MANAGING COMPLEXITY BY IDENTIFYING PRIORITIES AND TRACKING PROGRESS: USING QUALITY IMPROVEMENT PRIORITY MATRICES

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Abstract

A quality Improvement Priority Matrix is a method for achieving data-driven decision-making. It has been used by Baldrige Award winning companies. Regular information from employees and customers about the features of the organization that most need improvement allows managers to focus attention and resources where they can best contribute to improving employee and customer satisfaction. In May 2001 and May 2002 the members of the Department of Management Science at The George Washington University used a Quality Improvement Priority Matrix to identify those features of the Department that they felt were high on importance but low on performance. The changes in how the features of the Department were rated for importance and performance clearly reveal where progress was made in the intervening year and where attention next needs to be focused. In addition to identifying priorities and tracking progress these matrices can also be used by high level managers in conversations with lower level managers about useful actions and needed resources. A software program is now available to simplify the task of data manipulation.

Introduction

In February 1995, a Quality Improvement Priority Matrix was described by the people from GTE Directories in their presentation. This described how they won the Baldrige Award (Carlson, 1995). A similar matrix, called a "strategic improvement matrix," was used by the people from Armstrong Building Products Operations in their presentation to the February 1996 Baldrige Award conference (Wellendorf, 1996). The matrix was used in several GWU student group projects in the late 1990s. A matrix was used by visiting scholars at GWU in December 2000 to identify how the US Department of State's Junior Faculty Development Program might be improved (Naoumova and Umpleby, 2001). Later in May 2001, the members of GWU Department of Management Science also used a matrix (Umpleby and Melnychenko, 2001).

A Quality Improvement Priority Matrix asks customers or employees to rate several features of an organization on two scales – importance and performance. That is, how important to them is that particular feature, and how effectively is the organization currently performing on that feature. For this exercise we asked the faculty in the Department of Management Science at GW to evaluate various features of the Department and the School of Business and Public Management. Although the Department is functioning well, the quality improvement literature claims that improvement is always possible. If so, where is improvement most needed? With this method one looks at the quadrant that corresponds to high importance and low performance. What features of the organization fall into this quadrant? Those are the features where improvement will lead to the greatest increase in customer and/or employee satisfaction.

This is the second study of how a Quality Improvement Priority Matrix was used among faculty members in the Department of Management Science at The George Washington University. The first questionnaire was distributed in May 2001. The second questionnaire was distributed in May 2002. The 2001 questionnaire contained 51 features related to the Department and five questions about the matrix itself. These questions asked whether the members of the Department found the exercise to be useful and whether they thought it would be helpful to other departments in the University. A large majority thought the results were useful and that similar exercises in other departments would be helpful to them as well.

The 2002 survey listed 52 features of the Department and included some questions seeking additional information on the features rated high on importance and low on performance in the 2001 survey. The 2002 questionnaire contained no questions about the questionnaire itself.

Results of May 2002 Survey

Table 1 presents the mean ratings on importance and performance for the features in the Quality Improvement Priority Matrix that was distributed to members of the Department of Management Science at their May 2002 annual retreat. 19 questionnaires were returned. In some cases people did not rate all features. In these cases the mean is based on the number who replied to that feature, not 19. Figure 1 is the Quality Improvement Priority Matrix that presents graphically the data in Table 1.

The features of greatest interest are those that fall in the "southeast" quadrant, that is, those rated high on importance and low on performance. 16 of the 52 features lie in the SE quadrant. Using Excel it is difficult to attach either numbers or names to the points in the matrix. So, the features in the SE quadrant are listed in descending order of importance in Table 2 and increasing order of performance in Table 3.

Comparing the 2001 and 2002 Surveys

We also attempted to present the matrix data collected from the two years and hence to show how opinions had changed between the two surveys. When we plotted both 2001 and 2002 data on one matrix in order to see how the ratings had changed, we found that the matrix was hard to interpret, because the data were too crowded. So, we divided the features of the Department into three groups – office equipment, activities, and support. Table 4 contains the data from both 2001 and 2002. Figures 2, 3, and 4 present arrows showing how the positions of the features on the matrix changed in one year. The arrows were drawn by hand.

Figures 5, 6, and 7 present Pareto Charts of the differences in *importance* between the two years for the three groups of features: office equipment, activities, and support. Figures 8, 9, and 10 present Pareto Charts of the differences in *performance* between the two years for the three groups of features.

What we see from Figures 2 through 10 is that in general evaluations of the features of the Department have improved. The mean of all performance scores increased from 5.25 to 5.45. The mean of all importance scores declined from 7.85 to 7.52. There are several reasons for the improved scores. A new parking garage was built, so performance scores increased for both student and faculty parking while importance scores decreased. In addition a new office and classroom building was built, increasing the space available for faculty offices, classrooms, and conference rooms. These physical changes are reflected in higher performance scores on features such as office space, classrooms, and conference rooms. The importance scores on these features also declined. The data for the two years revealed one surprise. The importance scores for faculty, department, and school websites increased noticeably, while performance declined very slightly. Apparently faculty members are using websites more and their standards for what is a good website have risen slightly. Hence, figures 2, 3, and 4 demonstrate that when changes are made, satisfaction improves. Furthermore, the matrix can identify features that need increased attention.

