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Book Review

The Economics of Benchmarking

Thijs ten Raa, Palgrave Macmillan (2009), pp.108

Reviewed by

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1. What is Benchmarking?

Benchmarking is a management tool that involves the comparison between business units or firms. Benchmarking is simple if there is a single agreed upon criterion. If there are multiple criteria benchmarking can still be done but problem arises with those business units that score well in one dimension but are poor in another. How to compare them? Either one may think of stimulating the business unit top excel in all aspects by helping it to do better where it is weak, or allow it to specialize in what it is good at and trim the weak spots. However, quite often there may be trade-offs between alternative scores and such simple suggestion of specialization in a single direction may not work. When a business unit is interested in both cost reduction and quality improvement: excessive emphasis on cost reduction goes at the expense of quality performance and quality performance, on the other hand, has price tags. Compromises have to be found and different score aspects must be weighed by the management.

The situation is reminiscent of the classical economic problem of the allocation and pricing of scarce resources for alternative ends and this book explains how potentially conflicting performance aspects can be balanced by assigning rational weights to different dimensions

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leading to optimal reallocation of resources across units. To explain this method with attractive case studies without compromising analytical rigor the author discussed a number of useful concepts at the beginning. For example an *organization* is defined as a *constellation of decision making units that are each other's peer* where typical examples of decision making units are divisions within a corporation, supermarkets in a chain, branches of banks, firms within an industry and so on. When benchmarking technique is applied within organization it is called the *Internal Benchmarking* that helps to spot exemplary business units within big companies, such as, hotel chains, bank branches, etc. It identifies the relevant benchmarks for every unit, suggests cost components that can be cut and potential revenue sources that would boost performance. It facilitates multi-dimensional comparisons and indicates the intrinsic interaction effects present in the overall performance of the organization where the latter is something more than the mere sum of the parts. In fact, there is an interesting connection between the fine-tuning of an organization by *reallocation* and *rewards*. It is shown in the book that resources are better reallocated to the more efficient business units as that integrates *performance* and *incentives* better. Most managers appreciate a policy leading to enhancement of control over company resources (i.e., increased authority). Thus, benchmarking can be used not only to weed out production and organizational inefficiencies but to design effective bonus plans as well.

External benchmarking refers to inter-organization comparisons. If it is comparison across business units (firms) within the same industry then it is basically a comparison of 'market access' and is called *competitive benchmarking* whereas a comparison at corporate level within same industry is an instance of *simple external benchmarking*. A special type of external benchmarking is the inter-corporation comparison where the target is the improvement in allocative efficiency alone and is called the *organizational benchmarking*. Debasish (2006) analyzed 93 Indian banks over the period 1997-2004. He considered nine inputs and seven outputs and the banks were classified by size (small, medium, large), ownership (public, private, foreign) and age (young, old). The efficiency of smaller banks declined from 0.82 in 1998 to 0.63 in 2004; the average efficiency of medium banks did not show any significant change whereas that for larger banks steadily increased to 0.86 by 2004 from a quite low base. Public sector banks were least efficient with values in the range of 0.44 to 0.54 and the foreign banks were the most efficient ones; similarly new banks dominated the old banks in overall performance.

Internal benchmarking is practiced by big organizations with many business units. Since benchmarking steals production/ business processes from similar but better performing units the

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larger number of units provide proper backdrop to identify matching units with similar scope of outputs and inputs having differential performance scores. However, the competitive benchmarking is not constrained by the internal size of the organization and here all types of business units can fish in a bigger pool for *best practices*.

2. Scope of Improvement: The Expansion Factor

The technical efficiency to be gained through benchmarking is indicated by the expansion factor e. The notion of e may be illustrated as follows:

Table 1.1

Three Firms Producing the Same Output with Different Inputs

	Firm I	Firm II	Firm III
Units of Output	1	1	1
Units of Labor Inputs	1	0	L (>0)
Units of Capital Inputs	0	1	K (>0)

Consider a single output industry with three firms. Firm I employs 1 unit of labor to produce 1 unit of output, Firm II employs 1 unit of capital to produce 1 unit of output and firm III employs L units of labor and K units of capital to produce 1 unit of output. Could the third firm perform better? If (L + K) < 1 then obviously Firm III is doing better and if (L + K) = 1 then it is performing at per. So, the question of improvement will be pertinent if and only if (L + K) > 1. Suppose (L + K) = 1.1, then by adopting practices followed by Firms I & II, Firm III can do better. It's potential output would be 1.1 (as both Firms I & II transform 1 unit of input into 1 unit of output) whereas the actual output is 1 and so the firm is producing 1/1.1 = 91% of its potential output and it is 91% efficient. So, the expansion factor (e) can be defined as e = max (L + K), 1} and (in)efficiency =1/e.

