

The Adverse Effect of the Non-Compliance of the SMARTMATIC PCOS Machines to the 99.995%-Accuracy Specification of the AES 2010 to the Philippine Party List System

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The Commission on Election (COMELEC) submitted a report to the President and Congress of the Republic of the Philippines on the conduct of the automated May 2010 national and local elections.

The following is a screenshot of page number 25 of the said report. This part of the report tackled the Random Manual Audit. The COMELEC organized a technical working of the random manual audit (TWG-RMA). Ambassador Henrietta de Villa of the PPCRV chaired the TWG-RMA. Its members were Ms. Agnes Carreon of the COMELEC's Internal Audit Office and Ms. Carmelita Ericta of the National Statistics Office.

Random Manual Audit

At 10:30 a.m. on May 10, 2010, in accordance with Section 7 of Resolution No. 8837,¹⁹ and Section 24 of Republic Act No. 9369, COMELEC and PPCRV randomly chose 1,145 precincts to be subjected to a manual audit. This represented a rate of 5 clustered precincts per legislative district; an improvement over the 1 precinct per legislative district formula prescribed by RA 9369.

Chaired by Ambassador Henrietta de Villa of the PPCRV, together with Ms. Agnes Carreon of the COMELEC's Internal Audit Office, and Ms. Carmelita Ericta of the National Statistics Office as members, the random manual audit tests the counting accuracy of the PCOS machines.

At the chosen precincts on election day, right after the Boards of Election Inspectors accomplished their election duties, the Random Manual Audit (RMA) Teams conducted the audit for the positions of President, Vice-President, Member of the House of Representatives, Governor, and Mayor. The results were then recorded in the minutes of the RMA and Audit Returns.

As reported by the RMA Technical Working Group, the average accuracy rate of the electronic count was determined to be 99.06%

It is very clear in the said report as shown in the second paragraph of the heading on Random Manual Audit that the ***“random manual audit tests the counting accuracy of the PCOS machines.”***

In the last paragraph of the same heading, the RMA-TWG reported an average accuracy rate of **99.06%** of the electronic count.

An accuracy rating of 99.995% of a PCOS machine means that it accurately counted 19,999 of the 20,000 votes in a precinct and that 1 vote was miscounted.

An accuracy rating of **99.06%** for a PCOS machine means that it miscounted **188 votes** of the **20,000** votes it counted in the precinct.

A voter in the May 2010 automated national and local elections had voted from 26 to 29 votes. She or he had at most 15 votes in the national level. At most one vote each for the president, vice-president, and the party list positions and at most 12 votes in the senatorial position. The said voter had 11 to 14 votes in the local level.

A precinct with at most **26** votes per voter cannot have more than **769** actual voters so that a **99.995%**-accurate PCOS machine counts all the votes accurately. If the precinct with at most 26 votes per voter has **770** or more actual voters, then there is no guarantee that the 99.995%-accurate PCOS machine will count all the votes accurately.

A precinct with at most **29** votes per voter cannot have more than **689** actual voters so that a **99.995%**-accurate PCOS machine cannot miscount a vote. If the precinct with at most 29 votes per voter has **690** or more actual voters, then there is no guarantee that a 99.995%-accurate PCOS machine will count all the votes accurately.

An average accuracy of 99.06% is equivalent to an error rating 0.94%.

This means that the **TRUE VOTE COUNT** of candidate Juan who obtained 10,000 votes in the May 2010 elections ranges from 9,906 votes to 10,094 votes.

This means also that the **TRUE VOTE COUNT** of candidate Jose who obtained 9,950 votes in the May 2010 elections ranges from 9,856 votes to 10,004 votes.

This means also that the **TRUE VOTE COUNT** of candidate Maria who obtained 9,900 votes in the May 2010 election ranges from 9,807 votes to 9,993 votes.

If Juan, Jose and Maria were rivals of a certain position in the May 2010, then Juan with 10,000 votes is the proclaimed winner by the Board of Canvassers.

However, because of the inaccuracy of the PCOS count their respective vote ranges intersect. Thus, there is a possibility that Jose is the winner if his true vote count is 9,999 votes, and if the true vote counts of Juan and Maria are 9,960 and 9,870 votes respectively. There is a possibility also that Maria is the winner if her true vote count was 9,990 votes, and if the true vote counts of Jose and Juan are 9,950 and 9,870 votes respectively.