The quality improvement priority matrix is very helpful in identifying issues needing attention. But often additional questions need to be asked. Table 5 shows the results of nine questions asked to clarify the results of the questionnaire the year before. Figures 11 and 12 clarify the issue of secretarial support. We wanted to know whether the faculty felt we needed more secretaries or better-trained secretaries. Apparently the concern is not that the Department needs more secretaries, but rather better trained secretaries. Figures 13, 14, and 15 clarify the issue of teaching assistants. Here the faculty said that more teaching assistants are needed, but also better trained teaching assistants. Teaching assistants with better English language skills is important, but not as important as training in general.

Conclusions

We believe that this brief report is useful for the Department of Management Science not only because of the results, which can be used to guide improvement efforts in the coming year but also because the report illustrates the utility of a management method for helping a group of people to focus attention where improvement efforts can be most productive. Future studies will probably focus on several issues:

- More work can be done on finding the best ways to display data in order to show changes in ratings by customers or employees.
- It would be useful to establish a criterion for deciding when changes in ratings are statistically significant.
- Rather than having a one year gap between collecting ratings on features and asking follow-up questions, a survey could be given to a small sample of members of the Department in order to identify the features that need further clarification.
- Finally, additional work could be done on finding ways to encourage people in organizations to use such matrices to guide improvement efforts.

A software package which makes it easy to create a survey that results in a quality improvement priority matrix is now available. See www.qipm.com.

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Tables

Table 1.   Data for the 2002 Quality Improvement Priority Matrix

	Feature	Importance	Performance
1	Computer hardware	8.95	7.20
2	Computer software	8.85	7.35
3	Office space for faculty	8.00	5.40
4	Conference room and other space	7.40	4.25
5	Computer labs	8.80	4.85
6	Copiers	7.80	6.60
7	Fax machines	6.75	7.25
8	Office security	8.95	4.30
9	Secretarial support	7.40	4.40
10	Teaching assistants	8.55	5.55
11	Annual retreat	5.85	5.75
12	Social activities	5.16	4.39
13	Recreational activities	4.33	4.39
14	Building/ physical environment	7.50	4.00
15	Accounts payable	6.89	4.22
16	Classroom scheduling	8.05	5.35
17	Classroom facilities	8.90	5.05
18	Projection equipment	8.75	6.25
19	Course catalogue	6.85	6.80
20	Faculty websites	6.90	4.90
21	Dept. websites	7.75	5.10
22	SBPM websites	8.40	5.10
23	Campus grounds	7.45	6.60
24	Parking for faculty and staff	7.65	5.35
25	Parking for students	6.78	5.00
26	Library journal collection	8.65	6.60
27	Library book collection	8.50	6.40
28	Interlibrary loan	8.17	7.11
29	Coordination with other depts.	6.65	4.90
30	A supportive climate in the dept.	9.00	7.15
31	Dept. head protects faculty from admin. interference	8.90	8.05
32	Transparency of APT process	8.06	6.61
33	Travel support	8.20	8.15

34	Funds to support research	8.85	5.10
35	SBPM working papers series	5.28	3.47
36	Help with writing research proposals	5.90	3.25
37	English skills of students	8.20	5.25
38	General ability of students	8.70	6.20
39	Course evaluations	5.60	4.45
40	Faculty annual reports	4.20	4.90
41	Salaries	8.80	5.35
42	Health care benefits	8.75	6.25
43	Retirement benefits	8.80	6.35
44	Opportunities for academic work with Dept. faculty	8.00	5.89
45	Opportunities for academic work with other GW faculty	7.95	5.32
46	Assistance with learning IT, e.g., Prometheus	7.16	6.11
47	Dept. strategic plan	7.47	4.11
48	Dept. organization to implement its strategic plan	7.11	3.84
49	Use of continuous improvement methods in the Dept.	6.42	3.58
50	Consulting opportunities in DC area	6.55	5.05
51	Opportunities to meet local businessmen and govt managers	6.05	5.10
52	Promotion of contract faculty	6.58	3.63

Table 2. SE Quadrant Sorted by Importance

		Feature	Importance/2002	Performance/2002
8		Office security	8.95	4.30
5		Computer labs	8.80	4.85
14		Building/ physical environment	7.50	4.00
47		Dept. strategic plan	7.47	4.11
4		Conference room and other space	7.40	4.25
9		Secretarial support	7.40	4.40
48		Dept. organization to implement its strategic plan	7.11	3.84
20		Faculty websites	6.90	4.90
15		Accounts payable	6.89	4.22
29		Coordination with other depts.	6.65	4.90
52		Promotion of contract faculty	6.58	3.63
49		Use of continuous improvement methods in the Dept.	6.42	3.58
36		Help with writing research proposals	5.90	3.25
39		Course evaluations	5.60	4.45
35		SBPM working papers series	5.28	3.47
12		Social activities	5.16	4.39

Table 3. SE Quadrant Sorted by Performance

	Feature	Importance/2002	Performance/2002
36	Help with writing research proposals	5.90	3.25
35	SBPM working papers series	5.28	3.47
49	Use of continuous improvement methods in the Dept.	6.42	3.58
52	Promotion of contract faculty	6.58	3.63
48	Dept. organization to implement its strategic plan	7.11	3.84
14	Building/ physical environment	7.50	4.00
47	Dept. strategic plan	7.47	4.11
15	Accounts payable	6.89	4.22
4	Conference room and other space	7.40	4.25
8	Office security	8.95	4.30
12	Social activities	5.16	4.39
9	Secretarial support	7.40	4.40
39	Course evaluations	5.60	4.45
5	Computer labs	8.80	4.85
20	Faculty websites	6.90	4.90
29	Coordination with other depts.	6.65	4.90

