Investigations
in university teaching and learning vol. 2 (2) spring 2005 ISSN 1740-5106

Investigating the Drivers of Student Satisfaction: the application of regression analysis

Steve Greenland
Department of Business and Service Sector Management
London Metropolitan University

Key words: *Regression analysis, teaching evaluation, student feedback*

Introduction

Many organisations strive to enhance service quality in order to increase customer satisfaction. This strategy is widely recognised as improving both customer retention and post consumption attitudes (Mittal and Kamakura 2001). Accordingly many different approaches for evaluating service quality have been developed. Quantitative studies frequently employ either gap analysis (Greenland 2003) or regression analysis in this regard, with many considering the latter to be one of the more statistically reliable methods (e.g., Bolton and Drew 1994; Chu 2002; Desarbo *et al.* 1994; Lassar *et al.,* 2000). Regression can be used to determine the significant drivers of customer satisfaction by linking ratings of various aspects of service (the independent variables) to an overall measure of satisfaction (the dependent variable). Some consider its application to be particularly relevant to university teaching (e.g., Liaw and Goh 2003). The main criticisms of the approach concern the level of explanation of the regression equation, which may be low, and multicolliniarity, which can mean attributes are highly correlated with one another. However, this latter problem is readily overcome by application of the Ridge Regression method (Coshall 1993, Hoerl and Kennard 1970) available in SPSS (Statistical Package for the Social Sciences). This paper investigates the application of regression analysis to an appraisal of classroom teaching, in order to explore the key drivers of satisfaction for business students. After a description of the research method and results, recommendations for improving student satisfaction, as well as implications for classroom teaching evaluation are discussed.

Research method and top-line findings

Initially qualitative student feedback was obtained for five marketing modules to identify the core teaching dimensions important to business students. On the basis of the most frequently mentioned aspects of teaching quality, as well as a literature review, a one-page questionnaire was produced. After piloting this was given to business students taking four marketing modules, taught by different lecturers. The self-completion questionnaire was administered towards the end of the modules in

weeks ten and eleven, following a short recap of the content and objectives. In the questionnaire a seven point scale is used to rate the module along thirteen dimensions of classroom teaching, as well as indicate the degree of satisfaction or otherwise with the module overall. Mean ratings for the modules are presented in Appendix 1. Whilst a statistical purist might regard the use of mean scores from categorical data as inappropriate, such values are commonly utilized in popular service quality evaluation techniques such as SERVQUAL (e.g., Buttle 1996; Cronin and Taylor 1992; Oldfield and Baron 2000; Parasuraman *et al.* 1985; Pariseau and McDaniel 1997). As well as an open-ended section for specific module likes and dislikes / improvements, student biographical details and patterns of study time were also collected (See Appendix 2). Ultimately122 completed forms were returned and all data were processed and analysed using SPSS.

Exploring relationships in the data

Factors influencing study patterns

The relationship between student biographical details and study patterns were investigated using Chi-Square and correlation (Spearman's). For most of the variables there are no significant relationships. However, older students are more likely to devote greater time to out-of-class studies (0.01 level of statistical significance).

Factors influencing student satisfaction

Multinomial logistic regression (MLR) was adopted to investigate the relationship between the module teaching dimensions and student satisfaction. MLR is especially designed for situations where the dependent variable is categorical or discrete in nature (Montgomery and Peck 1992, Myers 1990). Additionally, MLR permits independent variables that may be factors (e.g. student background characteristics like age, gender, etc.) or covariates (e.g. module ratings). Application of MLR reveals achieving learning outcomes as being the most important statistically significant driver of student satisfaction. Enjoyment is also statistically significant and influential, but to a lesser extent (See table 1).

Table 1 Multinomial logistic regression results with satisfaction as the dependent variable

Effect	-2 Log likelihood of reduced model	Chi-square	Df*	Sig**
Has achieved learning objectives	191.59	18.69	5	.002
Enjoyable	184.90	12.00	5	.035

* Degrees of freedom ** Significance levels

The chi-square statistic in the table is the difference in the –2 log- likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters (or MLR coefficients) of that effect are zero. Cox/Snell and Nagelkerke pseudo (r^2) coefficients are respectively 74.9% and 79.1% for the final model tabulated above, the level of explanation provided by the model is therefore quite good.

