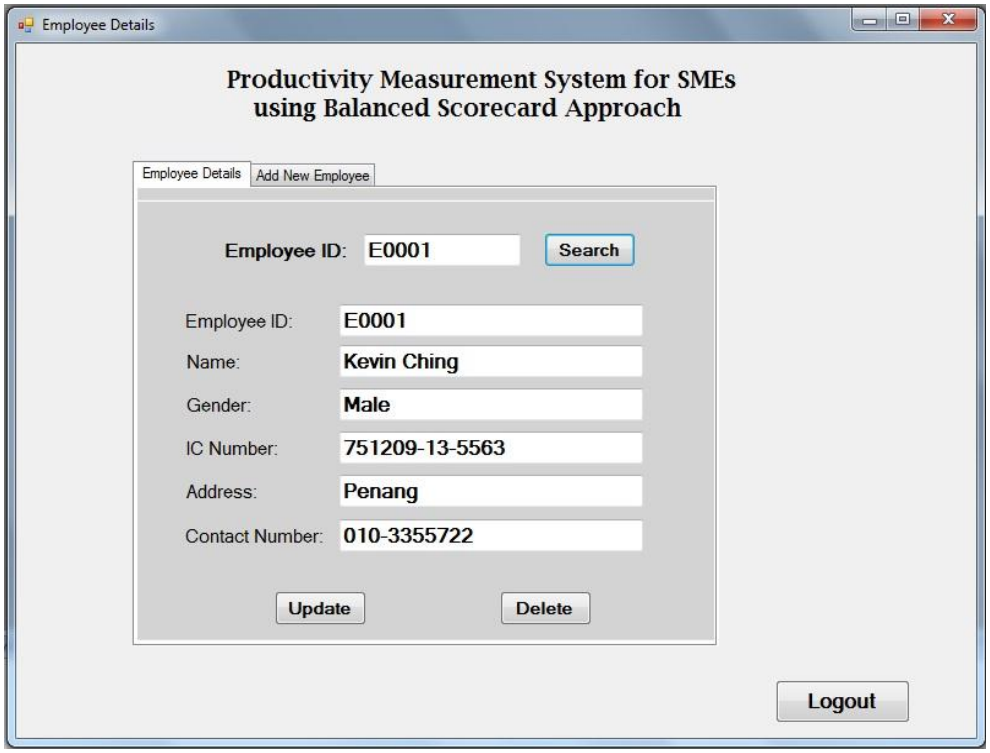
On the other hand, the above figure will appear if the User ID and Password being keyed in to the system is wrong or does not match with the User ID and Password as stored in the database of the system. Thus, a message box will appear showing that the User ID does not exist.



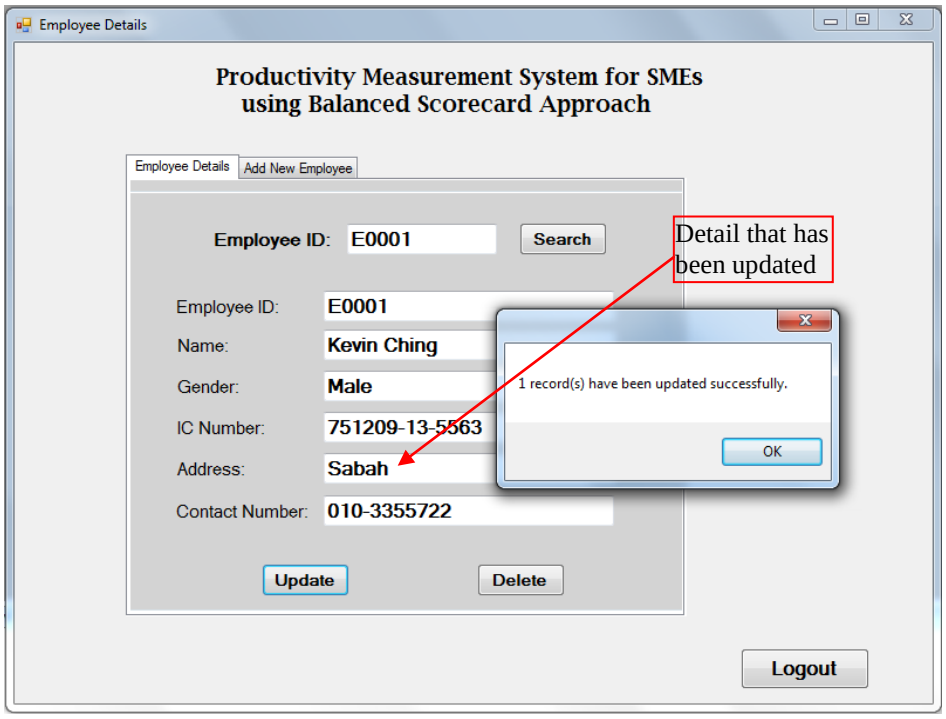
The figure above shows the Main Menu page for the Productivity Measurement System after the user has successfully logged in to the system.