Table 4. Comparison of Data from 2001 and 2002

	Feature	Importance/ 2002	Performance/ 2002	Importance/ 2001	Performance/ 2001
1	Computer hardware	8.95	7.20	9.44	6.44
2	Computer software	8.85	7.35	9.47	6.00
3	Office space for faculty	8.00	5.40	9.00	4.06
4	Conference room and other space	7.40	4.25	7.61	3.18
5	Computer labs	8.80	4.85	8.94	5.06
6	Copiers	7.80	6.60	8.24	5.76
7	Fax machines	6.75	7.25	7.44	6.00
8	Office security	8.95	4.30	8.88	5.31
9	Secretarial support	7.40	4.40	7.50	4.19
10	Teaching assistants	8.55	5.55	8.50	4.75
11	Annual retreat	5.85	5.75	7.00	6.94
12	Social activities	5.16	4.39	5.19	5.27
13	Recreational activities	4.33	4.39	4.38	4.33
14	Building/ physical environment	7.50	4.00	8.69	3.75
15	Accounts payable	6.89	4.22	8.00	3.58
16	Classroom scheduling	8.05	5.35	8.20	5.47
17	Classroom facilities	8.90	5.05	9.00	4.06
18	Projection equipment	8.75	6.25	8.65	5.88
19	Course catalogue	6.85	6.80	7.13	6.38
20	Faculty websites	6.90	4.90	6.38	5.13
21	Dept. websites	7.75	5.10	7.00	5.50
22	SBPM websites	8.40	5.10	6.94	5.50
23	Campus grounds	7.45	6.60	7.20	6.00
24	Parking for faculty and staff	7.65	5.35	8.13	4.63
25	Parking for students	6.78	5.00	7.00	2.92
26	Library journal collection	8.65	6.60	8.59	5.24
27	Library book collection	8.50	6.40	8.56	5.50
28	Interlibrary loan	8.17	7.11	8.44	6.36
29	Coordination with other depts.	6.65	4.90	\7.27	4.43
30	A supportive climate in the dept.	9.00	7.15	8.88	7.76
31	Dept. head protects faculty from admin. interference	8.90	8.05	8.25	8.63
32	Transparency of APT process	8.06	6.61	8.93	6.79

33	Travel support	8.20	8.15	8.53	8.33
34	Funds to support research	8.85	5.10	8.63	5.07
35	SBPM working papers series	5.28	3.47	6.19	3.00
36	Help with writing research proposals	5.90	3.25	6.76	3.07
37	English skills of students	8.20	5.25	8.53	5.06
38	General ability of students	8.70	6.20	8.76	6.88
39	Course evaluations	5.60	4.45	7.00	5.00
40	Faculty annual reports	4.20	4.90	6.38	5.81
41	Salaries	8.80	5.35	9.44	4.28
42	Health care benefits	8.75	6.25	9.50	5.27
43	Retirement benefits	8.80	6.35	9.50	6.44
44	Opportunities for academic work with Dept. faculty	8.00	5.89	8.53	5.60
45	Opportunities for academic work with other GW faculty	7.95	5.32	8.36	5.21
46	Assistance with learning IT, e.g., Prometheus	7.16	6.11	7.75	7.27
47	Dept. strategic plan	7.47	4.11	7.31	4.44
48	Dept. organization to implement its strategic plan	7.11	3.84	7.06	3.63
49	Use of continuous improvement methods in the Dept.	6.42	3.58	5.75	3.44
50	Consulting opportunities in DC area	6.55	5.05	6.69	4.56
51	Opportunities to meet local businessmen and govt managers	6.05	5.10	6.88	4.56
52	Promotion of contract faculty	6.58	3.63		
	Average	7.52	5.45	7.85	5.25
	STDV	1.25	1.21	1.16	1.32

Table 5. Results of Supplementary Questions

	Yes	No	Don't know
1. Should the Department have a written strategic plan?	**13**	**5**	
2. Should there be a team to implement the strategic plan?	**10**	**8**	
3. Should we create several process improvement teams within the department?	**8**	**10**	
4. Should the members of process improvement teams receive training in process improvement methods?	**3**	**1**	
5. Has Accounts Payable improved in the past year?	**7**	**5**	**5**
6. Do you read the working papers?	**1**	**17**	
7. Do you contribute working papers to the series?	**5**	**14**	
8. With regard to writing research proposals			
where would help be most useful?			
__ Generating ideas for research	**4**		
__ Finding likely funding sources	**12**		
__ Preparing the description of the research, including research methods	**7**		
__ Preparing the budget, institutional descriptions, vitae, attachments	**9**		
__ Other			
9. What kinds of help with research proposals would you like to have?			
__ Research assistant	**11**		
__ Professional proposal writer	**7**		
__ Other	**1**		