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3. The Linear Programming Solution

Most applications of benchmarking are basically alternative performance measures and rankings, both financial and non-financial and the bulk are based on output scores such as revenues, net earnings, customer satisfaction, etc. It is particularly useful for organization where market prices are missing either on output side (e.g., for education institutions or health care services where output refers to contributions to quality of life aspects) or the input side (e.g., volunteers' work provided by non-profit organization). Market prices, if available undistorted, constitute natural weights for performance measurement. However, most of the time they are distorted and for non-profit services they are not available. Hence, a substitute set of values like virtual prices are needed and these virtual prices, if socially optimum, would be considered as shadow prices. Raa attempted to develop such methodology in this book by using the simple tools of linear programming.

Consider another example of three business units (firms) within same organization where two outputs (activities) are considered, viz., acquisitions and sales with one input (managerial labor).

Table 2.1

Three Firms Producing Different Outputs with the Same Input

	Firm I	Firm II	Firm III
Acquisitions	30	20	52
Sales	25	43	19
Managerial Labor Input	1	1	1

Manager 1's outputs are 30 and 25, respectively per unit of labor. We want to assess how well she compares with her peers. Compared with Manager 2 her acquisition output is better (and sales output is worse) and opposite is the case with respect to Manager 3. Since no direct comparison of two different outputs is possible let us take it as given that under the implicit assumption of constant returns to scale (CRS)[1] to improve performance Manager 1 has to scale

[1] This CRS assumption is relaxed in the penultimate chapter of the book.

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up maintaining output proportions fixed at 30:25. Her potential output can be calculated as 30e and 25e with e as expansion factor. Manager 1 may allocate her total labor time over three practices in the proportion θ_1, θ_2 and θ_3 such that $\theta_1+ \theta_2+ \theta_3=1$ (the given managerial labor input). The consequent LPP would be

$$\begin{aligned} &\text{Max} \quad e \\ &\theta_1, \theta_2, \theta_3 \\ &\text{Subject to:} \quad 30\,\theta_1 + 20\,\theta_2 + 52\,\theta_3 \geq 30e \\ &\qquad\qquad 25\,\theta_1 + 43\,\theta_2 + 19\,\theta_3 \geq 25e \\ &\qquad\qquad \theta_1+ \theta_2+ \theta_3=1 \text{ and } \theta_1, \theta_2, \theta_3 \geq 0 \end{aligned}$$

The solution to this problem in Microsoft EXCEL using the add on tool SOLVER is explained step by step in Chapter 2 of the book and the optimal value of e turned out to be equal to 1.22 which can be attained by Manager 1 by dropping her present practice altogether and adopting that of Manager 2 and 3 in the proportion 48:52. In the present practice Manager 1 is operating with 82% efficiency.

4. Data Envelopment Analysis (DEA) and the Dual LPP

The technique used here is the Data Envelopment Analysis (DEA). During the 90s a major limitation of DEA was noted as follows:
"*In a multi-product case, the production function can neither associate specific inputs with specific outputs, nor can it determine the relative importance of individual outputs for performance (analysis)*"… [Schefczyk, 1993]

However, Raa overcame this criticism by using the concept of accounting prices (Chapter 2) that express the value of outputs in terms of costs leaving no room for profit. That means accounting prices correspond to market prices in a perfectly competitive set up and are thus the shadow prices that correspond to marginal productivity. In fact, accounting prices sort variables by their profitability and represent knife-edge in terms of the dual problem. Instead of shadow prices λ's[2]

[2] λ stands for the Greek letter l to honour the inventor of the analysis, the mathematician Lagrange;