The findings support the work of other educational researchers such as Banwet and Datta (2003) who, using a different approach (structural equation modelling), found that lecture outcome was the most important variable influencing perceived lecture quality and student satisfaction. The result is also consistent with other works in other (non education) service sectors, where the consequence or outcome of the core service was found to have most influence on perceptions of overall quality (e.g., Patterson and Spreng 1997; Schneider and Bowen 1995).

None of biographical variables or study pattern variables emerged as having a statistically significant impact upon satisfaction ratings. Similarly when the influence of student biographical factors on the drivers of satisfaction were analysed their impact was found to be limited. For instance, MLR models for each gender and studying full or part time all identify achieving learning objectives as the key driver of satisfaction.

Table 2 Multinomial logistic regression results with learning outcomes as the dependent

Effect	**-2 Log likelihood of reduced model**	**Chi-square**	**Df***	**Sig** **
Effective assignments	245.17	21.00	5	.001
Clarity of information	239.50	15.34	5	.009
Appropriate student workload	235.12	10.95	5	.050
Appropriate student class participation	240.26	16.09	5	.007

* Degrees of freedom ** Significance levels

Given the key importance of achievement of the learning outcomes in driving student satisfaction a second MLR analysis was also run taking this dimension as the dependent variable. In this regression model four variables emerge as the statistically significant drivers, determining the extent to which learning outcomes are perceived

to have been achieved (see Table 2). Cox/Snell and Nagelkerke pseudo (r^2) coefficients are respectively 73.2% and 76.1% for the final model tabulated above, the level of explanation provided by the model is good. The model predicts that if improvements are made in these four aspects then a positive impact upon the achievement of learning outcomes will be forthcoming.

Conclusion and implications

In conclusion the application of regression analysis (MLR) has achieved the research objectives and enabled the drivers of business student satisfaction to be identified. Compared to other methods of service quality evaluation, such as gap analysis (Greenland 2003), the regression approach is the statistically more reliable (Chu 2002). However, it does require the researcher to have a greater statistical knowledge. The initial regression analysis identified achievement of learning outcomes as the most important factor determining business student satisfaction. This finding is consistent with other studies and highlights the importance of including this dimension in teaching evaluation instruments. In terms of implications for teaching, it is therefore essential to communicate with students regarding a module's learning objectives and explain how these are going to be achieved at the beginning of a course, and then reiterating how they have been achieved during and at the end. If students appreciate this then, according to the model, their satisfaction levels will increase. Since enhancing customer satisfaction is widely recognised as improving both retention and post consumption attitudes (Mittal and Kamakura 2001) this should also have positive ramifications for the institution as a whole.

The second regression model identifies the statistically significant drivers of achievement of learning outcomes, in order of importance as effective assignments, clarity of information, appropriate student workload, and appropriate student class participation. By improving these aspects of classroom teaching lecturers may also enhance the extent to which students perceive learning outcomes have been achieved. These variables originate from the questionnaire and are based on the qualitative student feedback. Re-examination of these data provides further insight into the meaning of these terms. Clarity of information refers to the whether or not students find the module content informative and whether it is provided in a clear, unambiguous manner. Lecturers might improve upon this aspect by making sure that there are no areas of confusion, as well as recapping the main learning points at the end of each session. From the qualitative feedback, appropriate student workload appears to have two key dimensions. One aspect refers to the amount of time that needs to be spent on assignments, reading, etc. The other refers to the perceived relevance of these activities to the module and learning objectives. Students seem willing to spend an average of 4 hours per week on a subject (see Appendix 2), so designing a programme with this figure in mind seems appropriate. Furthermore reiterating the learning objectives of particular assignments might help to improve ratings in this aspect. Appropriate student class participation also

appears to have two distinct dimensions. The qualitative feedback clearly shows that business students enjoy class interaction. However, the class activities / discussion must have a clear relevance to the lesson and the broader module learning objectives.

In the future conducting focus groups with students and lecturers might provide further insights into how learning objectives and outcomes can be achieved more effectively. Once potential improvements have been implemented it should then be possible to track performance in these areas and monitor whether student satisfaction does indeed improve as a result.

References

Banwet, D. K. and Datta, B. (2003) A study of the effect of perceived lecture quality on post lecture intentions, *Work Study*, 52 (5), 234-43.

Bolton, R. N. & Drew, J. H. (1994) Linking customer satisfaction to service operations and outcomes, in Rust R. T. & Oliver, R. L. (Eds.) *Service Quality: New Directions in Theory and Practice*, Sage, California, 173-200.

Buttle, F. (1996) SERVQUAL: review, critique, research agenda, *European Journal of Marketing*, 30 (1), 8-32.