Figure 1. Quality Improvement Priority Matrix
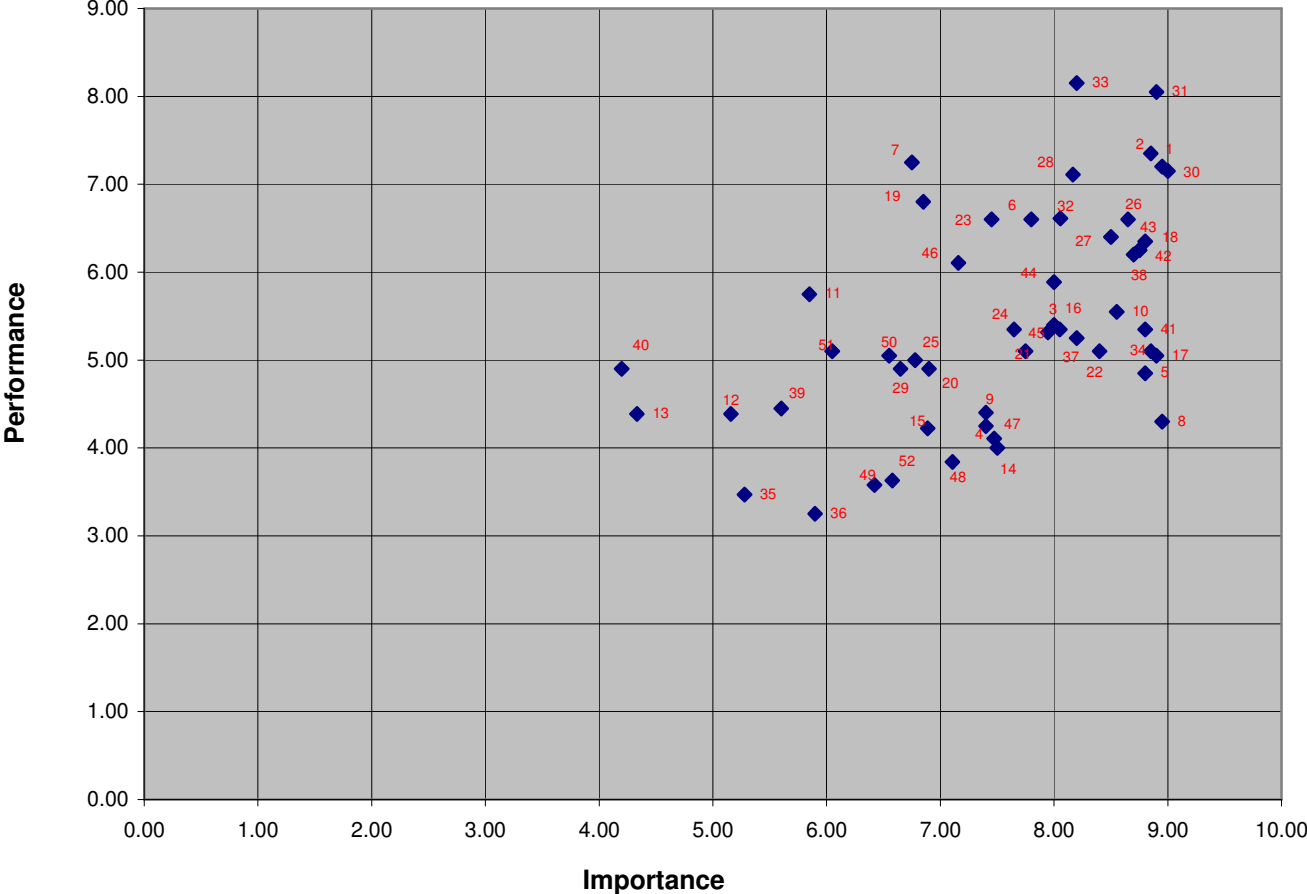
Figure 2. 2001-2002 Office Equipment
