Received 28 February 2013
Revised 5 August 2013
Accepted 21 August 2013

Determining improvement needs in higher education benchmarking

Muhammad Asif
College of Business Administration, Prince Sultan University, Riyadh, Saudi Arabia

Abstract

Purpose – A critical step in all benchmarking methodologies is "to determine what to benchmark." Although benchmarking methodologies have been noted in the literature, the need has arisen for the development of structured approaches to determine priority improvement needs. The purpose of this paper is to provide a framework for determining improvement needs in higher education benchmarking.
Design/methodology/approach – The paper makes use of the analytic hierarchy process to develop a framework. The application of the framework is demonstrated through a case study.
Findings – The framework discussed in this paper is consensus-based, allows different viewpoints to be integrated, and promotes input to and ownership of the decision making process and its outcomes. The feedback of the participants confirmed the usefulness of the approach.
Practical implications – The previous research has established that determining improvement needs in benchmarking was mostly unsystematic and ad hoc based. And failures in precisely determining improvement needs can result in a lack of alignment between processes to be benchmarked and strategic priorities of higher education institutions (HEIs). The developed framework can help determine priority improvement needs aligned with the strategic priorities of the HEI.
Originality/value – Since continual improvement is an essential element of all quality initiatives, the framework provides a starting point for benchmarking as well as other improvement initiatives such as total quality management.

Keywords Benchmarking, Continuous improvement

Paper type Research paper

Introduction

The growing need for performance excellence in higher education institutions (HEIs) requires continual improvement. Sharing good practices and learning from others – also called benchmarking – is an essential part of continual improvement. Benchmarking is generally defined as the search for best practices that will lead to superior performance. It is a continuous process of comparing an organization's processes against best practices anywhere in the world to gain information which will help an organization to improve its processes (Lema and Price, 1995). Since the purpose of benchmarking is continual improvement, it is conceptually very close to quality management and business excellence. While the informal sharing of good practices and learning from each other has been in practice since long in HEIs, interest is growing in the formalization and developing systematic approaches to the use of benchmarking.

Benchmarking requires several organizational resources such as, informational, human, financial, material, and infrastructural. Like many other organizations, HEIs have limited resources. Management should be clear on what to benchmark and the processes to be benchmarked must be prioritized. Although methodologies for benchmarking have been discussed in literature, there is, in general, a scarcity of literature on how to identify improvement needs in benchmarking projects. Furthermore, the literature notes that

Benchmarking: An International Journal
Vol. 22 No. 1, 2015
pp. 56-74

1463-5771
DOI 10.1108/BIJ-02-2013-0025

process selection practices in benchmarking are ad hoc based and do not employ a systematic approach to determine priority improvement needs (Carpinetti and De Melo, 2002; Fielden, 1997; Longbottom, 2000). An inability to precisely determine improvement needs can lead to wastage of efforts and organizational resources (Partovi, 1994; Spendolini, 1992). It also carries the risk of lack of alignment between processes to be benchmarked and strategic priorities of the HEI. The need, therefore, arises for the development of methodologies to systematically determine improvement needs in benchmarking projects.

The key contribution of this paper is that it provides a structured framework for selecting processes to be benchmarked in higher education (HE). The paper makes use of the analytic hierarchy process (AHP) to provide a framework that is consensus-based, allows different viewpoints to be integrated, and promotes input to and ownership of the decision-making process and its outcomes. The rest of the paper is structured as follows. The next section provides an overview of the literature on benchmarking. A framework for determining improvement needs is then discussed. This is followed by a case study to demonstrate the selection of key processes for benchmarking. The paper ends with conclusions.

An overview of the literature

Benchmarking is defined as "a continuous, systematic process for evaluating the products, services, and work processes of organizations that are recognized as representing best practices, for the purpose of organizational improvement" (Spendolini, 1992, p. 9). Several other definitions have also been provided in the literature, see for example, Besterfield *et al.* (1999), Bhutta and Huq (1999), Camp (1989), Jackson and Lund (2000), Lema and Price (1995), and CHEMS (1998). The common elements in these definitions are "search for best practices," "collecting information about best pr actices," "improving performance," and "benchmarking as a continuous process" (Anand and Kodali, 2008; Dattakumar and Jagadeesh, 2003). The initial work on benchmarking was carried out at Xerox Corporation to compare its operating costs, product features, and operating capabilities against its competitors. Benchmarking is now well established and a large number of organizations benchmark their processes, products, and performance on a regular basis (Lema and Price, 1995).

Benchmarking in HEIs can be integrated with other performance improvement initiatives, including performance indicators (PIs) and standards for performance excellence. For example HEIs can benchmark PIs as well as the whole performance measurement system (Nedwek and Neal, 1994). Other improvement initiatives – such as Education Criteria for Performance Excellence (ECPE) and accreditation standards – require benchmarking as one of their essential elements. An overview of these approaches and their links with benchmarking is provided in the following section.

PIs

PIs are used to track and improve performance (Nedwek and Neal, 1994; Taylor and Massy, 1996). Their use in HEIs has gained widespread recognition as funders, governments, and donors are increasingly linking the funding of HEIs with PIs (Taylor, 2001). The use of PIs is also required to address the demands of stakeholders for accountability, transparency, and acquisition of information (Smith *et al.*, 1999). PIs can be classified by the category they belong to, e.g., research, teaching, financial, and service performance (Nedwek and Neal, 1994). The examples of research related PIs include number of research publications, research projects, patents, and spin-offs from main

research stream, etc. (Asif and Raouf, 2013; Badri and Abdulla, 2004; Nedwek and Neal, 1994; Taylor and Massy, 1996). The examples of teaching related PIs include number of graduates, dropout rate, percent of students with a particular GPA, and graduates employment rate, etc. (Nedwek and Neal, 1994; Patrick and Stanley, 1998). The examples of service PIs include number of programs designed, community service, and student counseling, etc. (Badri and Abdulla, 2004). PIs are very useful in tracking and monitoring performance, and thus provide a means for targeted performance improvement. However, PIs also have certain limitations: several PIs currently in use are unable to fully capture the dimension of academic work (Taylor, 2001); mapping of key PIs is difficult given the subjective perceptions of those involved in mapping process (Badri and Abdulla, 2004); and PIs do not trigger improvement on their own, they need to be integrated into a broader improvement program – such as benchmarking – that uses organizational resources and a structured approach for performance improvement (Nedwek and Neal, 1994; Patrick and Stanley, 1998). One aspect of the integrated use of PIs and benchmarking is the development of composite index which is used to measure the overall performance of a HEI in terms of research, teaching, and service performance (Kells, 1992; Lukman *et al.*, 2010). Composite index is then used to compare and benchmark performance of HEIs against best performers (Suryadi, 2007).

