Patent Bar Exam: Issues of Quality Control

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This article evaluates the soundness of the testing process of prospective patent attorneys and agents before the United States Patent and Trademark Office. Currently, a patent attorney must successfully pass the U.S. Department of Commerce *United States Patent and Trademark Office Registration Examination for Patent Attorneys and Agents*, commonly known as the patent bar exam.[2] However, the patent bar exam has a notoriously low passing rate.

A statistical quality control analysis of the last ten patent bar exams shows that the current testing process is out of control. The analysis treats the exam like a control process. Test takers are the input. The exam is the control system. The output is either those who pass the exam or those who fail it, assuming that those who failed the exam were defects of the system. Since the control process is an examination, it is unrealistic and undesirable that all test takers pass. The results of the analysis do not suggest that the system should be defect free. Rather, the results suggest that the exam should be a controlled system.

The statistical quality control analysis suggests implementation of a new control system. Accordingly, prospective patent attorneys will have another means of becoming registered patent attorneys. The new process is a better system of registering quality patent attorneys without creating an easier or less rigorous process. Moreover, the analysis shows that Total Quality Management (TQM) should be used to implement the new system.

THE CURRENT SYSTEM

Patent attorneys handle patent related matters for their clients. A patent attorney is licensed by a state bar and the U.S. Patent and Trademark Office. Each patent attorney must be well versed in the legal and procedural rules pertaining to patent prosecution because these professionals must perform a vast array of duties. To ensure the quality of knowledge, the U.S. Patent and Trademark Office requires that each patent attorney must pass the patent bar exam.[3]

THE PROBLEM

The problem is that this examination has a very low pass rate. It is not uncommon for the pass rate to be around 35%. With some extremely rare exceptions, the only way to become a registered patent attorney is taking and passing the patent bar exam.[4] While any exam should fully test the ability of its taker, one that consistently fails a higher percentage of test takers should be scrutinized. The U.S. Patent and TrademarkOffice must ensure that the exam is fair and unbiased. In addition, the examination should be statistically in control. Analyzing the current examination process in terms of quality control sheds light on the exam's shortcomings.

THE PROCESS

A statistical control analysis examines the current process and discerns the nature of the problems facing the patent bar examination. Data from the last ten bar exams is obtained to accomplish the statistical control analysis. See TABLE 1 in the appendix at the end of this article. The analysis examines the non-continuous registration process.

The analysis takes samples of the number of test takers in each of the last ten examinations. Then the analysis calculates the proportion of the defective items in the sample and determines if the proportion falls within the control limits. Mathematical equations establish the *upper control limit* (UCL) and the *lower control limit* (LCL).[5] A mathematical equation also establishes the standard deviation.[6] The formulas allow for the use of a set of samples with a variable sample size.[7] Each year of testing does not have a fixed number of test takers. Accordingly, the analysis computes a standard deviation for each individual sample.[8]

The current registration process is statistically out of control. See TABLE 2 in the appendix. Eight of the ten data points fall outside of the upper and lower control limits. Moreover, the test results indicate a pattern of increasing and decreasing points and suggest that some non-random factors exist. Accordingly, the points outside of the control limits indicate a possible process that is statistically out of con-

trol.

Forecasts for the next exam indicate continued low passing rates, estimated around 45%. See TABLE 3 in the appendix. Forcasting is an uncertain process, sometimes employing the qualitative methods based on judgment, opinion, past experience, or best guesses. To minimize uncertainty, forecasting future exam results used a formula[9] that employed a quantitative method called the simple moving average.[10] This formula uses several demand values during the recent past to develop a forecast.[11] Additionally, this method does not display any seasonal or trend pattern.[12]

PROPOSAL FOR A NEW SYSTEM

One possible strategy which may improve the exam for patent attorneys is a plan described by W. Edwards Deming.[13] Deming's plan introduced a type of Total Quality Management that conceptualizes the Deming Wheel or plan-do-check-act (PDCA) cycle.[14] Planning is the first step of the cycle.[15] The process is studied, the problems are identified, and a plan to solve the problem is created.[16] The process is studied by performing the statistical control analysis. Accordingly, identifying the problems is the next step.

The first problem is the existence of an unusually low passing rate. Many students take the exam several times. If the process is statistically in control then the passing rate could be increased while eliminating redundant administration and maintaining a high standard. Eliminating needless administrations of the exam decreases costs. Additionally, an increased pass rate satisfies shortages of competent patent professionals.

Another problem is that the test does not ensure that the test takers have an acceptable familiarity with the practice of patent law because the questions are exceedingly fact specific. Furthermore, the entire exam is based upon the Manual of Patent Examining Procedure. This Manual consists of approximately 600,000 words or 4 megabytes of testable material which is difficult to encompass in any single exam. It is possible that chance plays a role in passing the exam.

If the questions are favorable to a particular individual's strength, then they might achieve a passing score. Also, because the exam is objective and no points are deducted for incorrect answers, passing does not ensure competency in the subject matter. For example, suppose test taker A scores a 68 and fails while test taker B scores a 70 and passes. Test taker B guessed at some of the questions correctly, while A guessed incorrectly. Test taker B's competency is no greater than A's, yet B passes the exam. Thus, B passed the exam by chance.