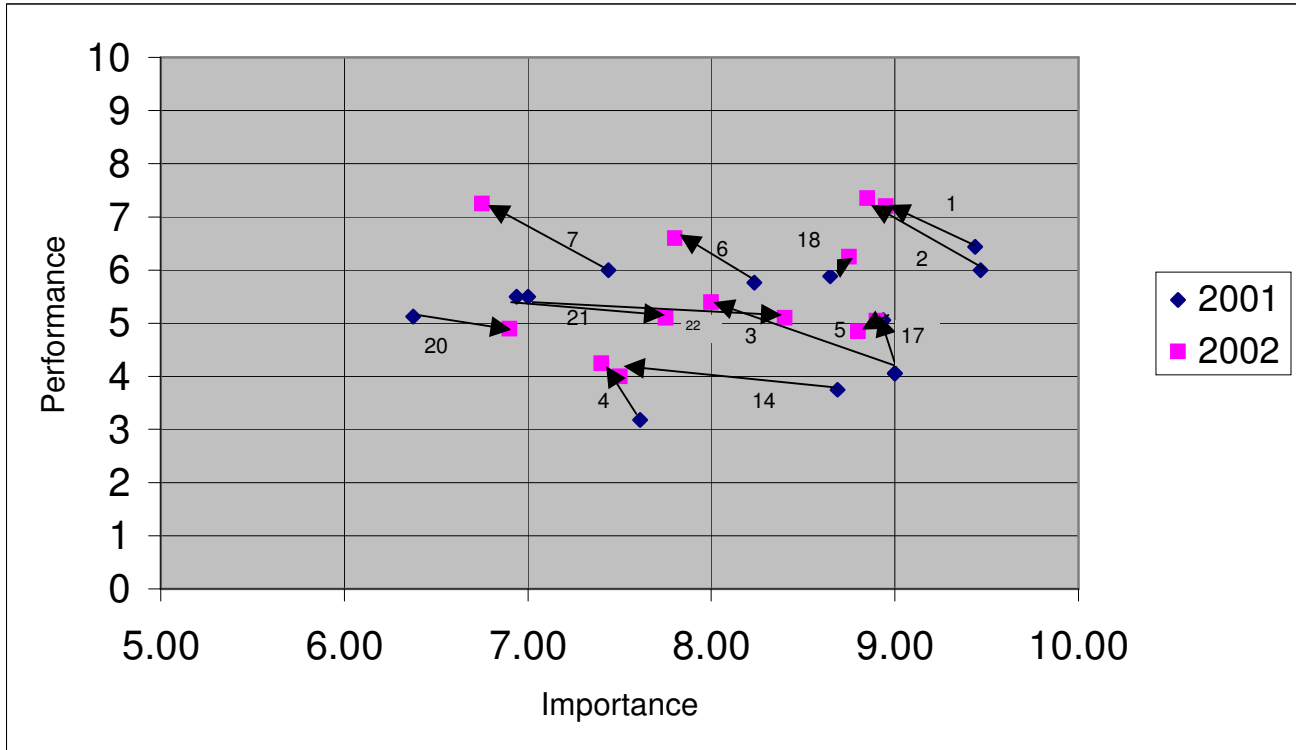
Figure 3. 2001-2002 Activities
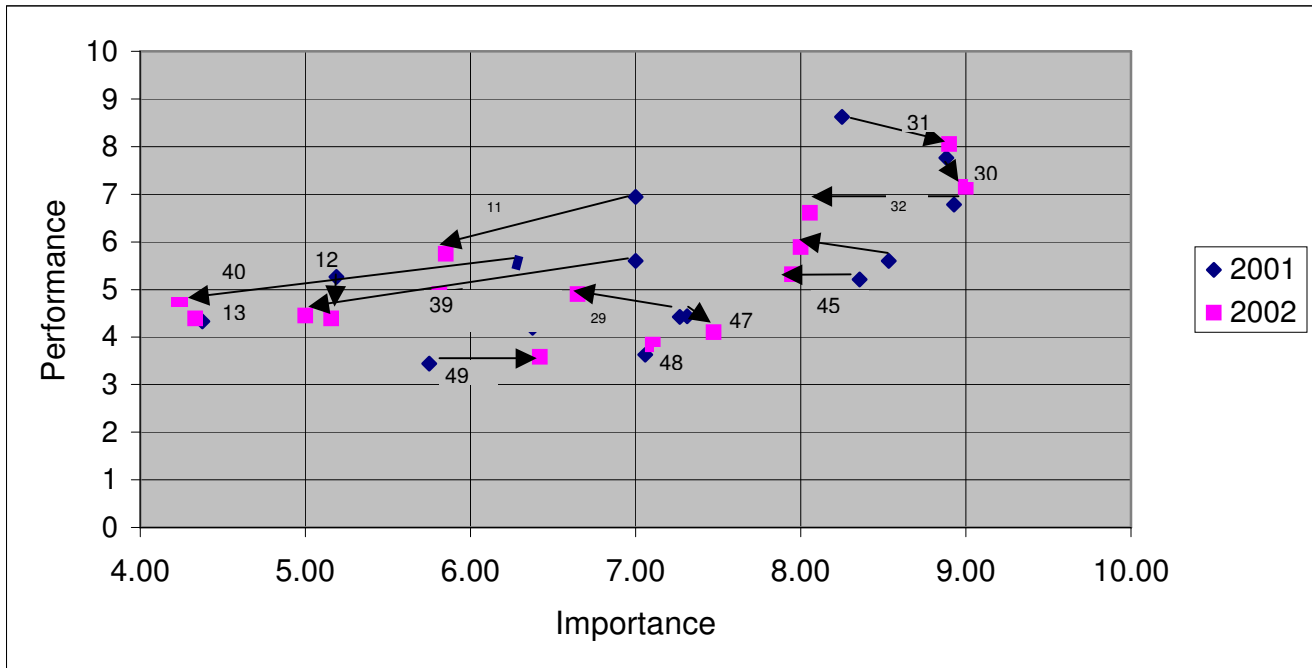
Figure 4.   2001-2002 Support