Buttle, F. (1996) SERVQUAL: review, critique, research agenda, *European Journal of Marketing*, 30 (1), 8-32.

Chu, R. (2002) Stated-importance versus derived-importance customer satisfaction measurement, *Journal of Services Marketing*, 16 (4), 285-301.

Coshall, J. T. (1993) An illustration of ridge regression using agricultural data, *Discussion Papers in Business Economics*, 9, University of North London.

Cronin, J. J. & Taylor, S. A. (1992) Measuring service quality: a reexamination and extension, *Journal of Marketing*, 56, 55-68.

Desarbo, W. S., Huff, L., Rolandelli, M. M. & Choi, Jungwhan (1994) On the measurement of perceived service quality, in Rust, R. T. & Oliver, R. L. (Eds) *Service Quality: New Directions in Theory and Practice* Sage Publications, Thousand Oaks California, 201-22.

Greenland, S. J. (2003) Exploring the use of a gap analysis approach for quantitative evaluation of teaching effectiveness, *Investigations in University Teaching and Learning*, 1 (1), 28-34.

Hoerl, A. E. & Kennard, K. R. (1970) Ridge regression: applications to nonorthogonal problems, *Technometrics*, 12, 69-82.

Lassar, W. M., C. Manolis, C. and Winsor, R. (2000) Service quality perspectives and satisfaction in private banking, *Journal of Services Marketing*, 14 (3), 244-71.

Liaw, S. H. and Goh, K. L. (2003) Evidence and control of biases in student evaluations of teaching, *The International Journal of Educational Management*, 17 (1), 37-43.

Mittal, V. and Kamakura, W. (2001) Satisfaction, repurchase intent, and repurchase behaviour: investigating the moderating effect of customer characteristics, *Journal of Marketing Research*, 37 (2), 131-42

Montgomery, D.C. and Peck, E. A. (1992) *Introduction to Linear Regression Analysis*, Wiley, New York.

Myers, R.H. (1990) *Classical and Modern Regression with Applications*, PWS-Kent, Boston.

Oldfield, B. M. and S. Baron (2000) Student perceptions of service quality in a UK university business and management faculty, *Quality Assurance in Education*, 8 (2), 85-95.

Pariseau, S. E. and McDaniel, J. R. (1997) Assessing service quality in schools of business, *International Journal of Quality and Reliability Management*, 14 (3), 204-18.

Parasuraman, A., Zeithaml, V. & Berry, L. (1988) SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality, *Journal of Retailing*, 64, 12-40.

Patterson, P. G. and Spreng, R. A. (1997) Modelling the relationship between perceived value, satisfaction and repurchase intentions in a business to business, service context: an empirical examination, *International Journal of Service Industry Management*, 8 (5), 414-34.

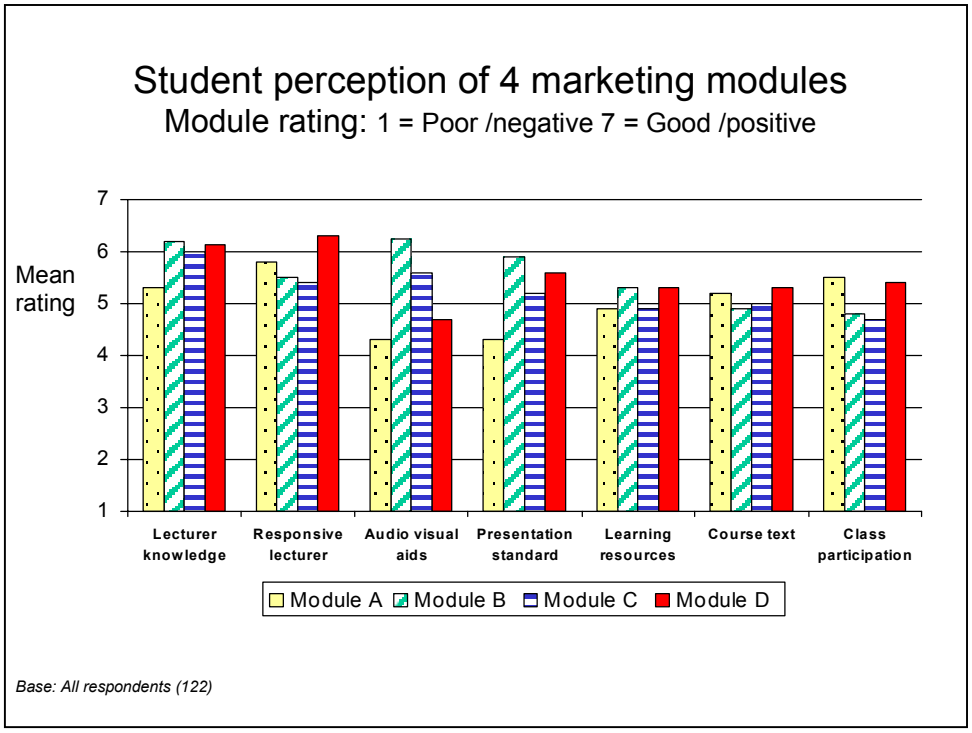
Schneider, B. and Bowen, D. E. (1995) *Winning the Service Game*, Harvard Business School Press, Boston, MA.