Hence, the three candidates, Juan, Jose and Maria shall be considered as statistically tied because of the inaccuracy of the PCOS count and winner shall not be proclaimed until a manual recount determines the real winner. *(Note: it must be included in the contract that the financial expenses of a manual recount in case of a statistical tie shall be shouldered by the technology provider.)*

The Party List Election in the May 2010 had 187 parties participating as shown in **Canvass Report Number 10** as audited in July 22, 2010 with **30,092,613** total party list votes.

There were 12 parties that obtained at least 2% of the total party list votes cast. See Table 1.

TABLE 1. TWO-PERCENTERS OF THE MAY 2010 PARTY LIST ELECTION			
RANK	PARTY	VOTES GARNERED	PERCENT SHARE
1	AKO BICOL POLITICAL PARTY	1,524,006	5.06439%
2	SENIOR CITIZENS	1,296,950	4.30986%
3	BUHAY	1,250,467	4.15540%
4	AKBAYAN!	1,061,947	3.52893%
5	GABRIELA WOMENS PARTY	1,006,752	3.34551%
6	COOP NATCCO	944,864	3.13985%
7	1ST CARE	770,015	2.55882%
8	ABONO	766,993	2.54878%
9	BAYAN MUNA	750,100	2.49264%
10	AN WARAY	712,405	2.36738%
11	CIBAC	653,399	2.17129%
12	A TEACHER	617,898	2.05332%

We shall enumerate in the next pages the possible adverse effects of the 0.94% error rate of the PCOS Machines in the 2010 automated national and local elections.

1. There is a statistical possibility that true vote count of six of these two-percenters is less than 2% if we take into account the PCOS error rating of 0.94% as shown in Table 2.

RANK	PARTY	PERCENT SHARE PCOS COUNT	TRUE VOTE COUNT RANGE	
			LOW COUNT	HIGH COUNT
1	AKO BICOL POLITICAL PARTY	5.06439%	4.12439%	6.00439%
2	SENIOR CITIZENS	4.30986%	3.36986%	5.24986%
3	BUHAY	4.15540%	3.21540%	5.09540%
4	AKBAYAN!	3.52893%	2.58893%	4.46893%
5	GABRIELA WOMENS PARTY	3.34551%	2.40551%	4.28551%
6	COOP NATCCO	3.13985%	2.19985%	4.07985%
7	1ST CARE	2.55882%	1.61882%	3.49882%
8	ABONO	2.54878%	1.60878%	3.48878%
9	BAYAN MUNA	2.49264%	1.55264%	3.43264%
10	AN WARAY	2.36738%	1.42738%	3.30738%
11	CIBAC	2.17129%	1.23129%	3.11129%
12	A TEACHER	2.05332%	1.11332%	2.99332%

2. Hence, there is a statistical possibility that the 7th ranked to the 12th ranked party list are not two-percenters and will only receive one seat.
3. There is a statistical possibility also that those parties that are ranked from 13th to 22nd may obtain two percent or more of the total number of party list votes cast as shown in Table 3. These parties who only received 1 seat may obtain one additional seat.
4. In fact those parties that are ranked 7th down to the 22nd are statistically tied as their true vote count ranges intersect with each other as shown in Table 3 also. Note that the low count of the 7th ranked party is less than the high count of the 22nd party.