2001 - 2002 Support

Figure 5. Pareto Chart of Importance Differences: Office Equipment

	SBPM websites	Dept. websites	Faculty websites	Projection equipment	Classroom facilities	Computer labs	Conference room and other space	Copiers	Computer hardware	Computer software	Fax machines	Office space for faculty	Building/ physical environment
Importance Difference	1.46	0.75	0.53	0.10	-0.10	-0.14	-0.21	-0.44	-0.49	-0.62	-0.69	-1.00	-1.19

Figure 6. Pareto Chart of Importance Differences: Activities

	Use of continuous improvement methods in the Dept.	Dept. head protects faculty from admin. interference	Dept. strategic plan	A supportive climate in the dept.	Dept. organization to implement its strategic plan	Social activities	Recreational activities	Opportunities for academic work with other GW faculty	Opportunities for academic work with Dept. faculty	Coordination with other depts.	Transparency of APT process	Annual retreat	Course evaluations	Faculty annual reports
■ Importance Difference	0.67	0.65	0.16	0.12	0.05	-0.03	-0.04	-0.41	-0.53	-0.62	-0.87	-1.15	-1.40	-2.18

Figure 7. Pareto Chart of Importance Differences: Support

	Campus grounds	Funds to support research	Office security	Library journal collection	Teaching assistants	Library book collection	General ability of students	Secretarial support	Consulting opportunities in DC area	Classroom scheduling	Parking for students	Interlibrary loan	Course catalogue	English skills of students	Travel support	Parking for faculty and staff	Assistance with learning IT, e.g.,	Salaries	Retirement benefits	Health care benefits	Opportunities to meet local	Help with writing research	SBPM working papers series	Accounts payable
■ Importance Difference	0.25	0.23	0.07	0.06	0.05	-0.06	-0.06	-0.10	-0.14	-0.15	-0.22	-0.27	-0.28	-0.33	-0.33	-0.48	-0.59	-0.64	-0.70	-0.75	-0.83	-0.86	-0.91	-1.11

Figure 8.   Pareto Chart of Performance Differences: Office Equipment

	Computer software	Office space for faculty	Fax machines	Conference room and other space	Classroom facilities	Copiers	Computer hardware	Projection equipment	Building/ physical environment	Computer labs	Faculty websites	SBPM websites	Dept. websites
■ Performance Difference	1.35	1.34	1.25	1.07	0.99	0.84	0.76	0.37	0.25	-0.21	-0.23	-0.40	-0.40
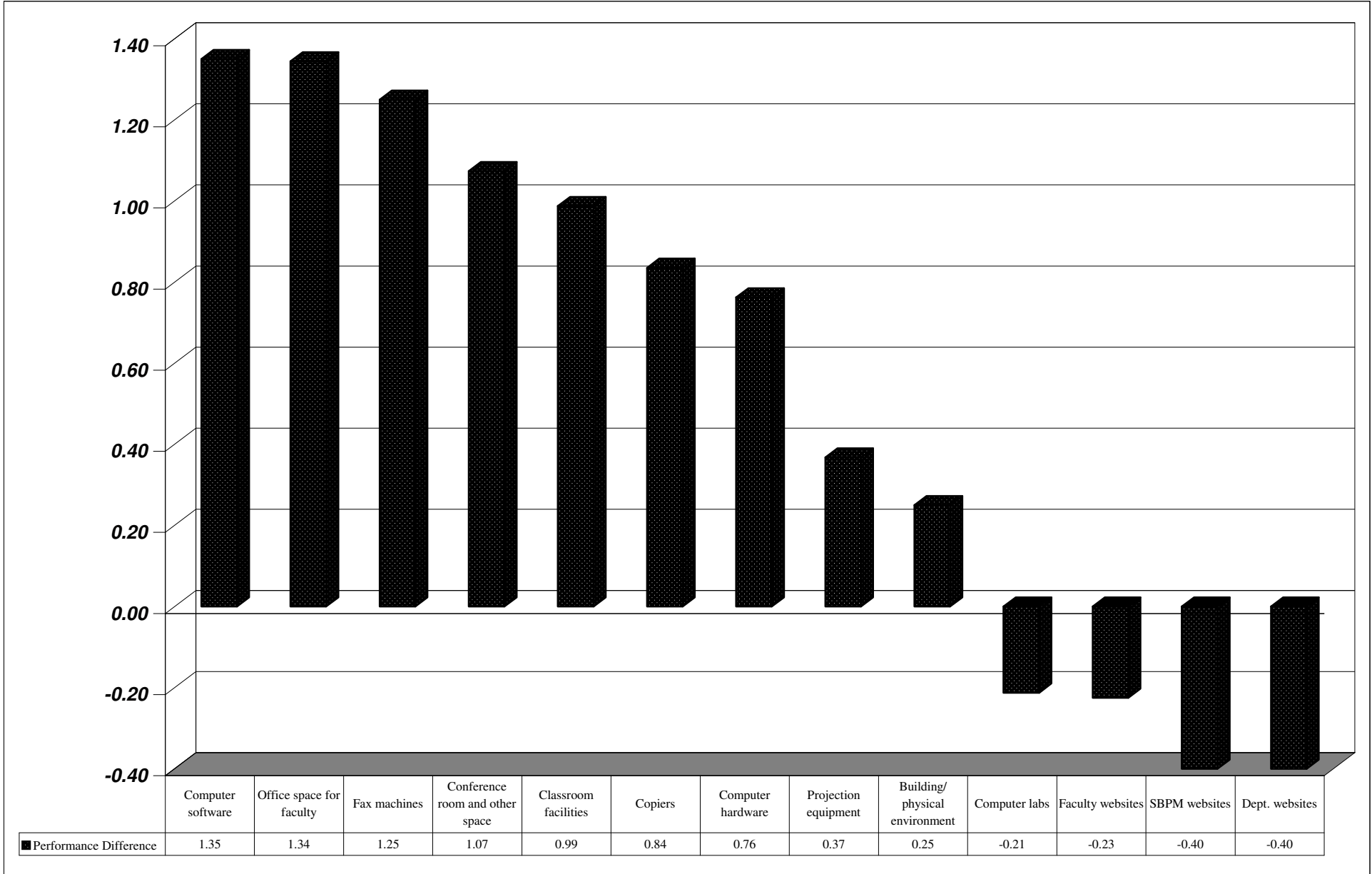
Figure 9. Pareto Chart of Performance Differences: Activities