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it is customary to denote the accounting prices of the input by w and outputs by p_1 and p_2. So, the dual constraints would be the following:

$$w - 30\,p_1 - 25p_2 \geq 0;\ w - 20\,p_1 - 43p_2 \geq 0;\ w - 52\,p_1 - 19p_2 \geq 0;$$

$$30\,p_1 + 25p_2 \geq e;\ \ w, p_1, p_2, e \geq 0;$$

The optimal value of e is at least 1, which amounts to a simple reproduction of decision making unit 1 itself. That is, no one can opt for a worst state than the present one. Hence $e > 0$ and here non-negativity constraint is non-binding. Hence, by complementary slackness theorem, for e = 1 we will have $30\,p_1 + 25p_2 = 1$, the so called price normalization constraint (i.e., only the relative prices matter, not the absolute prices). Dual inequalities highlight an important fact that accounting prices do not allow any activity to enjoy positive profit. If the profit is zero the activity will break-even and it will be undertaken.

In general accounting prices make decision making units other than themselves to break-even. It is extremely interesting to identify them, because they constitute the best available practices. So, one needs to focus on the decision making units I, for which the associated (zero)-profit equations are binding. It constitutes the set of activities that would be run if the resources available to decision making unit I (i.e., Firm I in this case) are used optimally to maximize its output. Since the expansion factor is at least 1, it follows by sheer arithmetic that efficiency is a measure between 0 and 1. Full efficiency (e = 1) represents the situation where a decision making unit cannot improve its performance, and so is a leader. It should be appreciated that the accounting prices generated by benchmarking are not necessarily equal to the market prices and in fact, they are internal and may vary across decision making units. It is possible to compare accounting prices between decision making units to compare their relative competitiveness. Thus, by using the concept of accounting (shadow) prices, Raa has developed the benchmarking technique that reconciles technical efficiency with allocative efficiency and helping the decision making units to improve their performance as efficiency is measured by the revenue-cost ratio evaluated at accounting prices.

After developing the benchmarking tool illustrated in terms of a number of case studies drawn from different contexts like Spanish restaurants, Indian Banks, Korean quality management, etc. Raa has introduced different competing but related benchmarking concepts like productivity, profitability, etc. other than efficiency. Here case studies are drawn from both manufacturing sectors and service sectors. Uses of Econometric techniques in estimating the efficiency frontier is also indicated through a rudimentary introduction of Stochastic Frontier Analysis (SFA).

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5. Generalized Accounting Prices and Ranking

Chapter 5 is another core chapter of the book where the problem associated with the ranking of different decision making units are discussed in the context of benchmarking. Since efficiency is measured in terms of revenue-cost ratio evaluated at accounting prices and the accounting prices are internal to the unit (determined relative to its peers) hence, without further modification no universal comparison is possible. Raa described the extended DEA methodology as follows:

"*There is a way out as follows. Imagine that we have the power to improve the performance of decision making units not only by letting them adopt best practices, but also by reallocating resources between them. A bank consists of branches and we not only force each branch to be efficient, we can also free its resources by closing it or at least trimming it down. The formal analysis involves the assessment of the overall efficiency of the bank by calculating how much more total output it could produce given the total input. Instead of benchmarking a branch on its peers, we benchmark the entire bank*". The accounting prices so generated have the attractive property that they are the marginal productivity of inputs and outputs to the organization as a whole and, hence, are not *internal* to the decision making unit under consideration.

6. General Impression

The book is mainly targeted for the management students and managers with a very simple and attractive way of presentation. The treatment of complex issues is generally intuitive. It has a smart and handy get up and it touches upon the advanced topics like variable returns to scale, stochastic frontier analysis, etc. with comfortable flair keeping the simple DEA structure at the core. Chapters 2, 3, and 5 develop the essentials with 4 and 6 as extensions. An informative and comprehensive preface has added high value in terms of enhanced reader-friendliness of the book. We congratulate Professor Raa for his thoughtful as well as useful contribution to the techniques of efficiency analysis from managerial perspective and recommend all interested practitioners to use the book.

References:

Debasish, S. S. (2006). Efficiency Performance in Indian Banking. Use of Data Envelopment Analysis. *Global Business Review* **7**(2), 325-33.

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