Standards for excellence in HE

A number of guidelines and standards exist to facilitate systematic improvement in HEIs. Some notable examples include the ECPE, The Association to Advance Collegiate Schools of Business (AACSB) international standard, European Quality Improvement System (EQUIS) and the Association of MBAs (AMBA), among many others. The ECPE – the education version of the Baldrige criteria – is not an accreditation standard rather provides a self-assessment model. The AACSB international, EQUIS, and AMBA regulate the quality of business schools. In the following section the ECPE and the AACSB international standard are briefly discussed. The reason for their selection is that the ECPE provides a generic self-assessment model that applies in every HEI setting irrespective of the type of education – business, medical, or engineering education, etc. The AACSB international is the most popular accreditation body. It accredits more than 680 business schools all over the world (AACSB, 2013).

The ECPE provide guidelines to achieve educational excellence. The criteria requires HEIs to assess their performance, diagnose its overall performance, and identify strengths and opportunities for improvement (ECPE, 2011). The ECPE is considered the most comprehensive means for achieving performance excellence in HE (Asif *et al.*, 2013; Badri *et al.*, 2006). The criteria, however, lacks theoretical underpinning and has not been tested for content and internal validity (Asif *et al.*, 2013). Nonetheless, the criteria is widely used, and an essential requirement of the criteria is benchmarking performance in the areas of leadership, student learning strategies, educational program, and the overall performance of the HEI (ECPE, 2011). HEIs, therefore, need to institutionalize benchmarking practices in order to achieve performance excellence.

The AACSB international standard is designed to enhance the quality of business schools, promote continual improvement, and provide better stakeholder management (AACSB, 2013). The 2013 version of the standard requires HEIs to focus on four key areas of HE, including "strategic management and innovation," "management and development of students, faculty, and professional staff," "learning and teaching," and "academic and professional engagement." The new standard emphasizes

distinctiveness in the goals, characteristics, priorities, focus areas, or approaches of the school that are special or notable. The distinctiveness should be reflected in the mission of the school and expected outcomes and strategies. Although the standard provides a system for enhancing the quality of business schools; it has been criticized for promoting isomorphism, that is "the constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions" (DiMaggio and Powell, 1983, p. 149). As a result of such mimetic pressures the potential voice of business school research in social and economic issues is diminished (Wilson and McKiernan, 2011). Nonetheless, AACSB international accreditation remains popular among business schools. The standard has an explicit focus on innovation, benchmarking, and systematic continual improvement (AACSB, 2013). The possible areas for benchmarking may include program design, program delivery, faculty performance evaluation system, student assessment techniques, and research infrastructure, etc.

The role of benchmarking in HE is critical. It can take the form of independent benchmarking project, integrated with the use of PIs, or as an essential requirement of the ECPE or other standards. The following section presents methodologies for benchmarking.

Methodologies for benchmarking

A number of models for benchmarking have been discussed in the literature. Anand and Kodali (2008), Dattakumar and Jagadeesh (2003), and Yasin (2002) carried out a review of literature on the various aspects of benchmarking and benchmarking models. The review shows the existence of more than 60 benchmarking models (Anand and Kodali, 2008). Some representative examples of these approaches include Xerox seven-step approach (Camp, 1989), Spendolini (1992) five-step process, Alcoa's six-step process (Bemowski, 1991), Drew's five-step process (Drew, 1997), and Bhutta and Huq (1999) five-step model, among many others. These approaches are similar to each other but have been tailored to incorporate the unique experiences of their authors (Partovi, 1994). Central to all these approaches are "determining benchmarking needs," "identification of benchmarking partner," "data collection," and "process improvement" (Dattakumar and Jagadeesh, 2003; Yasin, 2002). Some illustrative examples of benchmarking approaches are provided in Table I.

As shown in Table I, a common starting point in all benchmarking methodologies is to identify improvement needs (Bemowski, 1991; Camp, 1989; Drew, 1997; Spendolini, 1992). Further, Anand and Kodali (2008) also found in their review of benchmarking models that the first step in most benchmarking models is "identifying improvement needs." However, determining improvement needs is not straightforward and problems have been reported in the literature. Longbottom (2000), for instance, noted problems in benchmarking in the British companies and found that project selection was mostly ad hoc based rather than need based. Commonwealth Higher Education Management Service (CHEMS, 1998) report also highlights problems in determining improvement areas in HE. Further details of such problems are provided in Carpinetti and De Melo (2002), Fielden (1997), and Longbottom (2000). The problems related to systematically determining improvement needs can be attributed to a number of factors. First, while several methodologies are available for benchmarking, literature is relatively scarce on the structured approach to determine "what to benchmark" (Partovi, 1994). Second, benchmarking projects are usually initiated by those who have strong operational

Table I.
Some illustrative examples of benchmarking approaches

Partovi (1994)	Drew (1997)	Spendolini (1992)	Xerox approach (Camp, 1989)	Alcoa's six-step model (Bemowski, 1991)	Strategic benchmarking (Partovi, 1994)	Benchmarking wheel (Bhutta and Huq, 1999)
Situation analysis	Determine what to benchmark	Determine what to benchmark	Identify benchmarking outputs	Deciding what to benchmark	Situation analysis	Determine what to benchmark
Product feature analysis	Form a team	Form a benchmarking team	Identify best competitors	Planning the project	Product feature analysis	Form a benchmarking team
Process selection (determining what to benchmark)	Identify partners	Identify benchmark partners	Determine date collection method	Understanding your own performance	Process selection (determining what to benchmark)	Identify partners
Form a benchmarking team	Collect and analyze data	Collect and analyze benchmarking information	Determine current competitive gap	Studying others	Form benchmarking team	Data collection
Identify benchmarking partners	Implement and monitor results	Take action	Project future performance levels	Learning from the data	Identify partners	Take action
Collecting and analysis of benchmarking information			Establish functional goals	Using the findings	Collect and analyze information	
Implementation			Develop functional plans Implement specific plans Monitor results / report progress Recalibrate benchmarks		Implementation	

orientation and fail to consider strategic priorities and need of alignment of operations with strategy (Carpinetti and De Melo, 2002). Finally, since quality improvement requires collective efforts (Deming, 1986), a structured framework that allows input of multiple participants – during determining improvement priorities – is yet to be developed (Partovi, 1994).

A failure to systematically determine improvement needs carries the risk of lack of alignment between processes to be benchmarked and strategic priorities of the HEI. This could lead to wastage of efforts and organizational resources. Indeed, "[the models of benchmarking] stress the importance of aligning benchmarking projects with competitive and operatoins strategy, so that organizational efforst for improvemetns are directed toward dimensions of performance critical to competitiveness" (Carpinetti and De Melo, 2002, p. 245). Many authors believe that if the initial stages of benchmarking are not managed carefully, the subsequent stages may be unproductive and even counterproductive (Camp, 1989; Partovi, 1994; Spendolini, 1992). It is, therefore, important to systematically determine "what to benchmark."

A review of benchmarking methodologies shows that it has conceptual and philosophical links to the total quality management (Zairi, 1996). Due to these conceptual similarities, some authors believe that benchmarking is more suitable to HE than any other change management program (Alstete, 1995; CHEMS, 1998). The processes in HE are knowledge-oriented and knowledge-intensive where learning from each other and continual improvement is an essential requirement. Benchmarking in HE could be carried out along core academic processes, and administrative processes that support core processes (Godfrey and Godfrey, 1999). The examples of core processes include "program design," "curriculum-development," and "program-delivery techniques," etc. The examples of support processes include "quality assurance," "self-assessment," and "accreditation," among others. The ECPE (2011) also require HEIs to identify improvement needs in their processes, identify best performers, and calibrate their processes and performance against best performers. Benchmarking, therefore, remains an essential component of performance excellence in HE, and a critical step in this process is to determine priority improvement needs.