	Coordination with other depts.	Opportunities for academic work with Dept. faculty	Dept. organization to implement its	Use of continuous improvement methods in the	Opportunities for academic work with other GW	Recreational activities	Transparency of APT process	Dept. strategic plan	Course evaluations	Dept. head protects faculty from admin.	A supportive climate in the dept.	Social activities	Faculty annual reports	Annual retreat
■Performance Difference	0.47	0.29	0.22	0.14	0.10	0.06	-0.17	-0.33	-0.55	-0.57	-0.61	-0.88	-0.91	-1.19

Figure 10. Pareto Chart of Performance Differences: Support

	Parking for students	Library journal collection	Salaries	Health care benefits	Library book collection	Teaching assistants	Interlibrary loan	Parking for faculty	Accounts payable	Campus grounds	Opportunities to meet	Consulting opportuni	SBPM working papers	Course catalogue	Secretarial support	English skills of students	Help with writing research	Funds to support research	Retirement benefits	Classroom schedulin	Travel support	General ability of students	Office security	Assistance with learning
Performance Difference	2.08	1.36	1.07	0.98	0.90	0.80	0.75	0.73	0.64	0.60	0.54	0.49	0.47	0.43	0.21	0.19	0.18	0.03	-0.09	-0.12	-0.18	-0.68	-1.01	-1.16

Figure 11.   Secretarial Support

We need more secretarial support

	strongly agree	agree	slightly agree	neutral	slightly disagree	disagree	strongly disagree
Value	4	2	1	6	1	1	2

Figure 12. Training for Secretaries

The secretaries need more training

	strongly agree	agree	slightly agree	neutral	slightly disagree	disagree	strongly disagree
Value	4	7	2	1	1	1	0

Figure 13. Teaching Assistants

We need more teaching assistants

	strongly agree	agree	slightly agree	neutral	slightly disagree	disagree	strongly disagree
Value	6	5	5	3	1	0	0

Figure 14. Training for Teaching Assistants

The teaching assistants need more training

Figure 15. Language Skills

The language skills of TAs should be better
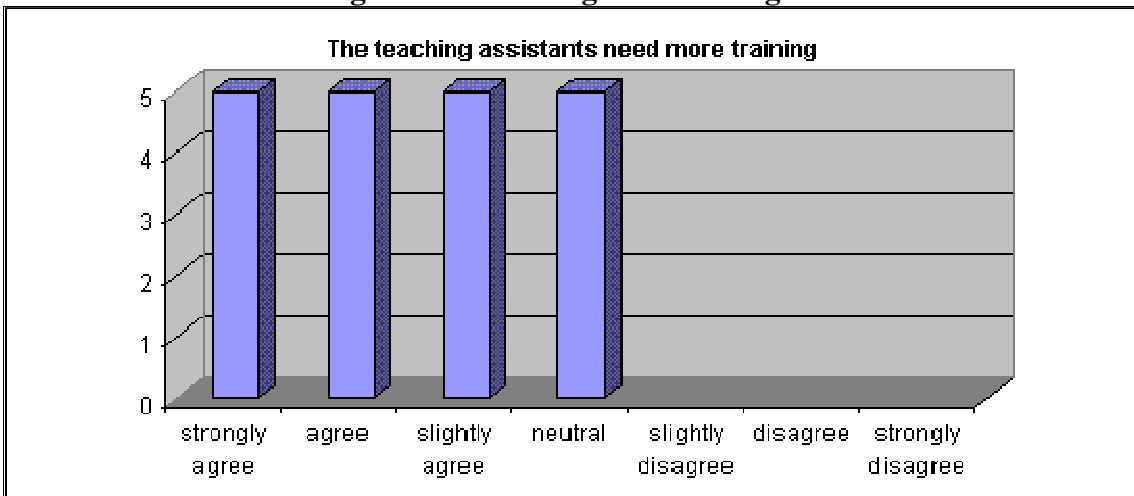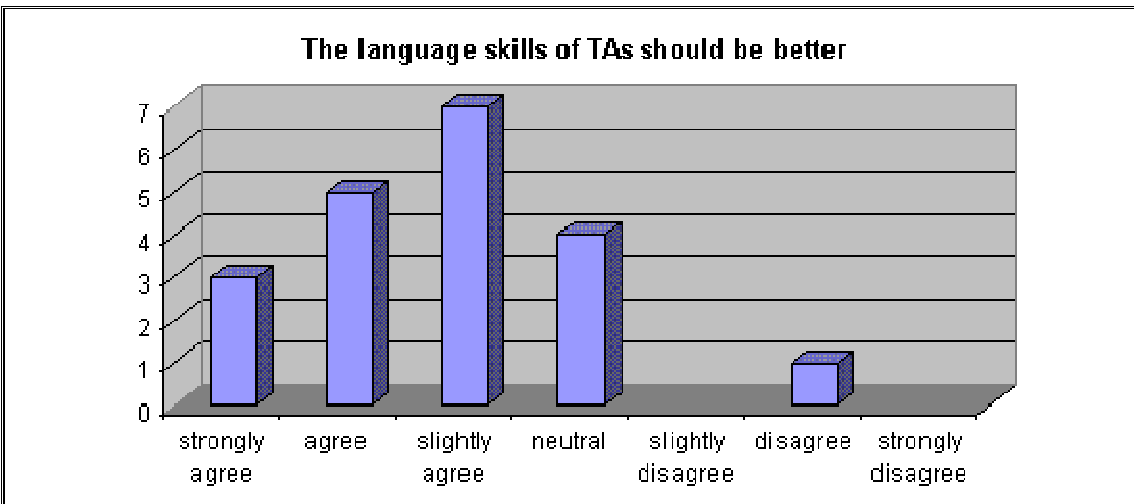
Appendix A