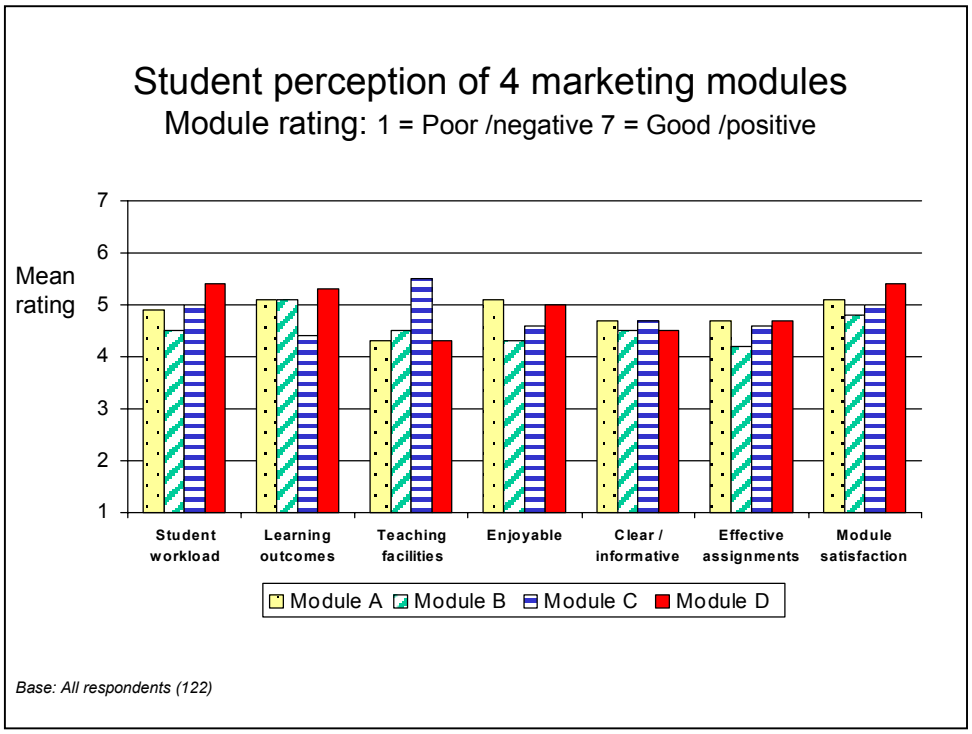
Biographical note

Steve Greenland is Senior Lecturer in Marketing and Social Research in the Department of Business and Service Sector Management. He has worked on a wide range of commercial and academic service quality projects. s.greenland@londonmet.ac.uk .

Appendix 1

Module ratings along 13 dimensions of classroom teaching and overall satisfaction*





* Coursework feedback, although an important aspect, was not included in the questionnaire, since at the time of administration it had not been given for all the modules the evaluated.

Appendix 2

Sample biographical details, patterns of studying

Registered	Full time 86%	Part time 14%	
Level	Undergrad' 37%	Postgrad 63%	
Gender	Male 42%	Female 58%	
Age	18-24 52%	25+ 48%	
Children	None 93%	1 or more 7%	
Nationality	UK 33%	Other EU 20%	Overseas 47%
Employed pre LMU	Full time 47%	Part time 23%	Not 30%
Hours per week on module (excl. class)	4.6		
Lectures missed	1.1		

(Respondent base 122)

Main module likes and dislikes / improvements (mentioned by at least 10 students)

		%
Top likes (Response base 92)	Lecturer capability	23
	Real life examples	20
	Module structure	14
	Teaching approach	14
Dislikes / improvements (Response base 71)	Module structure	24
	Core text	17
	Organisation	15