Identification of improvement areas

Identification of priority improvement areas is critical to the success of a benchmarking project (Carpinetti and De Melo, 2002; Partovi, 1994). Recognizing the strategic importance of benchmarking, a number of researchers and practitioners have developed guidelines for identifying improvement needs. These guidelines – which are experience based and are qualitative statements – do not offer much help to decision makers in choosing alternatives on a scientific basis (Partovi, 1994). For example, Carpinetti and De Melo (2002) developed a five-step procedure to determine what to benchmark: analyze product and market, gather information on critical dimensions, map out critical processes, conduct an assessment of the critical processes and activities, and based on the assessment of processes and activities determine improvement needs. Although this model outlines the general steps for determining what to benchmark but does not elaborate on tools and techniques to be used for assessment, and how to carry out assessment.

The ECPE (2011) emphasizes on benchmarking as an essential requirement of the performance improvement initiatives of a HEI, but does not tell how to determine benchmarking priorities. Spendolini (1992) calls for the identification of "critical success factors" as a means to identify priority improvement needs, but he does not elaborate on

the approach to identify critical success factors. Altany (1991) mentions of weak areas in the value chain as possible areas for improvement need, but does not mention of any methodology to identify weak areas in the value chain. Pryor (1989) suggested three rules to select processes for benchmarking: identify one area that represents critical success factor to operations; identify areas that contribute to the greatest portion of total cost or value added; and use customer feedback to identify priority improvement needs. However, Pryor did not provide any methodology to identify critical success factors. Camp's benchmarking framework (Camp, 1989) is another example. The framework starts at a high strategic level and cascades down to individual deliverables. However, the selection methodology in this framework is judgmental and cannot provide fruitful insights into identification of benchmarking needs without the aid of mathematical analysis and relevant decision support systems (Partovi, 1994).

In the nutshell, regarding the identification of priority improvement needs, the existing models tell "what to do" – such as identifying critical success factors (Pryor, 1989; Spendolini, 1992), mapping out critical processes (Carpinetti and De Melo, 2002), and analyzing value chain (Altany, 1991) – but not "how to do." In the following section a framework is developed for determining priority improvement needs using a systematic approach.

A framework for determining improvement needs

A structured approach to determining improvement needs starts from defining the key areas in a HEI. As noted earlier, benchmarking could be carried out for core academic processes as well as support processes. In addition to processes, HEIs may also choose to benchmark organizational structures required for performance excellence, for example, research-infrastructure, system for feedback collection and analysis, and management information system (MIS). In any case, HEIs need to determine the processes that are important in their unique context. These processes are, then, evaluated against certain evaluation criteria. Some examples of evaluation criteria include: knowledge-creation – that is the main function of HEIs, operational-excellence – during key processes such as projects execution, program design and delivery, student admission, and cost reduction, and stakeholder-satisfaction – stakeholders include students, faculty, accreditation and professional bodies, funders, industry, government, and community, etc.

The integrated use of these criteria is in line with: the key requirements of performance excellence in HE including research, knowledge creation, innovation, teaching, and addressing the requirements of stakeholder; simultaneous need for research, innovation, knowledge creation and performance excellence derived from Benner and Tushman (2003), March (1991), and Zhang *et al.* (2012); and the Balanced Scorecard approach (Kaplan and Norton, 1996) meant to balance the needs of relevant stakeholders, knowledge creation, and performance excellence. It should be emphasized that HEIs could include other criteria relevant in their unique contexts. Examples of other criteria could include infrastructure, learning outcomes, and sustainability. Since the purpose of this paper is to elaborate a process, we use the mentioned four criteria to keep the process simple and straightforward. The processes and/or structures to be benchmarked – also called "alternatives" – are evaluated against the criteria to determine priority improvement needs. Finally benchmarking is a process where processes and performance are recalibrated on a continual basis. This is shown in Figure 1.

Multi-criteria decision making (MCDM) methods are used when decision makers need to consider multiple criteria, as in this case, to arrive at an overall best decision.

AHP and data envelopment analysis (DEA) (Charnes *et al.*, 1978) are most common examples of MCDM approaches. Different MCDM methods have advantages and limitations. For instance, DEA measures the efficiency of different decision-making units (DMUs) with similar goals and objectives, e.g., different department of a hospital, different branches of a bank, and other comparable entities (Wong and Wong, 2008). It is not applicable when decision making involves a single DMU, such as in this research. Further, DEA measures the efficiency of DMUs by comparing their inputs and outputs converted into quantifiable values. It is inapplicable when decision making involves qualitative judgments and comparison of different alternatives, as in this case.

AHP developed by Saaty (1977, 1990) offers a useful tool in MCDM. The application of AHP consists of three steps:

structuring a problem;
data collection through pairwise comparisons; and
computation of priority weights.

The scale used for pairwise comparisons is shown in Figure 2. After collecting data, eigenvector values are computed to determine the priority weights of each alternative. A measure called the consistency ratio (CR) is used to determine (in)consistency in pairwise comparisons made by respondents. The value of the CR up to 10 percent (0.10) is considered acceptable (Saaty, 1977). Some authors also consider 0.20 as acceptable (Nardo *et al.*, 2005). While the manual computation of the eigenvector and the CR could be found in Saaty (1977, 1990), a number of softwares are also available for this purpose. The application of the AHP is demonstrated through the following case study.

The key benefit of AHP is that it makes decision making systematic: "[AHP] formalizes and makes systematic what is largely a subjective decision process and thereby facilitates "accurate" judgments; as a by-product of the method, management receives information about the evaluation criteria's implicit weights; and the use of

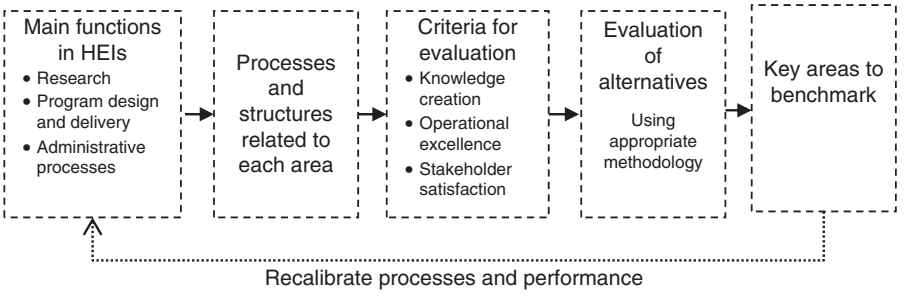
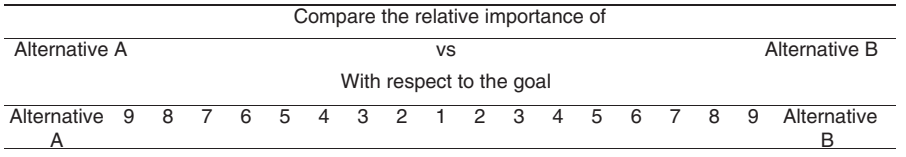


Figure 1.
A scheme for determining improvement needs



Notes: 1, Equal; 3, moderate; 5, strong; 7, very strong; 9, extreme

Figure 2.
Scale for pairwise comparison

computers makes it possible to conduct sensitivity analysis of the results" (Partovi, 1994, p. 30). Since determining improvement needs is a collective decision making processes (Deming, 1986; Partovi, 1994), it is important that employed approach for the "evaluation of alternatives" in Figure 1 has the following characteristics: it allows input of multiple participants; if there are differences in the responses of participants regarding importance of alternatives, the approach should allow integration of diverse viewpoints; and it is transparent and consensus based so that participation of people is encouraged. AHP provides the required characteristics. It allows integration of diverse viewpoints of multiple participants in a transparent way, thus, leading to greater buy-in of decision-making process and its outcomes.