Questionnaire for a Quality Improvement Priority Matrix

Below is a list of features of the Department of Management Science or SBPM. We would like to create a Quality Improvement Priority Matrix (2002) using these features. So, please rate each feature on a scale from 0 to 10. That is, on the importance scale, 0 would mean the feature is not important at all. 5 would mean the feature is moderately important. 10 would mean the feature is very, very important. On the performance scale, 0 would mean that current performance is very, very poor. 5 would mean that current performance is neither bad nor good. 10 would mean that current performance is excellent.

Please fill out the form and give it to Stuart Umpleby today (Monday).
Results will be presented (briefly) tomorrow.

	Feature	Importance	PERFORMANCE
1	Computer hardware		
2	Computer software		
3	Office space for faculty		
4	Conference room and other space		
5	Computer labs		
6	Copiers		
7	Fax machines		
8	Office security		
9	Secretarial support		
10	Teaching assistants		
11	Annual retreat		
12	Social activities		
13	Recreational activities		
14	Building/ physical environment		
15	Accounts payable		
16	Classroom scheduling		
17	Classroom facilities		
18	Projection equipment		
19	Course catalogue		
20	Faculty websites		
21	Dept. websites		
22	SBPM websites		
23	Campus grounds		
24	Parking for faculty and staff		
25	Parking for students		
26	Library journal collection		
27	Library book collection		
28	Interlibrary loan		
29	Coordination with other depts.		
30	A supportive climate in the dept.		
31	Dept. head protects faculty from admin.		

		interference		
32		Transparency of APT process		
33		Promotion of contract faculty		
34		Travel support		
35		Funds to support research		
36		SBPM working papers series		
37		Help with writing research proposals		
38		English skills of students		
39		General ability of students		
40		Course evaluations		
41		Faculty annual reports		
42		Salaries		
43		Health care benefits		
44		Retirement benefits		
45		Opportunities for academic work with Dept. faculty		
46		Opportunities for academic work with other GW faculty		
47		Assistance with learning IT, e.g., Prometheus		
48		Dept. strategic plan		
49		Dept. organization to implement its strategic plan		
50		Use of continuous improvement methods in the Dept.		
51		Consulting opportunities in DC area		
52		Opportunities to meet local businessmen and govt managers		

Appendix B

Additional Questions

Last year some items were ranked low in performance. These questions seek additional information on those items.

1. SBPM working paper series
    a. Do you read the working papers?   Yes   No
    If not, why not?
    b. Do you contribute working papers to the series?   Yes   No
    If not, why not?
    c. What would make the working paper series more useful to you?

2. Help with writing research proposals
    a. Where would help be most useful? (Check all that apply.)
    __ Generating ideas for research
    __ Finding likely funding sources
    __ Preparing the description of the research, including research methods
    __ Preparing the budget, institutional descriptions, vitae, attachments
    __ Other
b. What kinds of help would you like to have? (Check all that apply.)
    __ Research assistant
    __ Professional proposal writer
    __ Other

3. Use of continuous improvement methods in the Dept.
    a. Should we create several process improvement teams?   Yes   No
    b. If so, what processes should be worked on?
    c. Should the members of process improvement teams receive training in process improvement methods?

4. Accounts payable
    a. Has Accounts Payable improved in the past year?   Yes   No
    If so, in what way?
    b. What can the Dept. do to improve the performance of Accounts Payable?

5. Dept. organization to implement its strategic plan
    a. Should the Dept. have a written strategic plan?   Yes   No
    b. Should there be a team to implement the strategic plan?   Yes   No

6. Building/ physical environment
    What could be done to improve the building/ physical environment (before moving to the new building)?

7. Secretarial support
   a. We need more of them.

Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree

   b. They need more training/ preparation.

Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree

   c. Other

8. Coordination with other departments
   a. In what ways is coordination with other departments not working well?
   b. What are the causes of poor coordination?
   c. What could be done to improve coordination?

9. Opportunities to meet local businessmen and government managers
   a. Do you attend meetings of the SBPM Alumni Association?   Yes   No
   b. What could the Dept. do to increase your opportunities to meet local businessmen and government managers?

10. Consulting opportunities in the DC area
    a. Do you currently do consulting?   Yes   No
    b. What could the Dept. do to increase your consulting opportunities?

11. Teaching assistants
    a. We need more of them.

Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree

    b. They need more training/ preparation.

Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree

    c. Their language skills should be better.

Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree