
Teaching and learning of performance measurement in OR/MS degrees

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The issues around how organisations measure their performance effectively are attracting increasing interest from both practitioners and from academics. In 1991 Professor Bob Eccles of Harvard Business School commented that “*within the next five years every company will have to redesign how it measures its business performance.*” In 1997 the US Institute of Management Accountants reported that 64% of US businesses were actively experimenting with new ways of measuring business performance. Within the last 10 years or so, there has been a widely-reported “revolution” in performance measurement [1,4]. Professor Andy Neely from Cranfield University commented in 1998 that reports and articles on performance measurement (PM) had been appearing at the rate of one every five hours of every working day since 1994 and that by 1996 a new PM book was being published in the USA every two weeks. In 1998 he found over 170,000 references to PM on the Web. In 2003, we found over 355,000 references.

Historically, Operational Research/Management Science (OR/MS) has made a number of major contributions to the debate about performance measurement at both the strategic and operational levels and to the performance measurement “toolkit” available to organisations (for example, through the development of techniques such as data envelopment analysis). However, given the rapidly changing theoretical and practical base around performance measurement it is essential that effective teaching and learning approaches are developed, particularly at undergraduate level. As Dyson [2] commented “... *performance measures are here to stay and if that is accepted then there is an inviting role for OR to contribute to the design of effective performance measurement systems both in the public and private sectors.*” And yet relatively little has been published on the relationship between OR/MS and PM. A search on both the Emerald and ProQuest (ABI/INFORM) publication databases using the keywords “performance measurement” and/or “operational research”, “management science” revealed only a handful of articles which discussed the relationship in any meaningful sense.

The aims of this project were to investigate whether, and how, PM was being taught on UK OR/MS undergraduate programmes and to obtain the views of academics and practitioners as to what should be taught. The trigger for our interest in this was the introduction of a final year undergraduate class in PM in 2000 in the Management Science department at Strathclyde University.

Project Methodology

Data was collected from a convenience sample of practitioners of PM to assess which PM tools were in use and what issues were current in applying PM. Universities were also contacted about the academic content of OR/MS undergraduate classes in the UK.

Practitioners of PM: It was decided to publicise the research project through a small number of dedicated PM websites and through this to attract interest from practitioners. It is accepted that this would be purely a convenience sample. A number of PM websites were approached to seek permission to publicise the project to users/members. For practical, logistical reasons it was decided to use a web-based questionnaire to collect data from practitioners. The questionnaire was available for access between December 2002 and April 2003. It attracted 40 useable responses.

Academic content of OR/MS undergraduate classes: A list of 23 UK university undergraduate OR/MS degrees was obtained from the UCAS website and individual University websites were then checked for any information about the degree and, where appropriate, PM teaching. In addition, a short questionnaire was emailed to a named academic associated with each OR/MS degree. Reminders were sent two weeks after the initial emailing and these were then followed up by individual phone calls in an attempt to increase responses. A total of 13 responses was received.

Results

Teaching PM on OR/MS undergraduate degrees in the UK: All the academic respondents, including those with no PM class in their department, commented on the accepted importance of PM as part of OR/MS teaching. However, the responses to the academic questionnaire and the web searches revealed only four recognisable PM classes in UK undergraduate operational research degrees (out of the 23 universities that offer an OR/MS degree). Of the four classes, only two comprehensively concentrate on PM. The remaining two integrate topics on PM as part of the overall class content.

In general, the topics covered on the four undergraduate classes included: Balanced Scorecard; Benchmarking; Business process reengineering (BPR); Customer satisfaction measurement; Data Envelopment Analysis (DEA); EFQM/Business Excellence model; Implementation issues of PM; Leadership aspects of PM; The PM “revolution”; Process Mapping; PM and OR/MS; Quality measurement; Six Sigma; Total Quality Management (TQM); Traditional approaches to PM

Academics were questioned about reasons for not having a class on this subject. Seven responses were received with the main reasons given as:

- the degree concentrated more on mathematical topics such as computing science, information studies and mathematics.
- there was no room for “another” class due to the existing intensive teaching programme
- lack of knowledge of the subject in the department. Some respondents indicated that they were interested in adding a PM class but the lack of expertise in the department would not allow this.

In terms of assessment it was impossible to obtain any detailed information on the assessment of the PM classes other than that a mixture of assignments and exam was typically used.

Practitioner views on PM

PM Tools: Respondents were asked to detail which specific PM tools and techniques they had used in the organisations they were working in. Altogether 30 PM tools were referred to in the responses with the most popular shown in Fig 1. The Balanced Scorecard comprises 22.7% of the responses¹ on tools and proves to be the most popular PM tool among the practitioners with just over 50% of respondents saying they have applied the Balanced Scorecard in their organisation. Benchmarking had 18.6% of responses, with 45% of respondents using this in their organisation.