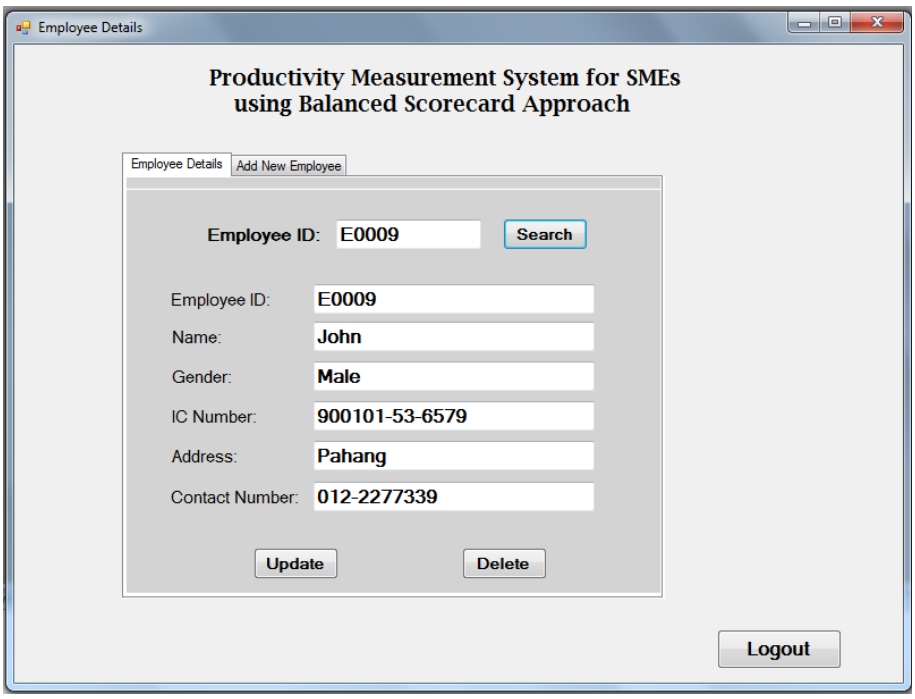
If "Employee" category is chosen, the above figure will appear showing the employee menu page.



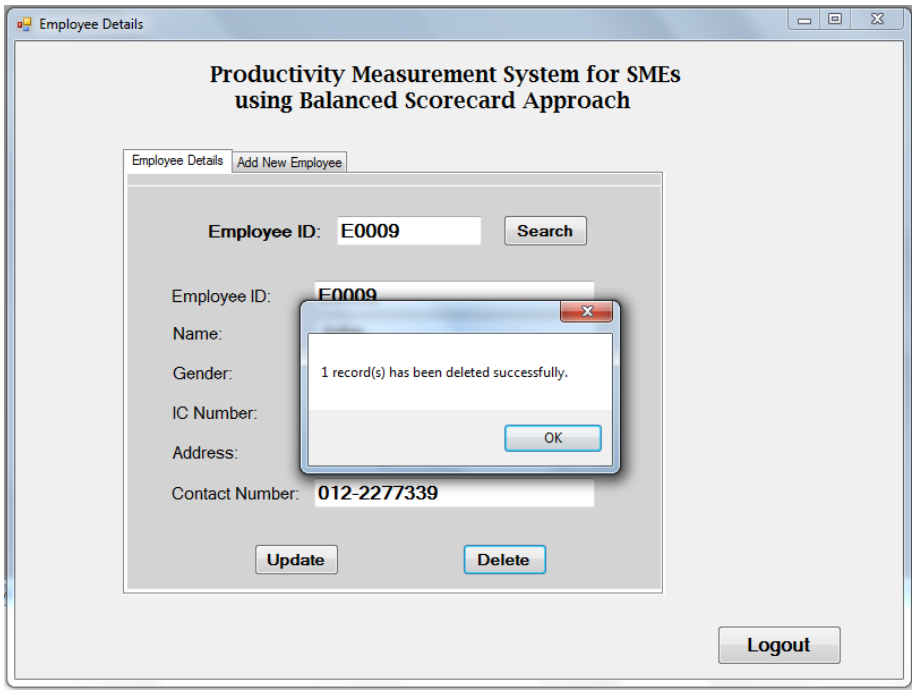
When the Employee ID is inserted and the ID is available in the system database, the above figure will appear after the "Search" button is clicked.



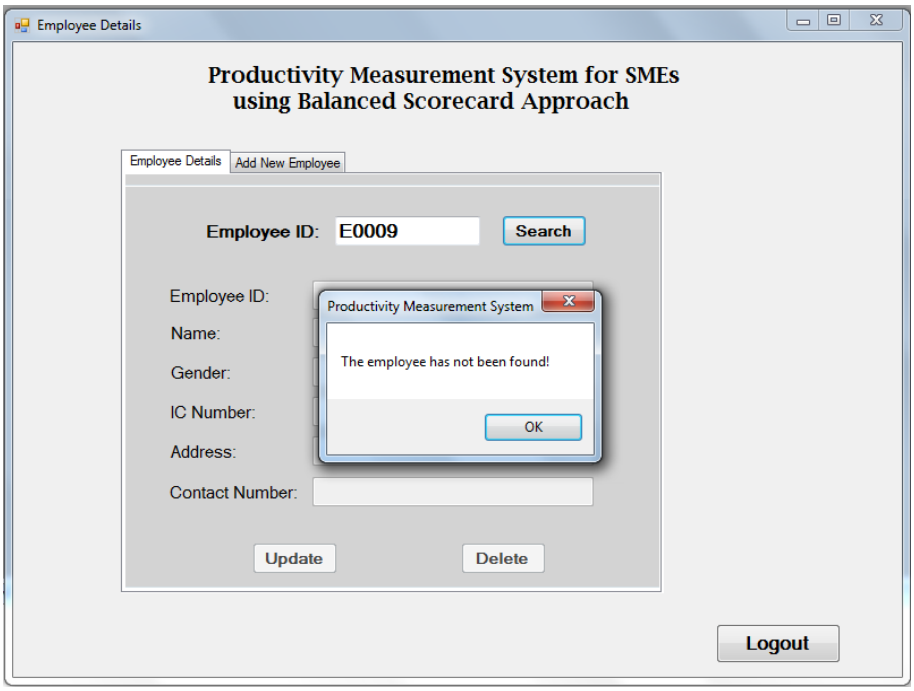
If the user would like to update the detail in the system, he can update the detail in the form and then click on the "Update" button. Thus, a message box will appear as shown on the above figure showing that the record(s) have been updated successfully.



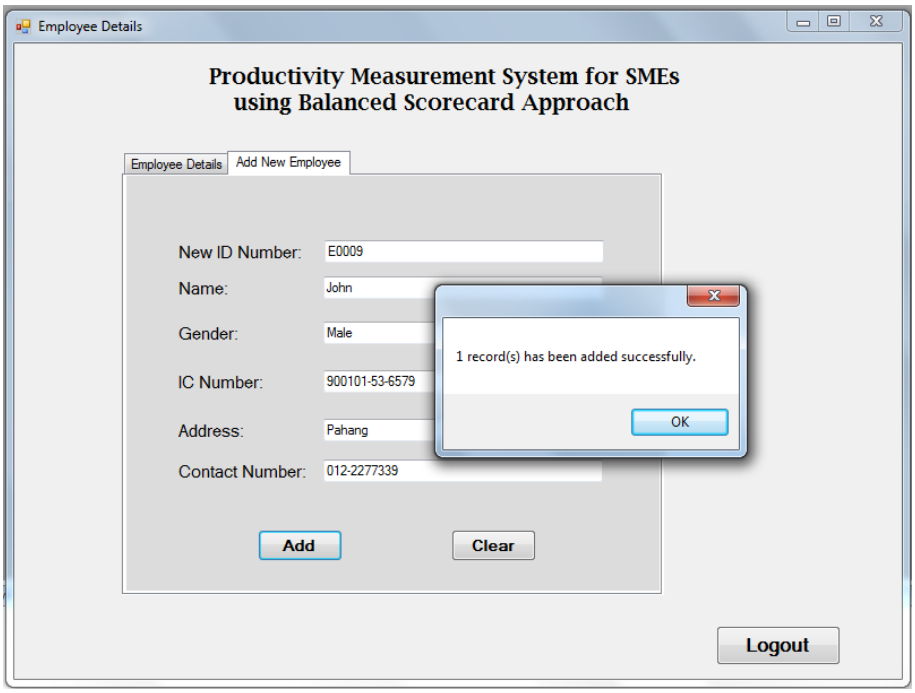
If a particular employee details is to be deleted from the system, the employee details can first be searched through the "Search" button. Once the employee details appear as shown on the above figure, the user can further click on the "Delete" button located at the bottom of the form.



