CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

This chapter presents the existing literature reviews on the related issues as to provide the basis study of the research. The background of the research area is studied, covering the topics such as education in Malaysia, Performance Measurement, Knowledge Measurement and Balanced Scorecard. This is continued with the review on the focused topics such as performance measurement in public sector, performance measurement in higher education sector, electronic-based performance measurement and issues on the application of BSC. At the end of this chapter, some comparisons of development tools are made to distinguish the suitability of tools to be used for the development of e-BSC prototype.

2.1.1 Performance Planning

Organizations may have created brilliant mission, vision, goals and management for performance efficiency and expansion. However, the backbone lies behind the success rate of any organization is the employees. Therefore, it is important to ensure that the performance of the employees is counted in the organization success issues in order to effectively realize the success plans of the organization.

Performance planning falls as a critical issue for every organization that intends to succeed and sustain its continuity. The planning is not to cover only the expectation on the organization in overall, but also the involvement of performance plans for employees.
Individual performance plan with a clear set of goals and objectives drives the employees to know where they are heading and how to achieve the expectations. In addition, the early performance planning allows employees to determine the attainable goals. From the report results of a research done by Gibson and Cassar, it is concluded that planning is commonly being adopted by well-performing firms. Although having planning in the organization does not guarantee great performance results, but it is believed to output encouraged performance in the organization. Likewise, as claimed by Orpen (1985), it was evident that firms which include formal planning promote better performance than those who did not.

Performance planning gives early view of the direction and focus so that efforts can be regulated especially to reach the difficult level of goals. It allows setting of performance goals or targets and determines what to do in order to channel the efforts ahead towards the expectations. Besides, with the acknowledgement of the superiors’ expectations, it provides employees to have clear understanding of what have to be done and which areas to focus. The initial plans can be used as a comparison point during the end of the performance evaluation period to distinguish how far the plans of the organization were accomplished. Based on the research findings by Martz (2001), when employees mutually accepted the initiated goals of their job functions, they enthusiastically work towards the achievements when having prescribed performance expectations. In contrast, if management places uninformed or unpredictable establishment of performance objectives, this will weaken the entire process.

The details of goals settings are communicated between staff and superior through a contracting process whereby performance contract is established to be viewed as an agreement and interaction instrument, which is the process of contract management.
(Greiling, 2005). This encourages the “knowing” culture where higher management can have a set of expectations towards the staffs’ performance while staffs aware of the direction they need to head. To seek if the scheduled performance plans or expectations are executed along the performance period, this can be done by monitoring the staff’s performance continuously.

2.1.2 Performance Measurement (PM)

Performance measurement (PM) in the context of an organization is the act of assessing and quantifying the effectiveness and how well an organization performs. It is crucial to ensure organization is pursuing strategies that drive to the achievement of the overall goals. By having a performance measurement system that is a governing system, it presents hints and indications in three situations of the organization; the past of what has happened, the present of what are happening and the future readiness of what corrective actions to be taken (Jahankhani and Ekeigwe, 2005). PM provides a set of defined measurement elements which are factors that leads to the achievement of organization’s strategies and goal. It also promotes as a tool to connect employees in a circle of communication while they are heading to the same aim through different approaches. By having a performance measurement system which intentionally to measure human behavior, in time, it will indirectly change the behavior of the measured person to a positive direction (Neely et al., 1997 cited by Ukko et al., 2007). As reported by Ukko and colleagues in a 2007 study, they revealed that through some evidence from investigated companies, performance measurement impacts positively towards the interactivity between higher management and employees, leads to higher performance. However, PM only contributes as to support the leadership style of managers but not as a replacement of it.
PM is able to report things that have been done which let us know our current status, revealing the potential for achievement in future that allow us to design action plans to reach the target. According to Yang et al. (2005), there are general methods have been used in investigating the performance of non-profit organizations performance such as financial accountability; program products or outputs; adherence to standards of quality in service delivery; participant-related measures, key performance indicators (KPI); client satisfaction; reputation and image; and management by objective. Nevertheless, it is dependable on the organization itself to choose the most appropriate methods that are suitable, applicable and yet, effectively shows the current performance of the organization. It requires strong leadership, good quality and management skills in order to achieve the goal of the overall success of the organization’s performance. Before begin to move into the step of performance measurement, an organization should clearly identify the definition of “good performance” for its company, what have been done so far and its current status so that action plans can be distinguished in reaching the desired targets or goals in future. As mentioned by Ukko et al. (2007), performance measurement serves as a medium to communicate the company’s vision to the whole organization as illustrated in Figure 2.1. The goals of the organization are cascaded down to staffs through the use of performance measurement.
2.1.2.1 Examples of Performance Measurement Frameworks

According to Bititci et al (2002), the performance measurement efforts started since mid-1980s when there was a need of better integrated performance measurement system, plus the dissatisfaction of the traditional performance measurement methods. By then, it triggered the interest of many researchers in this issue and as a result, many development efforts were done especially on the needs of improvement in performance measurement systems. Realizing the weakness of traditional performance methods that include only financial measures, some developers has made the improvements by incorporating non-financial measures in the performance measurement frameworks.
Examples of developed performance measurement (PM) frameworks are:

Table 2.1 Performance Measurement Frameworks

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<tr>
<th>PM Frameworks</th>
<th>Description</th>
<th>Developers</th>
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<tr>
<td>PM Matrix</td>
<td>“The development of performance measurement matrix was based on the above concept by addressing the non-financial aspects of organizational performance. Accordingly, it incorporates cost, non-cost, external and internal factors that influence organizational performance. However, the links between these categories are not explicitly described and this is identified as one of the main weaknesses of the matrix”.</td>
<td>Keegan et al.’s (1989)</td>
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<td>BALANCED SCORECARD</td>
<td>“BSC explicitly identifies links between different dimensions of performance. It incorporates four perspectives: financial, internal business, innovation and learning, and the customer. The four perspectives of the BSC minimizes the overloading of information but focuses on the most critical success factors of the organization (Kaplan &amp; Norton, 1992). Furthermore, the BSC can be used to translate the organization’s mission and strategic objectives to a set of performance measures and help communicate and implement the organization’s strategy throughout the organization, consequently enabling the employees to identify the drivers of current and future success (Kaplan &amp; Norton, 1996). A major strength of the BSC is that it links the PM with organizational strategy. The BSC differs from the traditional approach of performance measurement in combining both “lagging” and “leading” measures. Furthermore, the measures in the BSC are balanced not only between external measures (shareholders and customers) and internal measures (critical business process, innovation, and learning and growth), but also between the result measures (outcomes) and driver measures (measures for future improvement)”</td>
<td>Kaplan and Norton (1992)</td>
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<td>RESULTS AND DETERMINANTS FRAMEWORK</td>
<td>“Similar to Kaplan and Norton’s BSC, Fitzgerald et al. (1991) developed another PM framework by considering leading and lagging performance measures. This PM framework specifically targets the PM in the service sector. The framework identifies six performance measures: two measure the results (lagging indicators) of competitive success (competitiveness and financial performance) while the other four measure the determinants (leading indicators) of competitive success (quality of service, flexibility, resource utilization and innovation)”</td>
<td>Fitzgerald et al. (1991)</td>
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<td>EUROPEAN FOUNDATION FOR QUALITY MANAGEMENT MODEL (EFQM)</td>
<td>“Another framework which was developed on the basis of determinants (enablers) and results indicators similar to the Fitzgerald et al. (1991) PM framework. The model consists of five “Enablers”, or with criteria that the organization can manipulate, and four “Results”, or what an organization will achieve. The enabler criteria are concerned with how the organization undertakes key activities, while the results criteria is concerned with what results will be achieved. The model is widely used to carry out quality management and the self-assessment of organizations. However, the terms used in the EFQM model are open and can be interpreted in number of ways (Neely et al., 2000), thus increasing the number of performance measures within each category. This leads to the problem of selecting and relying on the appropriate performance measure for the organization”</td>
<td>The European Foundation for Quality Management (2000)</td>
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<td>PERFORMANCE PRISM</td>
<td>“It emphasises the need to consider the stakeholders who interact with the organization. The performance prism does not limit itself to just addressing the needs of shareholders and customers, as in the case of BSC, but goes beyond these to address the needs of the employees, suppliers, intermediaries, regulators and community as they too have a substantial impact on the project performance (Adams and Neely, 2000). The performance prism consists of</td>
<td>Neely and Adam (2001)</td>
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five interrelated aspects:
- **Stakeholder satisfaction**: who are our key stakeholders and what do they want and need?
- **Stakeholder contribution**: what do we need and want form our stakeholders in a reciprocal way?
- **Strategy**: what strategies do we have to place in order to satisfy our stakeholders while satisfying our needs?
- **Processes**: what processes do we need to put in place to enable us to execute our strategies?
- **Capabilities**: what capabilities do we need to put in place to allow us to operate our process?"

(Source: Kulatunga et al. (2006))

### 2.1.2.2 The Needs of Performance Measurement (PM)

Performance Measurement (PM) is not neglected by organizations who intend to succeed in performance and to sustain its continuity. According to Parker (2000), there are several possible reasons to undertake PM into the organization. It is to find out the level of success, how far their customer requirements is fulfilled, understanding the process flow, identifying where problems exist, ensure accurate decision-makings and performance plans are working well. Besides, Parker identified a few essentials of measures in Performance Measurement (PM). Performance measures need to be ensured for the alignment with the organization strategy whereby the sub-unit measures must be combined into organization’s measures. In addition to that, the measures that organization includes may consist of different types of measures such as outcome measures, action measures, input measures and diagnostic measures which must have effect on performance and reliable. The functionalities of PM promotes better understanding of the organization’s process, encourages learning where mistakes are identified and improvements are seek while produces performance-based appraisal (de Bruijn, 2002).
2.1.2.3 Factors of Performance Measurement Implementation

For an effective implementation, numerous factors need to be judged to determine the suitability of the performance measurement method to fit into the organization. Cited by Bourne (2005), internal context factors that affect performance measurement effectiveness are studied by previous researches and the factors are listed in Table 2.2. Besides that, other factors that promote influence on performance measurement were reported as well such as external context, processes and content.

### Table 2.2 Internal Contextual Factors Impacting Performance Measurement Effectiveness

<table>
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<tr>
<th>Internal context</th>
<th>Authors</th>
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<tr>
<td><strong>System maturity</strong></td>
<td>Evans (2001) and Martins (2002)</td>
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<td>More mature systems are more effective</td>
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<tr>
<td><strong>Organizational structure</strong></td>
<td>Hendricks et al. (1996) and Bourne et al. (2002)</td>
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<td>Importance of aligning structure and Measurement</td>
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<td><strong>Organizational size</strong></td>
<td>Hoque and James (2000) and Hudson et al.</td>
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<td>Measurement is easier in larger organisations (2001a, b) and more problematic in smaller ones</td>
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<tr>
<td>Alignment between the cultural elements embedded in the measurement system and the users’ cultural preference is beneficial</td>
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<td>Appropriate style is important, appropriate style may be different in different settings and phases of implementation and use</td>
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<tr>
<td>Measures should be aligned to strategy</td>
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<tr>
<td><strong>Resources and capability</strong></td>
<td>Bourne (2004) and Kennerley and Neely (2002)</td>
</tr>
<tr>
<td>Companies need resources and capabilities to implement and refresh their measurement Systems</td>
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<tr>
<td>High data integrity and a low burden of data capture are important</td>
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2.1.2.4 Performance Metrics

Compared to business organizations, non-profit organizations put less focus into management. This results in the difficulty for public organization to distinguish the suitable performance metrics. Defining and identify the appropriate and meaningful performance metrics would be challenging for most organizations. As claimed by Melnyk et al. (2004), metrics and performance measurement are linked tightly to each other. The translation of strategy or organization’s mission and vision into workable statements deals with the measurement by these metrics. They also indicate that metrics allow the realization of activities in measuring, educating and directing. Three basic functionalities of metrics include the control of performance, to communicate among the people involved and for improvement purpose (Melnyk et al, 2004). Besides, according to Melnyk, the definition of metric is “…. is a verifiable measure, stated in either quantitative or qualitative terms and defined with respect to a reference point”.

2.1.3 Knowledge Management (KM)

The amount of data and information keep increasing in this modern world. Organizations need to take initiative to perform data cleaning and sort out the useful data to be translated into meaningful processed data or information and finally into knowledge that is valuable for the organization. Knowledge is about justified true beliefs and commitment (Nonaka and Takeuchi, 1995, cited by Gillingham and Roberts, 2006) which
allows for making predictions, accurate decision making, planning and judgment. It was also been argued that knowledge need to be captured and codified accordingly, in order to exploit and maximized to the benefits of an organization (Ashton, 1998 and Earl, 2001, cited by Gillingham and Roberts, 2006). Generally, knowledge can be distinguished into two types. Tacit knowledge involves insights, intuitions and hunches while explicit knowledge refers to knowledge that could be expressed in words or numbers formally.

The term “Knowledge Management” is defined in various ways by expertise. Commonly, it involves processes of generating value from the organization’s intellectual and knowledge assets. Knowledge Management (KM) has become a popular management issue of and no longer a new subject for most organizations. Facing the pressures in the environment of high complexity and competitiveness, decision makers are requested to have fast responsiveness while making the most accurate and right decisions. Companies are looking for better ways of management in handling intangible assets. Knowledge Management allows better decision-makings while increase efficiency, higher productivity and increase revenue. Upon of that, most organizations have taken the action to implement KM solutions in response to necessitate of performance improvement for the organization. The solutions involve ways in which KM can be facilitated that include the process, systems, mechanisms and technology; and infrastructure.

2.1.3.1 Measuring Knowledge Management (KM) Solution

Through an analysis with companies, it is discovered that senior managers are working towards to determine their specific business part that contributes to KM and could be implemented with KM solutions through processes to avoid the problem of knowledge bottleneck while at the same time, improving company’s performance (Roy et al., 2000).
On top of that, identification of the effectiveness of KM solutions could be done through performance measurements while evaluating the achievements of the organization. The effectiveness of a solution or method is not known unless measurement or evaluation is performed to determine its value. KM practitioners have been struggling hard to distinguish an effective method to evaluate the benefits obtained from the application KM solutions. An attempt was made in classifying KM performance measurements into three common types which are internal measurement, external measurement and inferred value measurement (Teruya, 2004 cited by Kim, 2006). It was explained that internal measurement involves measuring how well KM initiatives are implemented while external measurement analyze the benefits achieved from the implementation. The measurement of inferred value is done based on hypothesis or speculation and anecdotal benefits are often captured. However, mentioned by Chen and Chen (2005), there are different types of KM performance evaluation methodologies and balanced scorecard (BSC) is as one of the well-known methods for analyzing internal performance analysis. Also, balanced scorecard is a framework recommended by Kim in 2006 to evaluate the KM performance and successfulness. As claimed by Kim, BSC does not only provide business view limited from the one aspect of financial but also, incorporates other perspectives of operational measures which enable senior managers to make improvement in every aspect by which not affecting or sacrifice another which was also highlighted by Kaplan and Norton in 1992. This allows improvements to be made for the overall business operational while having specifically focus in different perspectives. Reviewed by Kim in 2006, Gooijer (2000) suggested an approach to implement a KM scorecard based on the framework of BSC to evaluate how well KM initiatives perform in public agencies. Due to the dissimilarity of objectives or goals in public sector agencies compared to business organizations, Gooijer proposed changes to be made on the four perspectives initiated in
BSC (financial, customer, internal business processes; and learning and growth) in corresponding to the characteristics of public agencies. This evidence that it is agreeable that balanced scorecard has its suitability to be implemented as a framework to evaluate performance in public sectors.

2.1.3.2 Balanced Scorecard (BSC) – The Performance Measuring Tool

Balanced scorecard is mentioned as a best-known performance measurement framework (Roy et al., 2000). Balanced Scorecard (BSC) is a comprehensive performance framework that was introduced by Robert S. Kaplan (Harvard Business School) and David P. Norton (American Management Consultant) in 1992. It aims to clarify the strategy of the organization and translate it into a clear set of actionable objective, focusing on long term success rather than just admirable statements. It is widely being adopted in organizations, as a strategic management and performance assessment tool that allows integrated view of the organization. Traditionally, organizations tend to evaluate their performance achievement by concentrating only on short-term financial goals and bottom line profits, offering an unclear and incomplete picture of overall performance. Even though financial measures are useful to tell us what happened in the past but it unable to clarify why it happened. When the failure reasons are unclear, the suppose way of correction is hardly found which end up repeating the same mistake or error again. Hence, Kaplan and Norton suggested both financial and non-financial measures should be incorporated into a more balanced performance scorecard. These measures are grouped into four different categories or called perspective whereby within each of them, there is a coherent set of performance measures. The four perspectives included Financial, Customer, Internal Business Process and Learning and Growth. Both Customer and Internal Business Process perspectives are working together in making the successfulness in financial
perspective while Learning and Growth perspective encourages the improvement of current situation for the future readiness. Through the years, Kaplan and Norton were aware of the organizations need to align their BSC with their strategy to reach maximum benefits. In 1996, they continued their view and suggested four critical interrelated management processes; clarify and translating vision and strategy, communicating and linking strategic objectives and measures, business planning and target setting and enhancing strategic feedback and learning. It was claimed that BSC helps to maintain a balance between short and long term objectives, between desired outcomes and the performance drivers of these outcomes and between quantitative-objective measures and qualitative-subjective measures (Kaplan and Norton, 1996). As BSC evolved, finally in 2001, Kaplan and Norton introduced five principles to keep strategy the focus of organizational management process: Translate the strategy into operational terms; align the organization to the strategy; make strategy everyone’s everyday job; make strategy a continual process; mobilize change through executive leadership.

Non-financial measures are meant to be “drivers of performance”, while financial measures are “final outcome”. Kaplan and Norton suggested that performance measures should be presented in a balanced form which between results of the past (lagging measures) and indicators of future readiness (leading measures); between outward looking measures (customer and financial perspectives) and internally (internal processes and learning and growth perspectives). It is also agreed by Papalexandris et al. (2005) that the introduction of the four BSC perspectives has promoted a balance between short and long terms objectives, desired outcomes and performance drivers of these outcomes and between quantitative-objective measures and qualitative-subjective measures. Measures are well-connected through causal links as provided in BSC. By this, it clearly shows that the
linkages by driver improvements are expected in order to produce the desired outcomes according to the aligned strategy. From the results of the on the causally linked drivers and outcome measures, it provides hints and evidences on how effective of the strategy that drive managerial teams to take necessary actions whether any modifications need to be done. It involves processes in accumulating scores from top to bottom in the organization, then making changes and modification on the organization so that the scores are improved next time when they are measured (Sparks, 2001).

In BSC, measures in each category used to access for that category and these four assessments are combined to evaluate the overall performance. The scorecard acts as a report card to be presented to stakeholders that includes scores accumulated by individual or organization based on a list of measures which are the factors affecting their performance. It is agreeable that BSC is a powerful management tool as it separate overall organization into different perspectives and adding measures to evaluate in achieving the aims. Also, the strategy focus helps to draw organization’s attention towards their objective goals set in every of their strategies. As mentioned by many practitioners, the motive is not rewarding or punishing based on the results collected from the scorecard, but it is to drive the staffs’ attention to their weak spots and encourage them to make improvements and corrections on it.

Mircea et al. (2006) opined that every Balanced Scorecard application must include the basic elements of Balanced Scorecard design although the naming conventions may be vary or different. They claimed that six important features are required for the BSC design which includes perspective, objective, measure, target, cause and effect linkage; and strategy initiative. Likewise, Dorweiler and Yakhou (2005) also stressed that four basic elements must be defined within each perspective of BSC. Objectives which aligned with
goals of the organization and *performance drivers* to improve the Board performance are the first two elements. *Targets* are set as industry best practices and commitment for superior governance which requires *measures* to determine the target achievements.

Traditional methods such as return of investment (ROI), net present value (NPV), the internal rate of return (IRR) and the payback period (PP) appeared to be more focusing on financial measures which failed to reveal the overall business performance and the creation of future business value. Financial measures tend to report the results of the past activities which have happened. By depending on these measures, managerial decisions are made to resolve the occurring problems for the short term which may fail to guarantee a better improvement in future operations.

Argued by Jahankhani and Ekeigwe (2005), traditional accounting-based measures are too historical, lack of prediction powers and poorly defined. This has resulted the wrong behavior is rewarded. Besides, the awareness of business changes is delayed and it gives insufficient consideration to intellectual capital. Typically, they work alone without integrating with one another and not in line with the business processes. Upon of that, the appearance of Balanced Scorecard framework is able to cover the shortcomings of these traditional financial measures. Jahankhani and Ekeigwe (2005) promoted BSC and claimed that it is linked to business vision and strategy. It is a process-based which creates the linkage of organizational and personal scorecards. In addition to that, BSC supports both qualitative and quantitative information and also encourages dynamic communication.
2.1.3.3 Knowledge Management (KM) in Higher Education Institutions

Universities or higher education institutions are known as knowledge business by some researchers for its involvement in knowledge creation, dissemination and learning while equally with profit business organizations, they are being pressured by public. Therefore, it is believed that in a way, knowledge management takes part in higher education institutions (Rowley, 2000). Besides, Rowley claimed that in universities, there is considerable level of KM activities that need to be identified and to be used as the basis of development process. In this case, it requires the attention of the University and its staffs to aware of their changing role of knowledge-based society while managing the processes tied with the creation of knowledge assets. Their intellectual capital value should be acknowledged especially for the continuity role in the society and market place of higher education.

The suitability of Knowledge Management application in higher education institutions is agreed based on modern information infrastructure, knowledge sharing environment which is common for lecturers and the requirements of quicker knowledge acquirement from the available sources (Mikulecky and Mikulecka, 1999, cited by Mohayidin et al., 2007). Cited by Mohayidin and colleagues, Metaxiotis and Psarras (2003) discovered three main aims of university which comprise teaching where students are to be prepared to be successful lifelong learners; research that is to wider the human knowledge boundary while encourage creativity; and service which to serve communities and in leadership positions within the university.

The application of KM methods are believed able to encourage knowledge sharing, improves teaching level and research collaboration; and promotes better working
relationships among stakeholders (Mikulecky and Mikulecka, 1999, cited by Mohayidin et al, 2007). However, the success rate of KM initiatives relies on the management effort in the process of knowledge assets creation and identification of intellectual capital value that supports their continuity role in the society (Rowley, 2000).

2.2 Performance Measurement in Public Sector

If performance monitoring is said to be crucial for private organizations, the same weight should be applied for public organizations as well. The importance of having performance indicators to reveal the organization’s performance status is applicable for any organization. However, as claimed by Wholey and Hatry (1992), government programs reports putting high concentration on expenditure expenses and the quantity of delivered services instead of the quality of the outcomes. This has gained some agencies’ interest to start developing performance monitoring systems which can clearly show the quality of outcomes in place. The performance results are used as to motivate the supposed improvements to be made while conveying the program values to public as to get their confidence in government and getting the sufficient resources for the continuity of the operations. Wholey and Hatry (1992) also demonstrated numerous performance results comparisons can be done by duration of deployment, geographical areas, populations, targeted performance results and characteristics. Unlike profit-seeking organizations that need to face with competition pressure, non-profit organizations is less apparent to management focus and resulting less efforts being put on the performance issues where evaluation work is neglected by management and administration, (Yang et al., 2005).
2.3 Performance Measurement in Higher Education Institutions

Higher education institutions and public universities are commonly considered of not being pressured or stressed for their existence and sustainability since they are fully supported and continuously subsidized by government or other public funds to carry out their operations. This has resulted the performance quality in these institutions is not highly focused. However, as the competitiveness around the world is rising, it has pulled most countries’ attention to reanalyze their status particularly in education sector. Besides, to address its accountability and in confronting the pressure from public, these non-profit organizations have been urged to produce performance indicators and evidence to prove their values and capability in attaining their vision, mission and strategies.

In higher learning institutions, performance measurement acts as a reporting and communicating tool to inform public and government for their effectiveness, quality and accountability; through a set of measures and indicators. Strong performance is perceived as the ability to operate within budget (i.e. not spending more or less than the allocated financial budget). The image or reputation carried by the institution impacts public’s thoughts while it has been taken as the main competitive advantage. Therefore, it has been the efforts of higher learning institutions to develop and maintain a strong image to represent its accountability which will affect the student’s choice of pursuing their education in the institutions. It is indicated by Kotler and Fox (1995) (cited by Ivy, 2001), there may be faulty higher learning institutions image formed by people which is resulted from the inaccurate information. This image may affect people favorable choice in joining the institution. Therefore, it is absolutely important to ensure the image or reputation accurately reflects the status of the institution. In a research done by Helgesen and Nesset (2007) on students’ loyalty to education institutions, three hypotheses which include the
perception of University’s reputation is positively related to student loyalty, student satisfaction is positively related to student loyalty and student satisfaction is positively related to the perception of the reputation of the university college were proven and supported. Although institutions may concern on students’ satisfaction, the reputation management is also important as it holds a great influence. Therefore, the performance quality is supposed to have an effect on both satisfaction and general evaluation of the reputation (Fazio and Zanna, 1978; Aaker and Keller, 1990, Helgesen and Nesset, 2007).

Often, one may judge or having the misconception the quality and performance of an institution can be evaluated through the typical set of external indicators such as graduation rates, number of students, resources, facilities and scholastic ranking as the comparison aspects among the institutions (Stewart & Carpenter-Hubin, 2001). In relating to this matter, it misleads to the understanding that when institutions successfully achieve these external targets, they are successful internally too. Without having an effective performance measurement tool, institutions may unaware the reasons of low quality which causes dissatisfaction and eventually declining the overall in academic credibility. Therefore, performance of institution individual members, the academicians specifically, are to be measured to ensure they are performing in the right track, supporting the organizational goals while moving towards the excellence of performance. The productivity and efficiency of academicians should be taken into account of evaluation. Academic measures which are commonly used among higher education institutions set around the aspects of teaching and administrative loads, research or publications and contribution activities towards the society. In this case, balanced scorecard (BSC) has been promoted as it is a well-known tool for the internal performance analysis. With the efforts of institution to self-improve and while at the same time, performing externally too, this
will definitely increase public’s confidence and also, emerge as a better one as compared with other competitors.

2.3.1 Measures Used in Evaluating Higher Education Institutions Performance

In the context of education, some familiar performance measures are set around aspects of faculty/student numbers (ratios), demographics; student passing percentages and dispersion of scores; class rank, graduation rates; percentage graduates employed on graduation; faculty teaching load; faculty research/publications; statistics on physical resource (Umashankar and Dutta, 2007). In addition, the performance of academicians is also taken into consideration namely teaching and administrative loads, research or publications and other contributions which are valuable for the society. The achieved results are indicators or values as to be shown to targeted stakeholders of university which comprises students, academic and administrative staffs, the institutional leaders and public community as identified by Cardosa et al. (2005). Also, they considered the basic mission of a brilliant University involves excellence in creating, sharing and applying knowledge which expressed in terms of teaching, scholarship/research and public service/outreach.

Kaplan and Norton (2001) opined that using the only financial measurement does not indicate the results of the organizational mission of governmental and non-profit organizations. Different from business organizations, education sector places heavy emphasis on academic measures rather than financial performance (Umashankar and Dutta, 2007). In this case, this does not mean that financial aspect is neglected as the investment and budgets play as the backbone in supporting and realizing other aspects of the educational institution financially. The suggested e-BSC performance measurement retains traditionally financial measures (lagging outcome indicators) in place while adding
supplements of drivers (lead indicators) which categorized in three other perspectives - customer, internal business processes; and learning and growth (Kaplan and Norton, 2001). Therefore, e-BSC is suitable to be used as a performance measuring tool in Higher Education Institutions as it provides comprehensive coverage view and a balanced set of measures for the institution while highlighting the appropriate financial measures in academic context. However, it requires leadership, good quality and strategic management within each institution for successful implementations.

2.4 Electronic-Based Performance Measurement System

A performance measurement system is considered ineffectual if the information being kept is inaccurate or not up-to-date. Historical information produces faulty performance results which affect the managerial decisions. In a research done by Bititci et al. in 2002, empirical evidence was found and proved that if proper implementation of performance measurement systems which designed accurately with the suitable technology supports, it can promote better communication, visibility, teamwork and decision makings which lead to positive management style. Unfortunately, performance measurement systems were still at the early stage of implementation and not much efforts of research especially on the implications of electronic-enabled performance measurement systems towards management being done. With the identification process worked-out by Bititci and Carrie in 1998 (cited by Bititci et al, 2002) through the audit process on manufacturing and services companies, they concluded that the need of responsiveness and agility performance measurement systems exists. This is because at the present, the performance measurement systems were static and possibly historical, which were sensitive to neither internal nor external environment changes. As a result, inaccurate and not up-to-date information was obtained. Besides, there were only a few IT-integrated performance
measurement systems exist which can eliminate inefficient and time-consuming data handling. Performance measurement system should be implemented dynamically so that it will continuously mirror the accurate and important issues for the organization (Lynch and Cross, 1991, cited by Kennerly and Neely, 2002) while remains to be integrated, efficient and effective all the time (Bititci et al, 2000). It is also crucial to ensure measures and the system are reviewed and modified according to the frequent circumstances change (Dixon et al, 1990, cited by Kennerly and Neerly, 2002). Reviewing and updating are two important processes need to be done regularly in performance measurement systems in order to reach the accuracy and relevancy which exactly reflects the organization performance in the most current status. Therefore, the proposal of putting performance measurement systems into electronic-based may be one of the effective ways to resolve these situations instead of developing a standalone system. A few defined levels that supposed to be included in performance system to cope with the frequent situation changes were demonstrated and cited by Bourne et al. (2000):

i. “...effective mechanism for reviewing and revising targets and standards (Ghalayini and Noble, 1996).”

ii. “...a process for developing individual measures as performance and circumstances change (Maskell, 1989; Dixon et. al, 1990; McMann and Nanni, 1994)”

iii.“...a process for periodically reviewing and revising the complete set of measures in use. This should be done to coincide with changes in either the competitive environment or strategic direction, (Wisner & Fawcett, 1991; Dixon et. al., 1990; Lingle and Schiemann, 1996)”

To cope with the numerous changes that may always happen over time, a electronic-based performance measurement system promotes the ease of accessibility and flexibility for updating process especially to deal with these changes. It also increases the
speed of information transfer so that users can retrieve the immediate and accurate information while their activities are traceable. In a research on the management implications of web-enabled performance measurement systems done by Bititci et al. (2002), they took into account the assessment of implications in the situations of before, during and after the implementation of electronic-based performance measurement systems. The assessment was analyzed in different subjects of implications such as business benefits, business performance and strategy, management decisions, management style and etc. Positively, the results showed at least some improvements or significant improvements in most related subjects even though a small number of weaknesses were responded. The benefits included the production of more transparent or visible information and improved accuracy, reliability and credibility of performance information while creating better understanding and awareness of important issues. Besides, it increases the confidence of higher management people of decisions making and encourage them to be actively involved with management style while working more effectively as a team. It also simplifies the communication between the higher management and employees.

2.5 Application of Balanced Scorecard (BSC)

Since the introduction of BSC by Kaplan and Norton in 1990, organization-wide started to implement it into the work of performance management in order increase the effectiveness of the organization’s performance. Some success factors of scorecard implementation were highlighted by Chan (2004) (cited by Greatbanks and Tapp, 2007) which include “top management commitment and leadership buy-in; department, middle manager and employee participation and buy-in; culture of performance excellence; training and education; keeping it relatively simple, easy to use and understand; clarity of
vision, strategy and outcome; link of balanced scorecard to incentive; and resources to implement system”.

2.5.1 The Benefits of Applying Balanced Scorecard (BSC) in Organization

It is studied that by adopting Balanced Scorecard in an organization, it helps to improve managerial decision making. Through the experiment done by Lipe and Salterio (2002), participants felt that the embracement of BSC format enables performance measures to be logically organized and also usefully categorized. Information is divided into categories where assessment is done on each group and finally, these assessments are to be combined. However, implementing the BSC format does not influence the judgment or evaluations of the managers. Besides, it is claimed by Ahn (2001) from the analysis of an experience report, the use of Balanced Scorecard is proved to meet the certainty for strategy-oriented action planning and budgeting especially as an aid for communicating-strategy and a comprehensive management tool. In addition, through the case study done by Braam and Nijssen (2004), they concluded that the effect to use BSC as strategy-focus influence on the overall company performance was significant and positive. The benefits in adopting BSC as experienced by organizations include the encouragement of strategy operational motivation by translating strategy into performance measures and goals. It directs the focus of the organization to what needed to be done in order to produce excellent in their performance. Furthermore, it acts as an integration medium to all the performance enhancement programs. Responsibilities of each member of the organization are decomposed so that a clearer view can be seen of required tasks in order to improve the organization effectiveness. Comprehensive view is provided while eliminates the traditional idea of putting organization into isolated, independent functions and
departments (Kaplan and Norton, 1996; Garisson et al., 2003 cited by Cronje and Vermaak, 2004).

2.5.2 Balanced Scorecard (BSC) in Education Sector

Most countries are putting high concentration and large investment on university education as to maintain their status in international competition (Chen et al., 2006). It has been studied that BSC has been widely being adopted in business sector as a performance management tool but its concept is rarely being applied in education sector (Karathanos and Karathanos, 2005). While universities have been encouraged to teach the increasing number of students in the increasing numbers of specializations and disciplines, they are also demanded to pay concentration to quality of teaching and educational programs (Smeby, 2003). Therefore, many institutions have taken the initiative to ensure their quality and excellence by adopting effective performance measurement tool. One of the responses is the Balanced Scorecard (BSC) which is customizable to fit into universities in order to serve the purposes according to the needs. While BSC has been proven to be an effective tool for performance management in business organizations, it is possible to embed this tool in academic area as well. In fact, the early placement in business provides better thoughts for BSC to be readily translated into the academic area by changing the basic elements and to perform required interpretations of BSC into the academic environment, (Dorweiler and Yakhou, 2005). Dorweiler and Yakhou (2005) have suggested some of the elements translation such as the perspectives in university strategy, academic administration objectives; the procedures in developing scorecard in the context of academic administration performance evaluation and the scoring board as well. It is also claimed by Chen et al. (2006), the introduction of BSC in universities requires the agreement of all staffs in order to produce a workable instrument. The execution involves
the people right from the top-level down towards the lower-level and therefore, communication plays the important linkage through the cause-and-effect relationships. In addition, they concluded that BSC has been proven to be a performance management system and a strategic management tool.

2.5.2.1 Examples of BSC Adoption in Education Sector

From the related research studies, a few examples of BSC application in education sector were found. It has been the effort of Praneetpolgrang et al. (2006) to propose a strategic model for the evaluation of Information and Communication Technology (ICT) in universities by having BSC as the template for the model and focused on both management and measurement systems. Meanwhile, in 2000, Sutherland presented that Rossier School of Education at University of Southern California applied BSC as an assessment tool for its academic program and planning process. Karathanos and Karathanos (2005) reviewed learning institutions who adopted BSC with different defined measures and these institutions received education awards in 2001. A survey of 69 among accounting department heads conducted showed that in overall, there is agreeable and support that the application of BSC and its benefits to accounting education programs (Ivy, 2001). Similarly, like other organization, realizing the potential of BSC, the Management, Social Sciences and Informatics University in Lisbon, integrated scorecard into the Decision Support Systems for University Effectiveness and Efficiency (DSS-UEE) project as the scorecard enables strategic planning and dissemination to all levels, allows necessary initiatives taken for execution of strategy and finally, consist performance measures which allow quality-driven information management in the University. These examples have successfully indicated that it is agreeable in world-wide for the acceptance of BSC in
education sector and it has brought into attention as a way to enhance the quality and excellence of academic area.

2.5.3 **Comparison of Balanced Scorecard (BSC) in business/profit-seeking organizations**

Earlier research studied that Balanced Scorecard model has proven to be as a useful performance measurement tool within the private or business sector as management instrument. It can be a two-way learning between business and non-profit organizations. Performance, which has been the center of attention in business organizations has resulted the development of efficient and strong management tools. Non-profit organizations such as education institutions should learn from business organizations while developing educational objectives and standards. In contrast, business organizations can learn from non-profit organizations for mission management. However, the exact translation of techniques from business organization into non-profit organization is not easy as the differ variety of important aspects serve as barriers over the translation (Boyne, 2002, cited by Greatbanks and Tapp, 2007).

In Malaysia, BSC concept has widely adopted by many business companies to determine their performance status such as Telekom Malaysia Berhad, Tenaga Nasional Berhad, Petronas, Ericsson, and Mobil Oil. The characteristic of business organization is dissimilar compared to non-profit organization as it is performing with commercial purpose and revenue is gained to support its mission. Applying the same typical set of performance metrics in non-profit organizations as business organizations is most likely ineffective due to the different goals of both sectors. Business organizations focus primarily on shareholder value while non-profit organizations concentrate on the
attainment and effectiveness of mission. Funding is well-supported and channeled by
government or other agencies in non-profit organizations whereas funds in business sector
are necessitate, which come from many sources, depending on the company’s financial
needs. Therefore, profit-seeking organizations primarily focus on financial objectives
while non-profit organizations concentrate on the objectives of organization’s members.
This highlights the biggest difference in the financial aspect of Balanced Scorecard which
resulting the changes of hierarchical order of the perspectives where financial perspective
is placed at the lowest level in the Balanced Scorecard model of non-profit organizations.
Therefore, perspectives in Balanced Scorecard are commonly modified and changed
accordingly, corresponding to the environment. Alterations are to be made to the scorecard
to fit for organization’s circumstances.

Profit-seeking organizations put their greatest concern on the output product; price and
services that must reach their requirements without really concerning internal efficiency.
Their main audience would be their customer satisfaction while non-profit organizations
concentrate more on stakeholders’ satisfaction. Therefore, in public sectors, internal
performance needs to be focused as to attract the interest of investors to fund the particular
organization. Financial perspective may be less critical while other perspectives needed to
be put at higher level or concentration.

2.6 Putting Balanced Scorecard into Automation

Through the previous research, it is found that BSC has been commonly adopted by
many organizations nowadays. Information Technology (IT) support is needed in realizing
the success of BSC implementation and therefore it attracted many software vendors to
start developing software packages for BSC solutions (Marr and Neely, 2003). Spreadsheet
tools might be needed at the start point to outline the design of balanced scorecard in the organization but however, automation would be necessary for effectiveness of the implementation (Classe, 1999 cited by Marr and Neely, 2003). In addition to that, Mar and Neely (2003) highlighted the disadvantages of using the standard spreadsheet tools which include no visible scalability, require plenty of time to perform data updating as manual work is needed, the spreadsheets which separately stored in places result the weakness in collaboration and communication; and the difficulty of analyzing work especially to integrate all the spreadsheets to come as one for analysis. In supporting the need of automating the scorecard, Sharman and Kavan (1999) opined that paper-based measurement system is time-consuming, cumbersome, requires labor intensive and not reliable (cited by Marr and Neely, 2003). By putting Balanced Scorecard into automation, academic staffs would have more freedom and flexibility to perform the measurement tasks.

2.7 Comparison of Other Performance Measurement Techniques Compared to BSC

It is undeniable that there are many other existing common performance measurement techniques used by organizations to evaluate their performance and achievements. Examples of techniques include Benchmarking, Key Performance Indicators (KPIs), Performance Appraisals, Six Sigma and Goal Question Metrics (GQM). Each technique has its own strengths and suitability, depending on the aims, requirements and the necessities of the organization. Benchmarking is quality process used to make performance comparison between organizations which having the same line of activities. However, it is more appropriate to be used to encourage good practices in order to pursue good performance in organization as a whole rather than evaluating or improving individual staff’s performance. Also, it might be unfair to force staffs to get into the shape of the
successor as every person is dissimilar and has their own way of working. In addition, benchmarking is lagging indicator which is based on previous measures instead of the current place (Parker, 2000). Key Performance Indicators (KPIs) are quantifiable measures used to reflect the performance or indicate how successful of an organization. It is agreeable that it is useful as it provides both financial and non-financial measures which connected to set of objectives goals. However, it is more functional to implement KPIs into scorecard which specifically tells area of focus and how the connection objectives or goals of the organization. Performance appraisals are used to evaluate the performance of employees against some standards or expectations. It acts as an indicator of telling how well the current performance of an employee while directing them to future improvements. Unfortunately, the wide area of evaluation may fail to give employee a clearer picture of the actual target they expect to achieve and the specific area for improvement. Overrating or appraisal with no measureable proofs may result inaccurate judgment by superior which gives a faulty performance appraisal of an employee. Therefore, a reliable and accountable appraisal report can only be achieved when both superior and employee understand well each other and superior must able to give accurate ratings. GQM structured model applies strategy into planning and keep track the levels of a project. When goal is established, a set of measurements is defined by linking a number of questions to the goal. However, this performance measurement technique is used as the evaluation of projects instead of assessment, specifically on the individual’s staff. Compared to these performance measurement techniques, the beneficial of Balanced Scorecard (BSC) does not only offer performance measurement of the organization as whole, but also provides individual performance measurement as well. While retaining the measure of financial aspect, it also provides a comprehensive view of the organization inclusively other aspects that should be taken into account for the success of the organization. The bond of KPIs and strategy in
BSC enable an effective and powerful performance measurement solution that reflects the level of achievement while leading individuals towards the goals or strategy of the organization.

2.8 Aspects to Consider for the Implementation of BSC Performance Measurement Systems

There are four factors that are believed to influence the growth of performance measurement system include process, people, infrastructure and culture. Likewise, according to Papalexandris et al. (2005), components such as structure, processes, people and technology should need to be considered for the implementation of BSC project. Besides, other critical supporting factors that contribute to the success of the project include change management, risk management and quality assurance, information technology (IT) and project and process management. The introduction of new BSC performance measurement system brings in changes into the environment of the organization and therefore, efforts are needed to ensure the people in the organization are motivated to change and able to adapt to the new environment. Risk management efforts such as risk assessment and risk control are taken into place at the beginning of the implementation so that the organization is well-prepared with the uncertainties and having the mitigate actions in facing it. Meanwhile, quality assurance concerns on the suitability and the quality of the solution if it effectively fits into the organization and meets the defined requirements. Operating the solution with the support of information technology adds in as the enablers and enhances the coordination and control abilities. Project and process management aspect need to be considered as BSC project implementation requires involvement of employees from different departments and every implementation process need to be ensured to work timely, accurately and within budget. Waggoner and colleagues
(1999) argued that the realization of successful performance measurement system should take into account some transformational barriers. The biggest obstacle will be the resistance of employees to change to the new environment from what they have used to. It is all depend on the organization’s culture which plays the significant role to encourage and shape the organization effectively responds to the changes.

2.9 Suggestion of Individual Performance Measurement Score

It is suggested by Kaplan and Norton (1996) of the inclusion range 4-7 measures in each perspective of the BSC performance measurement would be adequate (cited by Lipe and Salterio, 2002). In addition to that, research shows that people are limited to the capability of generating of 7-9 items of information concurrently (Baddeley, 1994; Miller, 1956, cited by Lipe and Salterio, 2002) and this is agreed by most experts where decision-makings are only made possible on the management of relatively small number of items at once (Atkinson, 1998). Suggested by Atkinson (1998), one of the ways to turn the chosen set of performance measures into an overall index performance score is by developing performance score for each defined measure. The overall score is achieved by accumulating the weighted sum of all the individual performance scores. Another recommendation of measurement is to allocate a mid-range score (or a target level) to determine if individual is underperformance (below mid-range score) or performs more than expected (above mid-range score). The mid-range score can be adjusted to increase the level of difficulty.
2.10 Gaps in Research Area

Realizing the potential of using Balanced Scorecard (BSC) as the performance management framework, this has raised the interest of researchers into the issues of the BSC adoption to increase organizations effectiveness. However, it is found that little empirical evidence is given to the investigation of the usefulness and effectiveness of BSC application in education sector. In support to this, Chen et al. (2006) concluded that the application of BSC is less apparent to the education sector of Taiwan. Plus, there is no in-depth study of the goals and suitable measures for the evaluation of academic institutions (Dorweiler and Yakhau, 2005). Added by Cronje and Vermaak (2001), the extension of research should be done to judge on the meaningful goals and measures across the universities world-wide. Besides, most studies are done on the implementation of BSC for performance management of the organization as a whole instead of individual performance management.

The importance of measuring the performance of the main character that plays an important role of knowledge transfer in the education institutions, the academician, has captured little attention from the researchers. Academicians who act as the value generator that largely contribute to the performance of education institution are supposed to be measured to guarantee the institution’s performance. Nevertheless, the current focus of academicians’ performance receives small significance especially BSC is not well-applied in education sector.
.11 Comparison of existing web-based Balanced Scorecard applications

A few existing BSC products have been reviewed to identify the initiatives and manners in building a web-based application. The review is used as a reference to distinguish the elements, features, functionalities and the fundamentals required for the development of the proposed system.

.11.1 Performance Management Software QPR Scorecard (QPR Software Plc, 2008)

- Provides a robust performance management tool that helps your organization plan, implement, communicate and assess strategy, commit your people to objectives, improve performance and foster a collaborative management environment that will help you lead your organization to success.

- Easy to use and quick to master with an easy to understand, intuitive user interface. Its top-down approach speeds implementing your performance management system and because it is web-enabled, it ensures that rolling out performance management in organization towards an enterprise-wide exercise will be swift, easy and convenient.

- Flexible, allowing decision on the perspectives for organizing business performance, targets, as well as the drivers for achieving your targets.

  Supports all performance management methodologies (BAM, EFQM, Malcolm Baldridge, Balanced Scorecard etc

Advantages:

- Create strategy awareness (using strategy map which enables communication and assessment of strategy, which illustrates the cause and effect assumptions when defining strategy. It allows cascading from the corporate level all the way down to
unit, team or individual levels, allowing employees to see how their individual objectives and actions contribute to the overall goals of your organization.

- Monitor, Analyze and Benchmark Performance
- Commitment to reach objectives
- Get Fast Results
- Fast and flexible Scorecard Modeling
  
  Always up-to-date Performance Information

.11.2 CorStrategy (Rocket Software Inc., 2008)

- Efficiently executing the strategic plan of a complex modern enterprise is often a challenging task. Aligning day-to-day operational activities with the strategic objectives can be even harder.
- Highly functional and highly scalable in automating methodologies such as the Balanced Scorecard, Six Sigma, etc.
- CorStrategy’s comprehensive list of features includes interactive scorecards, strategy maps, strategy focused dashboards, automated workflows to gather performance data, pre-built reports and views, along with cause-and-effect modeling and forecasting of performance outcomes (lagging indicators) based on performance drivers (leading indicators)
- CorStrategy ties performance metrics and initiatives to strategic objectives, so that performance can be measured, accountabilities monitored, workflows automated, communication encouraged and informed decisions made. CorStrategy helps to manage performance, not just measure it.
Advantages:

- Communicate the business plan to those who are responsible for executing it.
- Link key performance indicators and key initiatives to strategic objectives.
- Align employee behavior to strategy execution and provide a clear line of sight from their daily activities to the organizational strategy.
- Eliminate projects and redirect resources where initiatives are not aligned with strategic objectives.
- Manage key drivers of business performance with personalized dashboards, scorecards, briefing books and interactive business analysis.
- Enforce corporate governance through an automated performance management process that provides visibility, control, and accountability.

.11.3 Host Scorecard – Web based Balanced Scorecard and Dashboard Software (Host Analytics Inc, 2008)

- Continually monitoring and measuring your corporate goals and progress against those targets across the organization is critical in business performance management. Balanced Scorecard software HOST SCORECARD enables you and employees across the entire organization to access a snapshot of performance against goals without having to search through analytical reports. With charts and graphs, tracking your performance against your targeted goals is easy.

Advantages:

- Web-based: Balanced Scorecard software HOST SCORECARD is a Web-based application used to align the entire organization around strategic goals and...
objectives while providing the ability to track individual performance against those objectives

• *Link Key Performance Indicators with Objectives*: Provide the organization with a simple to use tool for tracking their progress toward meeting strategic goals.

• *Robust Visualization*: Quickly understand through visual charts and graphs how the organization is performing against key performance indicators

• *Improve Accountability and Transparency*: Provides users with an understanding of the role they play in meeting corporate goals and objectives. It enables them to measure their own success and provides management with more transparency.

• Collaboration: Enable departments and business units to clearly understand how their progress affects other areas of the business.

• *Hierarchical Scorecards*: Create multiple levels of scorecards such as Corporate, Strategic, Business Unit, Department or Individual.

### 2.11.4 PM Express™ (PM Express, 2008)

• The quickest, easiest way to build and manage a distributed solution for Balanced Scorecards and basic Performance Measurement. It is a packaged product which can be installed and configured in less than a day. It runs in conjunction with a standard Web Server, providing instant access to critical performance information and Balanced Scorecards for authorized users, at any location.

• Identify, implement, track and report a balanced set of performance measures which represent critical success factors for your enterprise.
Advantages:

- Simple, flexible, web-based Balanced Scorecard manageable solution to support bottom-line results tracking, Total Quality Management, proactive Decision Support, and cause-end-effect analysis.
- It works with your Organization, Mission, Strategy, and Objectives. It accepts and uses your specific metrics and parameters, and it collects and manages your planned and actual values.
- It provides online dynamic queries and instant graphing of performance results and trends, using historical and current data, all through an easy-to-use web-based interface.

2.11.5 Spider Strategies' Corporate Management Suite (CMS) (Spider Strategies, 2008)

- Web-based performance management software.
- **People**: CMS provides everyone in your organization with secure, up-to-date information from any web browser.
- **Processes**: Use powerful tools like Balanced Scorecards and Metric Analysis to track strategy and performance. Assign tasks and track results for accountability.
- **Paper**: Create, view, and print reports. Export to Microsoft Office applications. Manage and track changes to shared documents.
Advantages:

- CMS's power lies in its flexible architecture. Built to support a wide range of performance management methodologies, CMS allows you to use a particular approach, or design your own.
- CMS integrates scorecards, action planning, meeting management, document management, and key metric reporting.

2.11.6 Summary of existing web-based Balanced Scorecard applications

From the review of the existing web-based Balanced Scorecard applications in the market, the similarities of the products are notable. The significant strengths of the applications are selected so that it can be used as reference for the proposed system. The core elements that need to be implemented into the system include interactive scorecards, strategy maps, a well-constructed workflow, cause-and-effect modeling, performance outcomes and drivers; and analytical reports (charts and graphs). It is believed that a good web-based Balanced Scorecard application must be able to link organization plan, strategy, objectives, mission and vision; and goals to the organization day-to-day routine. Corporate level is cascaded down to unit, team or individual and employees are ensured to be clear of their contribution to the overall goals of the organization. From time to time, employees’ performance is monitored and analyzed. An efficient system must provide the ease of use and convenience for users to learn at a minimized time. Flexibility and up-to-date information are other factors that need to be considered which allow effortless decision-makings especially on the organization performance, targets and measures. Final results
should be obtained fast and represented in analytical reports with the illustrations in charts and graphs.

### 2.12 Comparison of Development Tools

Besides conducting the literature reviews on the related research topics, some information of the development tools are explored as well. This is to distinguish what are the development tools to be used that fit the development of the proposed e-BSC system.

#### 2.12.1 Scripting languages

Scripting languages are programming languages that are embedded within HTML tags to make Web pages to be more attractive and interactive. By using scripting languages, the content of the Web pages can be easily modified at the time when the page is downloaded. It adds functionality of the website that cannot be performed by using HTML tags. Besides, graphical user interface (GUI) elements can be created by these scripts while linking it to form controls such as buttons, text fields and etc. The scripts also provided the utility to check for authenticity especially for security purpose such as through username and password checking. Events can trigger the scripts to respond such as button selection, form submission and mouse actions. Generally, there are two types of scripting languages which are client-side scripting language and server-side scripting language.

#### 2.12.1.1 Client-Side Scripting Languages

Client-side scripting languages perform execution on the client computer. This script executes when a page is downloaded on the client computer or there is any activation happens such as a link is activated. This kind of scripting language is designed to reduce the processing load of server that it does not need to handle the whole processes. By
having client-side scripting languages, it also helps to reduce the network traffic that is reduces the work load. However, it cannot perform interaction with database server or accessing any local files or directories.

2.12.1.2 Server-Side Scripting Languages

Server-side scripting language executes on the server side. It performs more complex tasks compared with client-side scripting language and requires a lot more of processing power. All processes are performed before a Web page is sent over to the browser to be displayed. Therefore, it hides all the complex code from the users while just displayed the final result. Besides, the independency of server-side scripting language where all codes processing is done on the server allows no specific browser to be used as there is no impact on the processing work. However, the usage of server-side scripting needs high-configuration server and to perform complex tasks, it might require lot of processing speed and slows down the web site.

2.12.1.3 Comparison of Some Scripting Languages

In the market, there are a number of scripting languages being used by web developers that include the common ones, PHP, Perl, ASP and JSP. Every language has its own advantages and disadvantages. To make the right choice of web programming language, it depends on the user’s requirements, their budget and also the size of the organization. Besides, client-side scripting language that interacts with the user’s computer is used together with server-side scripting language that interacts with the server in order to produce web pages.

Below are some comparisons of the common web programming languages:

*Server-Side Scripting Languages:*
i. **PHP** - PHP (HyperText Preprocessor) scripting language is used to allow the content of websites to be dynamically changes and it is grown to be one of the most used web programming languages. PHP is an open-source language which works well on all operating system platforms. Mainly, it uses My SQL server for the database connectivity which can be access freely. The codes for PHP is simpler and easier to be understood compared to other languages. Besides, with the in built memory space, it enables the applications to run faster and reduces the processing time.

ii. **Perl** – Practical Extraction and Report Language (PERL) is an older language compared to PHP and performing well in the environment of Unix, MAC OS, Windows and Virtual Memory Systems. It was used earlier to write Common Gateway Interface (CGI) scripts, which was the first program for communication and dynamic interaction between web servers and users. Perl’s syntax is comparable with C programming language that focuses on procedure and structures. Perl is also influenced from shell scripts which are command line interpreters for operating systems and having the interface where users can make requests. Also, it is an open source programming language which is accessible by users.

iii. **ASP.NET** – ASP.NET is one of the commercial product language provided by the Microsoft Product Technology. It is one of the choices for programmers, besides PHP, to develop dynamic database oriented websites. ASP (Active Server Pages) is used with IIS (Internet Information Server) to run the applications successfully on the windows server platform by having MS SQL Server which is also the product of Microsoft, for database connectivity. Therefore, choosing ASP.NET language may required higher cost compared to other open-source languages. Although it is a high-cost language, it offers high security control with safe protections. This is one of its
advantages that make it into the choice of developers compared to those open source languages which have lower security protection.

iv. **JSP** – JavaServer Pages (JSP) technology which is part of the Java technology family that provides the ease to create dynamic web pages and simplify the steps of building web applications that work with web servers, application servers, browsers and development tools. JSP allows rapid web applications development which are platform-independent. User interfaces are separated from the content generation so that designers can make modifications on the page layout without affecting the underlying dynamic content. The advantages on JSP pages include the ease of static templates combination such as HTML or XML fragments with codes to generate dynamic contents, the dynamical compilation into servlets allows easiness of update the codes, JSP tags for invoking JavaBeans reduce the complexity of application logic and it allows developers to customize JSP tag libraries.

**Client-Side Scripting Languages:**

i. **Javascript** – To have a clear clarification, Javascript is not part of Java programming language. Javascript is a scripting language developed by Netscape Corporation which is used for the development of web pages while Java is a real programming language. Javascript is prototyped-based language which embedded into the HTML tags to perform the functions and control structures. Some examples of functions included by JavaScript include automation in changing the webpage formatted date, linked-to page for popup window display and text or image change during mouse rollover. JavaScript code is embedded in HTML pages to be interpreted by web browser or client.
ii. VBScript – VBScript is preferable in business applications because of its non-case sensitive type of variables which force them to have declarations in all variables, dynamic resizable arrays and multi-dimensional arrays which resulted better understanding. It is part of Visual Basic programming language for interpretation by web browsers. VBScript is used with Microsoft’s Internet Explorer web browser with the implementation of other programming which runs at the client side. Microsoft supports Netscape’s JavaScript even though Netscape does not support VBScript on the other way.

2.13 Comparison of Some Development Methodologies

i. Waterfall

   Waterfall provides sequential, orderly structure of development steps where each phase consists of definite set of activities and the deliverables must be completely down before entering into the next phase. The advantages of waterfall include the ease to analyze the potential changes, the ability to manage large teams and predictable budgets. However, this methodology is lack of flexibility and hard to predict the actual needs for the software. It also provides weaknesses in testing as flaws are only seen during the final phase.

ii. Prototyping

   Prototyping is a cyclic model where after the requirement analysis process is done and the design for a prototype is made, the development phase starts. The create prototype will be presented to customer for evaluation purpose in order to get the feedback for the refinement of the product until their requirements and expectations are achieved. This is one of the popular methodologies as the
requirements from customer cannot be comprehended in one time. Prototyping allows better understanding of system requirements and investigate the risk of the specific design. It also serves to be a communication tool between the developer and customer and encourage active participation.

iii. Spiral

Spiral model extends the waterfall model by introduce prototyping into the model. In this model, initially, users and system requirements are captured and a preliminary designed is constructed to produce a first prototype to represent the first draft of final product. Second prototype is evolved after the evaluation of the weaknesses, strengths and risks from the first prototype. Second prototype is designed, constructed and to be tested. Second prototype is tested with the same manner of first prototype or if necessary, another prototype is produced to get the better output. The steps are repeated or iterated until the final refined product meets the customer satisfaction and desired output is obtained. Routine maintenance may need to be carried out continuously to prevent any failure and minimize down time.

2.14 Conclusion

The literature reviews on the related topics contributed insights for the research on performance planning and measurement in the context of higher education institution encompassed the performance of academicians while providing ideas for the prototype development of e-BSC performance measurement tool. Performance planning is crucial as to set early expectations and targets while channeling the staffs’ efforts towards the performance achievement. Whether or not, the plans are accomplished, the following step of performance measurement need to be done to assess the level of achievement. The
effectiveness of performance planning and measurement involves processes that need to be arranged carefully and some success factors need to be considered. Previous researches have shown the evidence that the adaptation of Balanced Scorecard has seen to promote positive impacts towards the performance management of organization. Besides, automating and putting the scorecard into electronic-based proven to be beneficial and it is encouraged. From the comparisons of the development tools, decision can be made to choose the suitable tools for the development of the e-BSC system prototype.