AHP has also certain limitations (Asif and Searcy, 2014). Pairwise comparisons may fail the consistency test even when respondents have been rational and logical (Karapetrovic and Rosenbloom, 1999). In such cases data needs to be collected again, making it a tedious process. However, the benefits of AHP outweigh its limitations. The application of AHP has been demonstrated through the following case study.

A case study

The purpose of this research was to develop a framework for the prioritization of improvement needs in benchmarking. This required data collection from those who are actually involved in the benchmarking process. Case study research (Yin, 2003) was employed because it allowed greater interaction with the respondents and, thus, making it possible to explain to them: multi-level problem hierarchy consisting of objective, criteria, and alternatives; the process of AHP; the concept of (in)consistency in responses measured through the CR; and the method of data collection through pairwise comparisons for criteria and alternatives. Further, data collection may be needed again if responses are inconsistent. This requires discussing inconsistencies with respondents. All these features of AHP are possible only through case research. That is why case research is most popular in the use of AHP (Asif and Searcy, 2014; Hafeez *et al.*, 2007; Partovi, 1994; Sarmiento and Thomas, 2010).

Our case (college A) is a business school that offers business education in undergraduate and postgraduate programs. The college has taken a number of initiatives to improve the quality of research, education, and support services. As a part of these quality improvement initiatives, the college obtained national accreditation and is also at final stages of AACSB international accreditation. Since performance comparison against best performers and sharing best practices is an essential requirement for continual improvement (ECPE, 2011) and AACSB international accreditation, the college strives to improve performance through benchmarking. And the first step in this regard is to determine priority improvement needs for the college.

Structuring the problem

In the AHP a problem is structured along a hierarchy consisting of different levels (Saaty, 1977). The objective of this research is to determine priority improvement needs of the college. This makes the level-1 of the hierarchy. As noted earlier, the criteria used for the evaluation of processes to be benchmarked was "knowledge-creation," "operational-excellence," and "stakeholder-satisfaction." The criteria used for the evaluation of alternatives make the second level of the hierarchy. The third level of the hierarchy consists of alternatives, i.e., processes and structures to be benchmarked. In the nutshell, the level-1 consists of objective, and level-2 consists of criteria against

which processes and structures to be benchmarked (level-3) are evaluated. Data about potential processes and structures to be benchmarked was collected from three experienced faculty members actively involved in the continual improvement initiatives of the college and AACSB International accreditation. Respondents were asked to name the processes and/or structures that need to be benchmarked for improving performance of the college. The resulting list of processes and structures are shown in the hierarchy in Figure 3.

Determining priority improvement needs

Figure 3 shows 11 areas, needing improvement, identified by the respondents. In order to determine priority improvement needs using AHP, respondents were asked to compare the elements at each level of the hierarchy with respect to the elements at the upper levels of the hierarchy. For example one question at level-2 was "with respect to the objective, which criterion is more important: 'knowledge-creation' or 'operational-excellence', and by what scale (1-9)?" Similarly data were collected for all levels of the hierarchy.

The software called Expert Choice was used to determine the priority weights of the elements at each level and to determine prioritized improvement needs. Figure 4 shows the priority weights of the criteria. Figure 4 shows that "knowledge-creation" emerges as the main criterion for determining improvement needs followed by "operational-excellence" and "stakeholder-satisfaction" with priority weights of 50.1, 36.8, and 13.0 percent, respectively. The priorities of the alternatives are shown in Figure 5 which shows that "research-infrastructure" (12.8 percent), "effective program-delivery