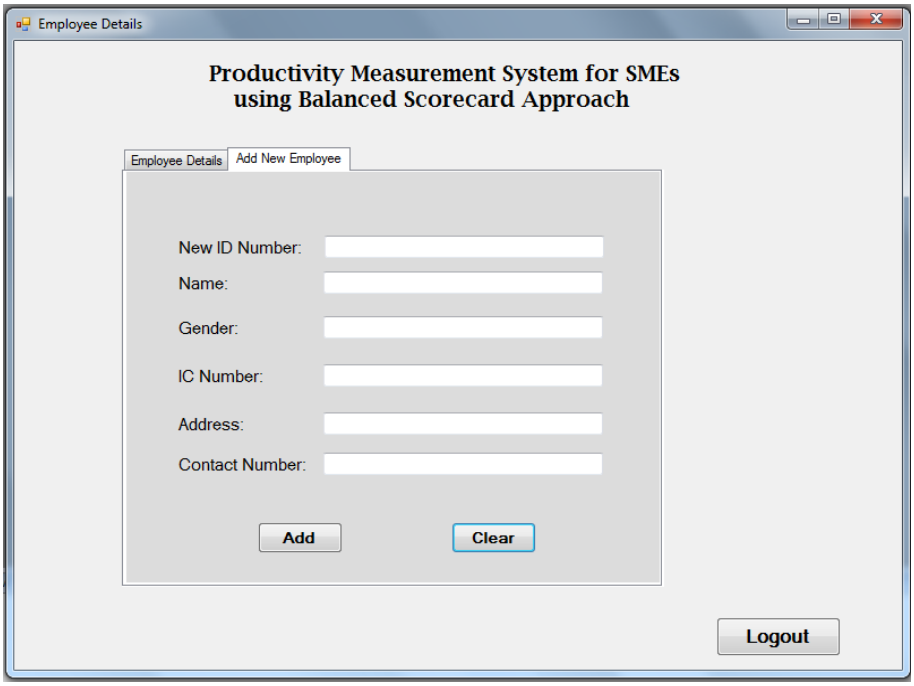
Then, a message box as shown on the above figure will appear after the "Delete" button is clicked showing that the record(s) has been deleted successfully.



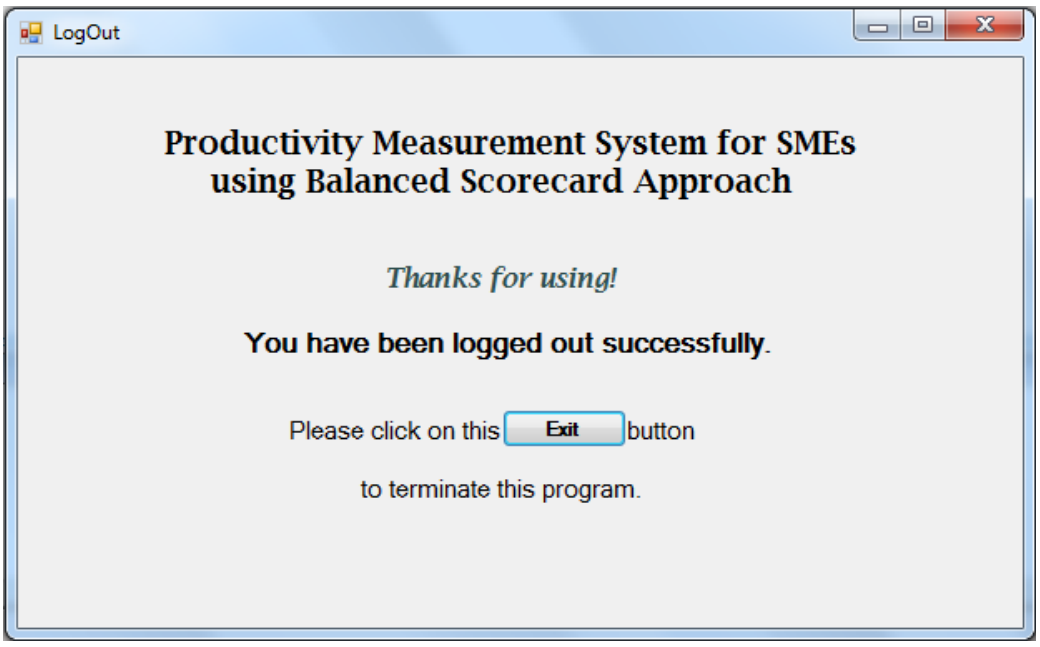
Hence, the next time when the Employee ID is being keyed in to the search box located beside the "Search" button, a message box as shown on the above figure will appear after the "Search" button is clicked showing that the employee has not been found.



If the user would like to add the employee details in the system, he can fill in the form and then click on the "Add" button. Then, a message box will appear as shown on the above figure showing that the record(s) have been added successfully.



If the user would like to clear the detail in the form before saving the details into the database, he can clear the form by just clicking on the "Clear" button. The details will then be cleared and the figure as shown above will appear.



The figure above shows the Log Out page for the Productivity Measurement System.