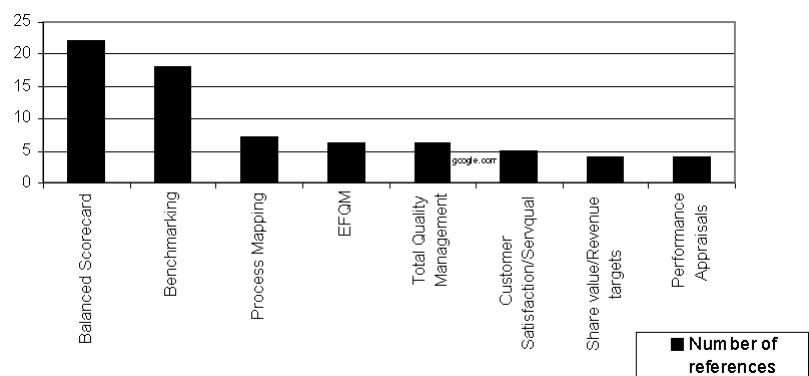


Fig 1 Popular PM Tools among practitioners

PM Difficulties: Respondents were asked to point out the practical difficulties they had in applying PM tools. Fig 2 shows the responses: “lack of top level support” was the most common difficulty cited by almost one-third of respondents.

Teaching and learning: Those completing the practitioner questionnaire were also asked their views on what they felt should be taught within a PM class and where their own learning about PM had taken place. The most common suggestions were:

- the concepts and principles of PM
- the tools commonly used in PM
- the main obstacles to implementing effective PM
- the impact of PM on an organisation
- the measurement process, describing the different methods and skills for obtaining the information for performance measures

¹ A reminder that each respondent could give more than one answer. This explains the emphasis on the word “responses” rather than “respondents”.

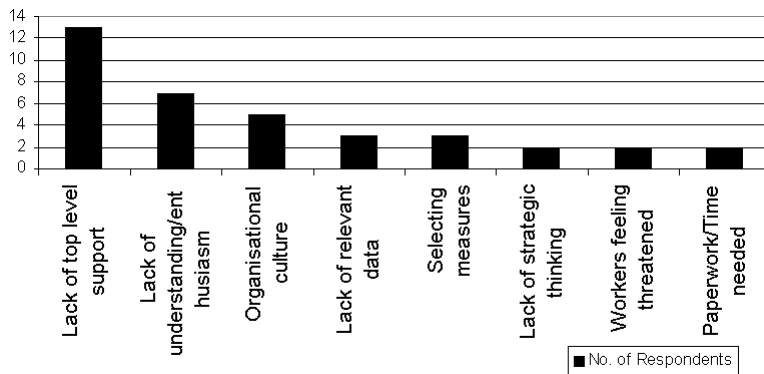


Fig 2 PM Difficulties

Interestingly, three quarters of practitioner respondents cited personal reading or personal experience as the way that they had developed knowledge of PM approaches and techniques.

Summary

The main aim of this research was to investigate the extent to which PM is taught on UK OR/MS undergraduate programmes, the nature of those classes and to gain an insight into the requirements of the professional world (practitioners).

The results revealed only four distinct PM classes taught in the UK on OR/MS undergraduate degrees. The main reasons given for the absence of PM classes were lack of staff expertise in PM, the lack of space in the programme and the focus on hard OR/MS. All the academic respondents appreciated the importance of PM.

From the survey of a small number of PM practitioners, the Balanced Scorecard and Benchmarking were found to be the most popular PM tools. Practitioners cited "Lack of Top Level Support" as the main difficulty in applying PM, with other popular answers being "Lack of Understanding/enthusiasm" and "Organisational Culture". "Personal experience" and "Personal reading" were given as the main ways practitioners had developed their knowledge and skills in PM.

Overall we would argue that OR/MS has a considerable contribution to make to effective performance measurement both from the perspective of theoretical development and of practical application. Dyson (2002) comments "... there is a key opportunity for

operational research to improve the design of performance measurement systems ..." and Smith and Goddard [3] also conclude, "OR has contributed substantially to the development of performance measurement instruments and one must hope that operational researchers... will redouble their efforts in this area". One of the stimuli for undertaking this research survey was to assess the extent to which undergraduate OR/MS teaching in the UK was responding to this opportunity.

Notwithstanding, the small sample sizes in this research, there appears to be a significant gap in OR/MS undergraduate teaching and a real opportunity for OR/MS to contribute to the PM "revolution" not just through the more obvious modelling and analytical techniques but also by utilising soft OR approaches. Given the increasing interest in PM, it appears that it is up to OR/MS academia to catch up with the requirements of the real world and, perhaps, to re-prioritise what is taught to OR/MS undergraduates. As one of the academic respondents commented "Even though the business world has recognised the importance of performance measurement, academia is only just starting to do serious research into the subject and it will therefore become a very important subject in the future possibly instigating the appearance of future performance measurement classes."

References

- [1] Neely A (1999), *The performance measurement revolution: why now and what next?* International Journal of Operations and Production Management; Volume 19 No 2, 1999
- [2] Dyson R G (2000), *Strategy, performance and operational research*, JORS 51, 5-11
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- [4] Johnston R, Brignall S and Fitzgerald L (2002), *'Good enough' performance measurement: a trade off between activity and action*, JORS 53, 256-262