The current process of taking the patent bar exam does not ensure quality. The objectives of implementing a new patent bar exam are to educate and effectively test prospective patent professionals. Setting forth the objectives for the new patent bar registration process begins by implementing Deming's first step to the proposed plan.[17] The class of test takers and the exam help focus the attention of the students to several salient areas which the patent bar deems most important. Students would not find themselves without any guide as to what the examiners expect. Furthermore, this reinforces quality in that the test takers become aware of the difficulties of practicing in this area of law.

Developing strategies is the next step. A class should teach prospective patent practitioners and continuously test these students on a variety of patent issues. Next, performance levels should ensure that students maintain a regular attendance level to effectively learn the material. Students should also obtain passing marks on several tests throughout the course. Passing grades will be a cumulative average on all exams given in the course. Additionally, the class should account for a certain percentage of the overall grade. Furthermore, the exam results will perform the function of a quality check on the class.

Doing is the second step in the Deming plan.[18] Doing involves implementing the new process on a test basis, measuring the improvement, and documenting the results.[19] Implementing the new exam should be instituted on a test basis to a limited number of test takers. The results of the examinations and grades should be documented to ensure that the new approach is statistically in control.

The Check step of the Deming plan is next. The results must be studied to determine if the proper standards are met.[20] If the test standards are met, the plan is working properly. However, if the test standards are not met, the

new approach must be studied to determine the deficiencies.[21] Studying the new approach and determining the deficiencies creates a contingency plan. Teaching methods should be evaluated and changed if necessary. Also, the contingency plan should consider increasing or decreasing the length of the class or the size of the class. Moreover, the new process must be monitored to see that no new problems are created. The new process must not become less effective than the current process. If implementing the contingency plan achieves the desired objective, then the plan is complete. If the contingency plan does not achieve the desired objective, then the objectives and standards must be revised.

The Act stage is Deming's final step.[22] The Act stage implements the plan and quality improvement is made part of the normal operation.[23] The process should return to stage one to continue the cycle of improvement.[24] An example of this process is detailed in FIGURE 1 of the appendix.

CONCLUSION

The current process of testing patent examinees is statistically out of control. A new process would better serve the needs of the patent community for two reasons. First, the objectives of the new process are improving the pass rate and ensuring that the individuals who take the examination achieve an acceptable level of competency. Second, the new process creates a program which will train, educate, and test prospective patent attorneys. Furthermore, the new exam must undergo periodic statistical checks ensuring that the process is statistically in control. The new program of educating and testing prospective patent attorneys will yield a larger and fully qualified group of practitioners.

ENDNOTES

1. Copyright 1998. Renzo Cerabino is a J.D./M.B.A. candidate (1999), Villanova University School of Law, Villanova University College of Commerce and Finance; Villanova, Pennsylvania. Mohammed Rahman is a J.D./M.B.A. candidate (1999), Villanova University School of Law, Villanova University College of Commerce and Finance; Villanova, Pennsylvania; and registered to practice before the U.S. Patent & Trademark Office. Tanuja Singh is a J.D./M.B.A. candidate (1999), Villanova University School of Law, Villanova University College of Commerce and Finance; Villanova, Pennsylvania.

2. 37 C.F.R. § 10.7(b) (1997).

3. *Id.*

4. 37 C.F.R. § 10.9 (1997).

5. The upper control limit was calculated using the formula $UCL = p + zs_p$. The lower control limit was calculated using the formula $LCL = p - zs_p$. The formula variable z is the number of standard deviations from the process average. The formula variable s_p is the standard deviation of the sample proportion. The formula variable p is the $[(\Sigma \text{ number of nonconforming})/(\Sigma n_i)]$. The formula variable z is set at 3.00 which corresponds to a normal probability of 99.74% and is set to ensure a high probability that the analysis values will fall within the control limits. Accordingly, if the analysis values fall outside the UCL and LCL, then the registration process is out of control.

6. The standard deviation was calculated using the formula $s_p = [\, p\,(1 - p) \,/\, n_i \,]^{1/2}$. The formula variable n_i is the i th sample size.

7. ROBERTA S. RUSSELL AND BERNARD W. TAYLOR III, OPERATIONS MANAGEMENT: FOCUSING ON QUALITY AND COMPETITIVENESS 137 (1998).

8. JAMES R. EVANS AND WILLIAM M. LINDSAY, THE MANAGEMENT AND CONTROL OF QUALITY 331-35 (1989).

9. Forecasts for future exam results used the formula $Ma_n = (\Sigma D_i) \,/\, n$. The formula variable n is the number of periods in the moving average. The formula variable D_i is the demand in period i. The demand is the passing exam results.