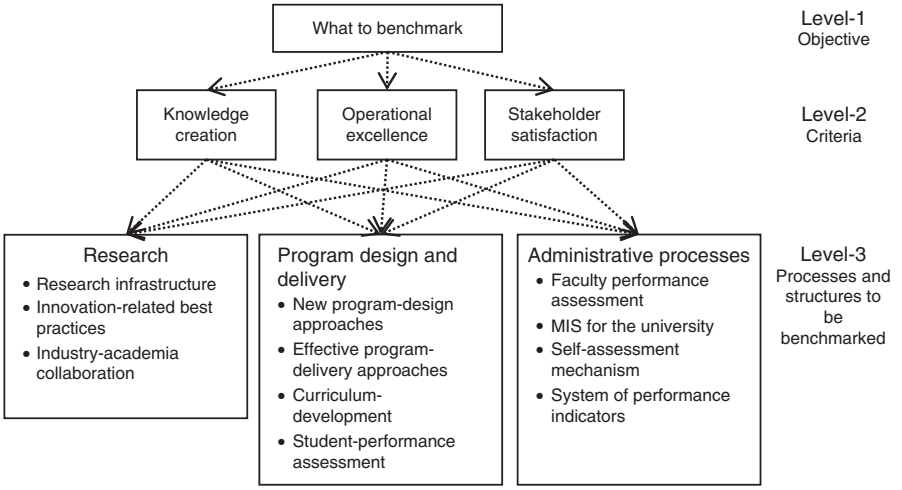


Figure 3.
Structuring the problem at different levels of the hierarchy

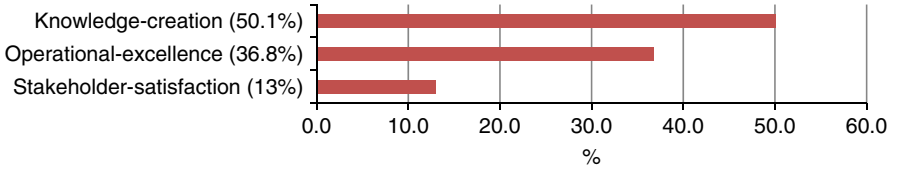


Figure 4.
Priority weights of the criteria

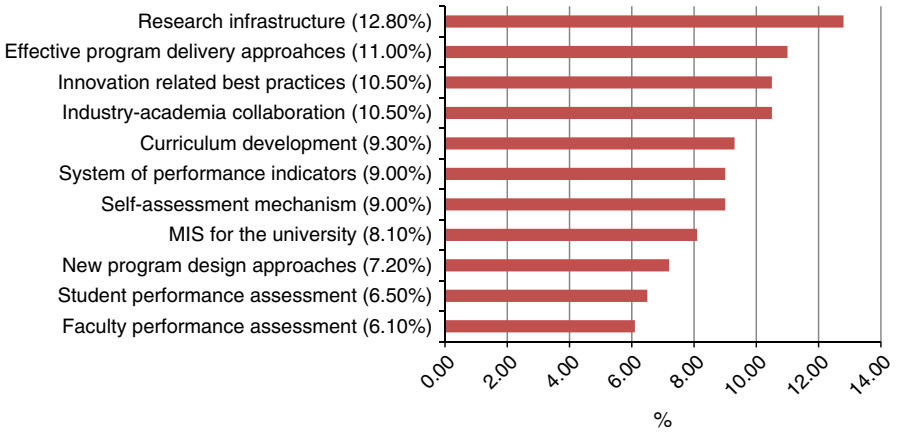


Figure 5.
Priority weights of the alternatives

approaches" (11.0 percent), "innovation-related best practices" (10.5 percent), "industry-academia collaboration" (10.5 percent), and "curriculum-development" (9.3 percent) emerge as the top five areas needing improvement.

After obtaining initial results, sensitivity analysis was carried out. The "dynamic sensitivity analysis" mode of Expert Choice program allows examining the priority of the alternatives with respect to changes in the criteria. For example, setting the weight of the three criteria equal, i.e., about 33.33 percent for each criterion, results in the following top five alternatives: "industry-academia collaboration," "research-infrastructure," "effective program-delivery approaches," "innovation-related best practices," and "curriculum-development" (Figure 6).

Comparing Figure 5 with Figure 6 shows that changing the weights of the criteria alters the priorities of the alternatives. The top five alternatives, however, remain essentially same. This means that the mentioned five alternatives are robust enough to moderate changes in the criteria. This gives confidence in the selected alternatives, i.e., processes and structures to be benchmarked. In order to further explore the relation of the alternatives with individual criterion, "gradient sensitivity analysis" was carried out. While the

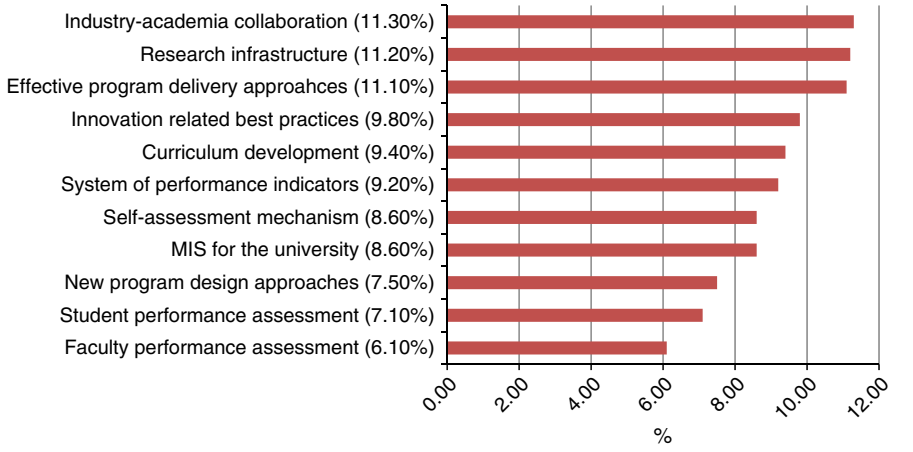


Figure 6.
Priority weights of the alternatives after setting the weights of criteria equal

"dynamic sensitivity analysis" (Figure 6) allows examining the priorities of the alternatives with changes in the criteria; "gradient sensitivity mode" allows examining changes in the resulting alternatives with respect to changes in individual criterion. Figure 7 shows the priority weights of the alternatives with respect to changes in "knowledge-creation" criterion. In Figure 7, the vertical line shows the current weight of the criteria; and the slanted lines show the alternatives. The point at which an alternative intersects the criterion line represents the priority weight of that alternative. Figure 7 shows that when the weight of the "knowledge-creation" criterion is about 40 percent, then "research-infrastructure" and "effective program-delivery" become equally important alternatives. Below this point "effective program-delivery" remains the preferred option and above this point "research-infrastructure" becomes more important option. The Figure also shows that above 60 percent the top three alternatives are "research-infrastructure," "innovation-related best practices," and "industry-academia collaboration."

Figure 8 shows changes in the priorities of the alternatives with changes in the weight of "operational-excellence" criterion. For instance, below 30 percent the top three alternatives are "research-infrastructure," "innovation-related best practices," and "industry-academia collaboration." However, if the criterion assumes greater importance, say 50 percent or above, then in addition to "effective program-delivery" three more alternatives emerge as important, including "MIS," "system of PIs," and "curriculum-development."

Figure 9 shows that if the criterion "stakeholder-satisfaction" assumes greater weightage, say 25 percent or more, then importance of "industry-academia collaboration" increases substantially; the importance of "research-infrastructure" decreases; and the importance of "innovation-related best practices" and "effective program-delivery" is not significantly affected. In such a situation "industry-academia collaboration," "innovation-related best practices," and "effective program-delivery" emerge as important alternatives.

The above figures show that alternatives for "what to benchmark" change with the weight of the criteria. However, some alternative – such as "research-infrastructure," "innovation-related best practices," "effective program-delivery," and "industry-academia

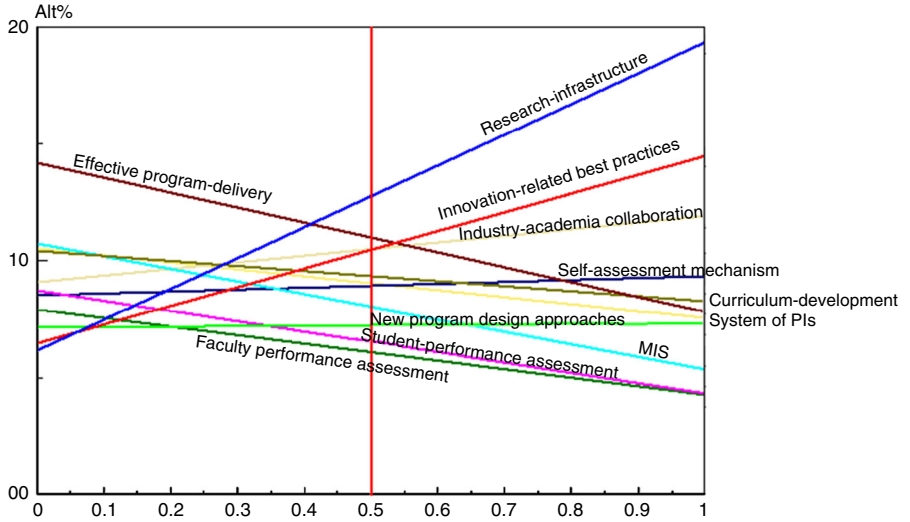


Figure 7.
The priority weights of the alternatives with respect to knowledge-creation criterion

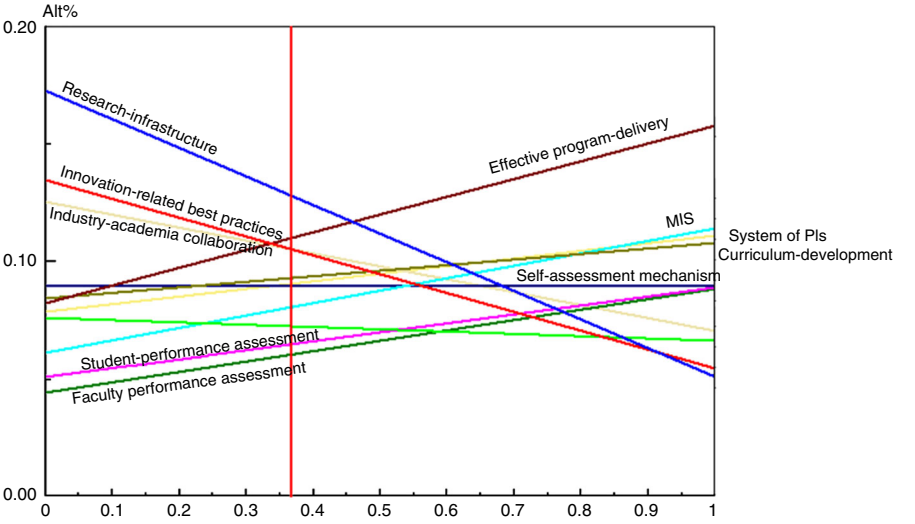


Figure 8.
The priority weights of the alternatives with respect to "operational-excellence" criterion

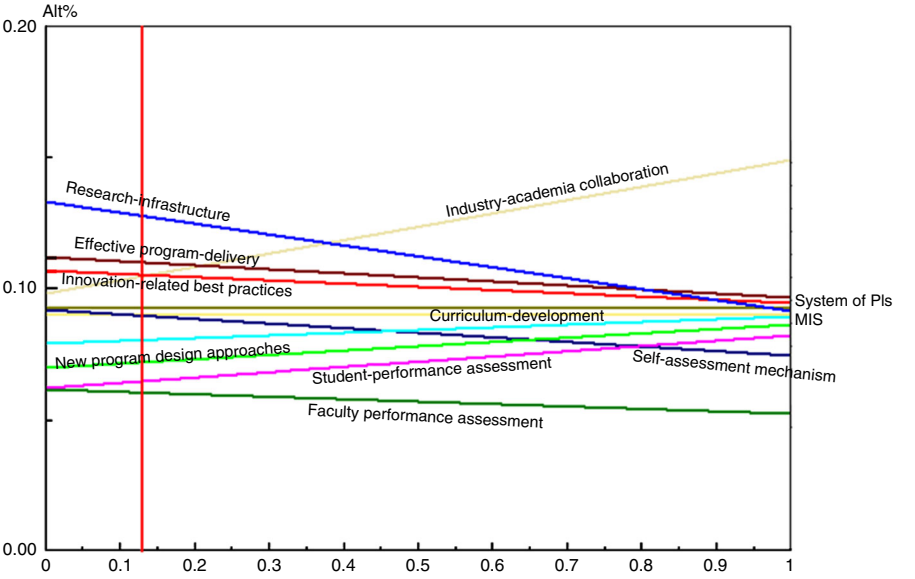


Figure 9.
The priority weights of the alternatives with respect to "stakeholder-satisfaction" criterion

collaboration" dominate the other options on almost every criterion. These alternatives represent strong options for benchmarking. Table II shows top five options for benchmarking if any criterion assumes weightage > 50 percent.

Discussion

The emergence of the alternatives with respect to their criteria is quite intuitive. For instance, knowledge creation in a HEI hinges upon research arrangements and

Criteria (weight ⩾ 50%)	Top five alternatives
Knowledge-creation	Research-infrastructure
	Innovation-related best practices
	Industry-academia collaboration
	Effective program-delivery
	Self-assessment mechanism
Operational-excellence	Effective program-delivery
	Management information system
	System of performance indicators
	Curriculum-development
	Self-assessment mechanism
Stakeholder-satisfaction	Industry-academia collaboration
	Effective program-delivery
	Innovation-related best practices
	Curriculum-development
	Research-infrastructure

Table II.
Top three options for benchmarking when the weights of the criteria are > 50 percent

collaboration with the industry. Therefore, when "knowledge-creation" is main criterion, the emergence of "research-infrastructure," "innovation-related best practices," and "industry-academia collaboration" is quite logical. On the other hand, if the HEI wants to focus more on "operational-excellence" then more relevant options would be "effective program-delivery," "MIS," and "system of performance indicators." Effective program-delivery – e.g., lectures, demonstrations, discussions, and case studies, etc. – are the cornerstone of effective teaching. The use of MIS – e.g., student registration, learning systems, student portals, corporate liaising, and online exams – can make the processes more efficient. Similarly the use of PIs is helpful in tracking and improving performance of the HEI. These areas are, therefore, essentially required for performance excellence.

Likewise, if the HEI wants to focus more on "stakeholder-satisfaction," then "industry-academia collaboration" emerges as the most important option for benchmarking. This could be due to the fact that industry-academia collaboration is of interest for various stakeholders. For instance, faculty can benefit from this collaboration through more research opportunities, students benefit from job opportunities, and industry benefits from knowledge and expertise of the HEI. To summarize, when the weightage of "knowledge-creation" criterion increases, "research-infrastructure" becomes the most important option for benchmarking. An increase in the weightage of "operational-excellence" criterion brings the "effective program-delivery" to forefront. And an increase in the weightage of "stakeholder-satisfaction" makes "industry-academia collaboration" most important option for benchmarking. Understanding the trends in the importance of the alternatives makes decision-taking easier.

The research approach and the results of this study also find support from the literature. Badri and Abdulla (2004), for instance, developed a model for faculty performance evaluation using multiple criteria. They found that AHP is most suitable for this type of research where decisions need to be made through consensus. Further, they found that in faculty evaluation research related activities get the highest priority followed by teaching related activities. Lukman *et al.* (2010) developed a model to rank universities using research, educational, and environmental indicators. They opted for AHP as the most appropriate tool. Suryadi (2007) developed a model of key PIs

measurement in HE. The research used AHP to prioritize key PIs related to research, teaching, and support function. However, compared to our research, they found that in their particular context teaching indicators had higher priority over the research indicators. Overall, the mentioned studies show that AHP provides a valuable tool for MCDM in HE.

The key contribution of this study is that it elaborates a process of determine improvement needs in benchmarking and develops a framework for this purpose. Benchmarking is an essential element of continual improvement (Zairi, 1996) and is also a requirement of the ECPE and AACSB international accreditation. This research is different from previous work on PIs, benchmarking models, and standards. The crucial role of PIs and their development has been discussed in previous publications (Nedwek and Neal, 1994; Taylor and Massy, 1996; Taylor, 2001); the framework developed in this paper can be used to develop key PIs that are critical to the success of a HEI. The literature on benchmarking focusses mainly on the models of benchmarking (Anand and Kodali, 2008; Camp, 1989; Zairi, 1996) and their application in different settings (Alstete, 1995; Godfrey and Godfrey, 1999; Longbottom, 2000; Partovi, 1994); this research advances the discussion toward developing priority improvement needs in benchmarking projects. Standards and excellence models have also been used to guide performance improvement. The ECPE and AACSB international standard also require benchmarking but they do not mention the process of benchmarking; neither are they intended for this purpose. In brief, HEIs using different performance improvement approaches, including PIs, excellence criteria, and standards, etc. would still need benchmarking and a means to systematically identify priority improvement needs.

Using this framework HEIs can determine their improvement needs with respect to each criterion. The framework, therefore, provides a means for determining improvement needs within the unique context of a HEI. Further the process of determining improvement needs is consensus-based, promotes input to the process and could result in greater buy-in of the outcomes. Finally, the outcomes and the decision-making process were discussed with the participants of the research. They were asked a question: "did this process help you in making a systematic decision about what to benchmark?" The respondents answered it affirmatively. They noted that the outcomes of the process were intuitive; the process was systematic; and it would be very difficult to determine priority improvement needs without such a structured approach. The participants further noted that it was a knowledge intensive process and exposed them to a systematic decision-making process.

This research has certain limitations. First, the evaluation criteria and benchmarking alternatives discussed in this study reflect the unique situation of the case. Findings may not be generalizable to other contexts. Different HEIs have different resources, priorities, goals, and operational strategies, so criteria and alternatives would be different in different settings, and their priority weights would also be different. However, developing a generalizable list of improvement needs is not the purpose of this research. Second, the study addresses only the first step of benchmarking processes, i.e., identifying improvement needs. It does not discuss the subsequent steps of benchmarking which could be more challenging than the first step. Indeed benchmarking processes of knowledge intensive processes – such as research activities – requires strong management commitment and consistent support from benchmarking partners (Alstete, 1995; CHEMS, 1998). The case study approach employed for this research also has certain limitations. There is a possibility of bias of respondents during data collection. Respondents, who are actively involved in a benchmarking project, may

overrate the criteria and alternatives of their interest. However, inconsistencies are identified using the CR test, and, therefore, can be minimized. Unavailability of comparative data is another limitation.

Future research could proceed in two directions: first the framework could be applied in other settings to further understand its application. This would help to understand how improvement needs are prioritized in other settings, what evaluation criteria are employed, and how contextual factors influence the prioritization of improvement needs. Second, future research could also focus on enhancing the use of AHP, such as the use of fuzzy AHP and integrated use of AHP with other MCDM approaches. This could provide better understanding of whether decision making is influenced by the use of integrated techniques, and if influenced, whether differences are significant.

Conclusion

Continual improvement is an essential requirement for managing quality and performance excellence in HE. Benchmarking provides a means for continual improvement. While the methodologies for benchmarking are discussed in the literature, the need arises for a structured approach to determine improvement needs, i.e., "what to benchmark." Since continual improvement and performance excellence require collective effort, the required approach for determining improvement needs should allow consensus-based decision making and integration of diverse viewpoints. The AHP provides the required approach. The framework presented in this paper is based on the AHP. The framework consists of: identifying potential processes and structures to be benchmarked (also called alternatives); developing evaluation criteria; mutual comparison of different alternatives with respect to the objective; and prioritization of the alternatives. The application of the framework was demonstrated through a case study.

Sensitivity analysis was carried out to determine how robust are chosen processes/structures to small changes in the criteria. When "knowledge-creation" is the main criterion, alternatives such as "research-infrastructure," and "innovation-related best practices" emerge as strong options for benchmarking. When "operational-excellence" is the main criterion, "effective program-delivery," "MIS," and "system of PIs" emerge as the most relevant options for benchmarking. And when "stakeholder-satisfaction" is the main criterion, "industry-academia collaboration," "effective program-delivery" and "innovation-related best practices" emerge as strong options for benchmarking. The framework for the decision making is unique in that it provides not only a structured approach to decision making but also exposes the participants to a knowledge-intensive process. Finally, the feedback of the respondents confirmed the utility of the framework.

References

AACSB (2013), "The Association to Advance Collegiate Schools of Business", available at: www.aacsb.net/eweb/DynamicPage.aspx?WebCode = LoginRequired&expires=yes&Site=AACSB&URL_success=http%3A%2F%2Ftheexchange.aacsb.edu%2FHigherLogic%2FSecurity%2FnetFORUMEnterpriseCustomLogin.aspx%3Fcstkey%3D%7BCustomerKey%7D%26ReturnUrl%3Dhttp%3a%2f%2ftheexchange.aacsb.edu%2fHome%2f (accessed July 31, 2013).

Alstete, J.W. (1995), "Benchmarking in higher education: adapting best practices to improve quality", ASHE-ERIC Higher Education Report No. 5, The George Washington University Graduate School of Education and Human Development, Washigton, DC, available at: http://eric.ed.gov/?id=ED402801 (accessed November 30, 2014).

Altany, D. (1991), "Share and share alike", *Industrial Week*, Vol. 240 No. 14, pp. 12-17.

Anand, G. and Kodali, R. (2008), "Benchmarking the benchmarking models", *Benchmarking: An International Journal*, Vol. 15 No. 3, pp. 257-291.

Asif, M. and Raouf, A. (2013), "Setting the course for quality assurance in higher education", *Quality & Quantity*, Vol. 47 No. 4, pp. 2009-2024.

Asif, M. and Searcy, C. (2014), "Determining the key capabilities required for performance excellence in higher education", *Total Quality Management & Business Excellence Journal*, Vol. 25 Nos 1/2, pp. 22-35.

Asif, M., Raouf, A. and Searcy, C. (2013), "Developing measures for performance excellence: is the baldrige criteria sufficient for performance excellence in higher education?", *Quality & Quantity*, Vol. 47 No. 6, pp. 3095-3111.

Badri, M.A. and Abdulla, M.H. (2004), "Awards of excellence in institutions of higher education: an AHP approach", *International Journal of Educational Management*, Vol. 18 No. 4, pp. 224-242.

Badri, M.A., Selim, H., Alshare, K., Grandon, E.E., Younis, H. and Abdulla, M. (2006), "The baldrige education criteria for performance excellence framework: empirical test and validation", *International Journal of Quality & Reliability Management*, Vol. 23 No. 9, pp. 1118-1157.

Bemowski, K. (1991), "The benchmarking bandwagon", *Quality Progress*, Vol. 24 No. 1, pp. 19-24.

Benner, M.J. and Tushman, M.L. (2003), "Exploitation, exploration, and process management: the productivity dilemma revisited", *Academy of Management Review*, Vol. 28 No. 2, pp. 238-256.

Besterfield, D.H., Besterfiels-Michna, C., Besterfield, G.H. and Besterfield-Sacre, M. (1999), *Total Quality Management*, Prentice-Hall, Englewood Cliffs, NJ.

Bhutta, K.S. and Huq, F. (1999), "Benchmarking-best practices: an integrated approach", *Benchmarking: An International Journal*, Vol. 6 No. 3, pp. 254-268.

Camp, R.C. (1989), *Benchmarking: The Search for Industry Best Practices that Lead to Superior Performance*, Quality Press, Madison, WI.

Carpinetti, L.C.R. and De Melo, A.M. (2002), "What to benchmark?: a systematic approach and cases", *Benchmarking: An International Journal*, Vol. 9 No. 3, pp. 244-255.

Charnes, A., Cooper, W.W. and Rhodes, E. (1978), "Measuring the efficiency of decision making units", *European Journal of Operational Research*, Vol. 2 No. 6, pp. 429-444.

CHEMS (1998), *Benchmarking in Higher Education: An International Review (No. 0851431623)*, Commonwealth Higher Education Management Service, London.

Dattakumar, R. and Jagadeesh, R. (2003), "A review of literature on benchmarking", *Benchmarking: An International Journal*, Vol. 10 No. 3, pp. 176-209.

Deming, W.E. (1986), *Out of the Crisis*, MIT Press, Cambridge, MA.

DiMaggio, P.J. and Powell, W.W. (1983), "The iron cage revisited: institutional isomorphism and collective rationality in organizational fields", *American Sociological Review*, Vol. 48 No. April, pp. 147-160.

Drew, S.A.W. (1997), "From knowledge to action: the impact of benchmarking on organizational performance", *Long Range Planning*, Vol. 30 No. 3, pp. 427-441.

ECPE (2011), *2011-2012 Education Criteria for Performance Excellence*, National Institute of Standards and Technology (NIST), Gaithersburg, MD.

Fielden, J. (1997), *Benchmarking University Performance, CHEMS Monograph, 1997*, Commonwealth Higher Education Management Service (CHEMS), London.

Godfrey, J.M. and Godfrey, P.J. (1999), "Benchmarking quality management: how does it apply to the university alumni office?", *Benchmarking: An International Journal*, Vol. 6 No. 1, pp. 40-59.

Hafeez, K., Malak, N. and Zhang, Y. (2007), "Outsourcing non-core assets and competences of a firm using analytic hierarchy process", *Computers & Operations Research*, Vol. 34 No. 12, pp. 3592-3608.

Jackson, N. and Lund, H. (2000), *Benchmarking for Higher Education*, Open University Press, Milton Keynes.

Kaplan, R.S. and Norton, D.P. (1996), "Using the balanced scorecard as a strategic management system", *Harvard Business Review*, Vol. 74 No. 1, pp. 75-85.

Karapetrovic, S. and Rosenbloom, E. (1999), "A quality control approach to consistency paradoxes in AHP", *European Journal of Operational Research*, Vol. 119 No. 3, pp. 704-718.

Kells, H.R. (1992), "Performance indicators for higher education: a critical review with policy recommendations" No. PHREE/92/56, Education and Employment Division, Population and Human Resources Department, The World Bank, Washington, DC.

Lema, N. and Price, A. (1995), "Benchmarking: performance improvement toward competitive advantage", *Journal of Management in Engineering*, Vol. 11 No. 1, pp. 28-37.

Longbottom, D. (2000), "Benchmarking in the UK: an empirical study of practitioners and academics", *Benchmarking: An International Journal*, Vol. 7 No. 2, pp. 98-117.

Lukman, R., Krajnc, D. and Glavič, P. (2010), "University ranking using research, educational and environmental indicators", *Journal of Cleaner Production*, Vol. 18 No. 7, pp. 619-628.

March, J.G. (1991), "Exploration and exploitation in organizational learning", *Organization Science*, Vol. 2 No. 1, pp. 71-87.

Nardo, M., Saisana, M., Saltelli, A. and Tarantola, S. (2005), "Tools for composite indicators building", available at: http://collection.europarchive.org/dnb/20070702132253/http://farmweb.jrc.ec.europa.eu/ci/Document/EUR%2021682%20EN.pdf (accessed August 16, 2012).

Nedwek, B.P. and Neal, J.E. (1994), "Performance indicators and rational management tools: a comparative assessment of projects in North America and Europe", *Research in Higher Education*, Vol. 35 No. 1, pp. 75-103.

Partovi, F.Y. (1994), "Determining what to benchmark: an analytic hierarchy process approach", *International Journal of Operations & Production Management*, Vol. 14 No. 6, pp. 25-39.

Patrick, W.J. and Stanley, E.C. (1998), "Teaching and research quality indicators and the shaping of higher education", *Research in Higher Education*, Vol. 39 No. 1, pp. 19-41.

Pryor, L.S. (1989), "Benchmarking: a self-improvement strategy", *Journal of Business Strategy*, Vol. 10 No. 6, pp. 28-32.

Saaty, T.L. (1977), "A scaling method for priorities in hierarchical structures", *Journal of Mathematical Psychology*, Vol. 15 No. 3, pp. 234-281.

Saaty, T.L. (1990), "How to make a decision: the analytic hierarchy process", *European Journal of Operational Research*, Vol. 48 No. 1, pp. 9-26.

Sarmiento, R. and Thomas, A. (2010), "Identifying improvement areas when implementing green initiatives using a multitier AHP approach", *Benchmarking: An International Journal*, Vol. 17 No. 3, pp. 452-463.

Smith, H., Armstrong, M. and Brown, S. (1999), *Benchmarking and Threshold Standards in Higher Education*, Kogan Page, London.

Spendolini, M.J. (1992), *The Benchmarking Book*, American Management Association, New York, NY.

Suryadi, K. (2007), "Key performance indicators measurement model based on analytic hierarchy process and trend-comparative dimension in higher education institution", paper presented at the ISAHP 2007, Viña Del Mar.

Taylor, B.E. and Massy, W.F. (1996), *Strategic Indicators for Higher Education: Vital Benchmarks and Information to Help You Evaluate and Improve Your Institutions Performance*, Peterson's, Princeton, NJ.

Taylor, J. (2001), "Improving performance indicators in higher education: the academics' perspective", *Journal of Further and Higher Education*, Vol. 25 No. 3, pp. 379-393.

Wilson, D. and McKiernan, P. (2011), "Global mimicry: putting strategic choice back on the business school agenda", *British Journal of Management*, Vol. 22 No. 3, pp. 457-469.

Wong, W.P. and Wong, K.Y. (2008), "A review on benchmarking of supply chain performance measures", *Benchmarking: An International Journal*, Vol. 15 No. 1, pp. 25-51.

Yasin, M.M. (2002), "Theory and practice of benchmarking: then and now", *Benchmarking: An International Journal*, Vol. 9 No. 3, pp. 217-243.

Yin, R.K. (2003), *Case Study Research: Design and Methods*, Sage Publishing, Thousand Oaks, CA.

Zairi, M. (1996), *Benchmarking for Best Practice: Continuous Learning Through Sustainable Innovation*, Butterworth Heinemann, Oxford.

Zhang, D., Linderman, K. and Schroeder, R.G. (2012), "The moderating role of contextual factors on quality management practices", *Journal of Operations Management*, Vol. 30 No. 1, pp. 12-23.

Corresponding author
Dr Muhammad Asif can be contacted at: muhammad.assif@gmail.com