10. RUSSELL, supra note 7, at 137.

11. *Id.*

12. *Id.*

13. W. Edwards Deming graduated from the University of Wyoming in electrical engineering. He received a doctorate in mathematics and physics from Yale University. Dr. Deming joined the Census Bureau in 1939 as head mathematician and statistician, and began lecturing about quality control. He joined the N.Y.U. faculty in 1945. Dr. Deming was a member of the International Statistical Institute and the National Academy of Engineering.

14. RUSSELL, supra note 7, at 83.
15 *Id.*
16. *Id.*
17. *Id.*
18. *Id.*
19. *Id.*
20. *Id.*
21. To determine the deficiencies of the new approach, the following important questions should be answered: Are students taught effectively and efficiently? Is the drop out rate too high? What is the passing rate? Moreover, the test taker's reaction to the examination should be monitored by asking: Did they feel that they had a realistic possibility of passing the exam based on the amount of effort they invested? What is their overall reaction?
22. RUSSELL, supra note 7, at 83.
23. *Id.*
24. *Id.*

APPENDIX

Patent Bar Exam

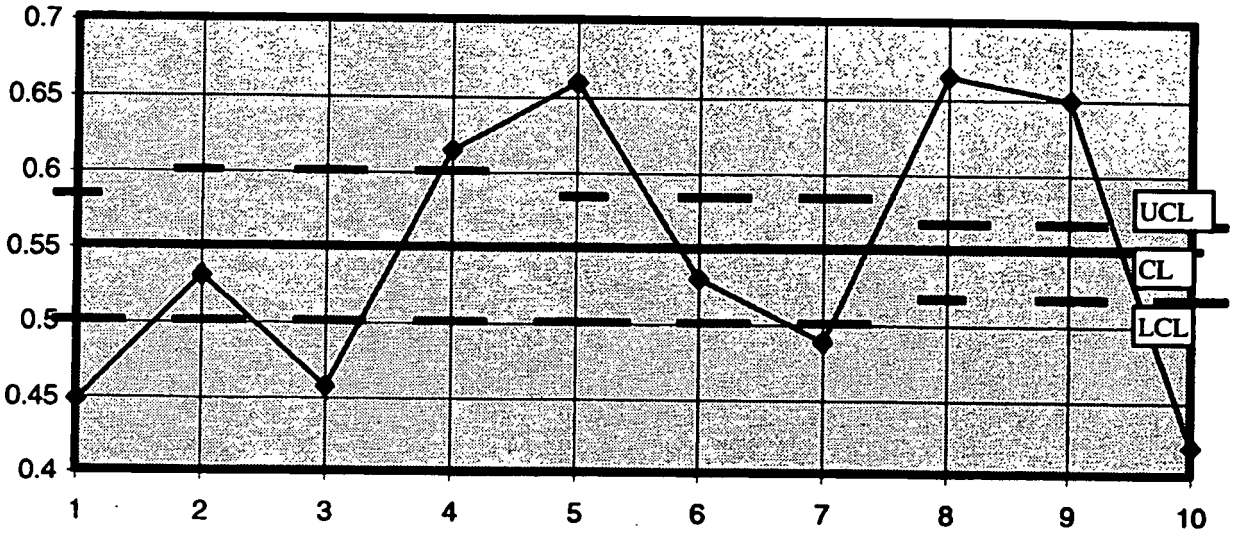

Table 1: Patent Bar Exam Data (1991-1997)

Year	Test Takers	Passed	% Passed	Failed	% Failed
Aug-91	1367	754	55%	613	45%
Apr-92	1146	537	47%	609	53%
Oct-92	1126	611	54%	515	46%
Apr-93	1112	428	38%	684	62%
Oct-93	1216	414	34%	802	66%
Apr-94	1399	656	47%	743	53%
Nov-94	1331	680	51%	651	49%
May-95	2086	699	34%	1387	66%
Aug-96	2762	968	35%	1794	65%
Aug-97	3162	1834	58%	1328	42%

Table 2: Results of UCL and LCL

Year	N	UCL	LCL	Actual (Failed)	Center Line
Aug-91	1367	0.586636	0.50584	0.44843	0.546238
Apr-92	1146	0.59036	0.502116	0.53141	0.546238
Oct-92	1126	0.59075	0.501726	0.45737	0.546238
Apr-93	1112	0.591029	0.501447	0.61511	0.546238
Oct-93	1216	0.589071	0.503405	0.65954	0.546238
Apr-94	1399	0.586171	0.506305	0.53109	0.546238
Nov-94	1331	0.587179	0.505297	0.48911	0.546238
May-95	2086	0.578941	0.513535	0.66491	0.546238
Aug-96	2762	0.574659	0.517817	0.64953	0.546238
Aug-97	3162	0.5728	0.519676	0.41999	0.546238

Table 3: Forecasting Results

Year	Failed (%)	Forecast (% Failed)
Aug-91	45	-
Apr-92	53	45
Oct-92	46	49
Apr-93	62	48
Oct-93	66	52
Apr-94	53	54
Nov-94	49	54
May-95	66	53
Aug-96	65	55
Aug-97	42	56
Aug-98	-	55

Fig.1: Proposed Plan