RANK	PARTY	VOTE SHARE PCOS COUNT	TRUE VOTE COUNT RANGE	
			LOW COUNT	HIGH COUNT
1	AKO BICOL POLITICAL PARTY	5.06439%	4.12439%	6.00439%
2	SENIOR CITIZENS	4.30986%	3.36986%	5.24986%
3	BUHAY	4.15540%	3.21540%	5.09540%
4	AKBAYAN!	3.52893%	2.58893%	4.46893%
5	GABRIELA WOMENS PARTY	3.34551%	2.40551%	4.28551%
6	NATCCO	3.13985%	2.19985%	4.07985%
7	1ST CARE	2.55882%	1.61882%	3.49882%
8	ABONO	2.54878%	1.60878%	3.48878%
9	BAYAN MUNA	2.49264%	1.55264%	3.43264%
10	AN WARAY	2.36738%	1.42738%	3.30738%
11	CIBAC	2.17129%	1.23129%	3.11129%
12	A TEACHER	2.05332%	1.11332%	2.99332%
13	AGAP	1.71488%	0.77488%	2.65488%
14	BUTIL FARMERS PARTY	1.68510%	0.74510%	2.62510%
15	ABC	1.56652%	0.62652%	2.50652%
16	ANAKPAWIS	1.48608%	0.54608%	2.42608%
17	KABATAAN PARTYLIST	1.39162%	0.45162%	2.33162%
18	LPG-MA	1.38828%	0.44828%	2.32828%
19	ABANTE MINDANAO, INC.	1.25727%	0.31727%	2.19727%
20	ACT TEACHERS	1.23918%	0.29918%	2.17918%
21	AAMBIS-OWA	1.18901%	0.24901%	2.12901%
22	YACAP	1.12149%	0.18149%	2.06149%

- Note that the 1st ranked party with a PCOS count of 5.06439% has 3 seats. Since the 2nd and 3rd parties have high counts that exceed the PCOS count of the 1st party, there is a statistical possibility that the 2nd and 3rd ranked parties will have 3 seats also. See Table 3.
- Since the low count of the 1st party is 4.12439% of the total party list votes, there is statistical possibility that it did not win three seats.
- The 44th ranked party is the last party to be given a seat for the 2010-2013 House of Representatives. It obtained 0.57% of the total party list votes cast. With the 0.94%-error rating of the PCOS Machines, there is a possibility that it did not win a seat in the 2010 party list election. See Table 4.

8. In fact there is a possibility that any of those parties that are ranked from 45th down to the last ranked party won a seat in the 2010 party list election since the last ranked party has 0.94% of the total party list votes which is larger than the PCOS count of 0.57% of the 44th ranked party. See Table 4.
9. In fact those parties from rank 27th with 0.89% of the total party list votes down to the last party are statistically tied. See Table 4.
10. Because of the 99.06% accuracy rating of the PCOS machines, we are not really sure who are the real winners of one, two and three seats of the 2010 party list elections.

TABLE 4. THE RANGE OF THE TRUE VOTE COUNT OF THE MAY 2010 PARTY LIST ELECTION BASED ON THE 99.06% AVERAGE ACCURACY RATING OF THE PCOS MACHINES			
RANK	VOTE SHARE PCOS COUNT	TRUE VOTE COUNT RANGE	
		LOW COUNT	HIGH COUNT
1	5.06%	4.12%	6.00%
2	4.31%	3.37%	5.25%
3	4.16%	3.22%	5.10%
4	3.53%	2.59%	4.47%
5	3.35%	2.41%	4.29%
6	3.14%	2.20%	4.08%
7	2.56%	1.62%	3.50%
8	2.55%	1.61%	3.49%
9	2.49%	1.55%	3.43%
10	2.37%	1.43%	3.31%
11	2.17%	1.23%	3.11%
12	2.05%	1.11%	2.99%
13	1.71%	0.77%	2.65%
14	1.69%	0.75%	2.63%
15	1.57%	0.63%	2.51%
16	1.49%	0.55%	2.43%
17	1.39%	0.45%	2.33%
18	1.39%	0.45%	2.33%
19	1.26%	0.32%	2.20%
20	1.24%	0.30%	2.18%
21	1.19%	0.25%	2.13%

[THE ADVERSE EFFECT OF THE NON-COMPLIANCE OF THE SMARTMATIC PCOS MACHINES TO THE 99.995%-ACCURACY SPECIFICATION OF THE AES 2010 TO THE PHILIPPINE PARTY LIST SYSTEM]

22	1.12%	0.18%	2.06%
23	1.04%	0.10%	1.98%
24	0.99%	0.05%	1.93%
25	0.99%	0.05%	1.93%
26	0.97%	0.03%	1.91%
27	0.89%	0.00%	1.83%
28	0.87%	0.00%	1.81%
29	0.86%	0.00%	1.80%
30	0.86%	0.00%	1.80%
31	0.81%	0.00%	1.75%
32	0.81%	0.00%	1.75%
33	0.79%	0.00%	1.73%
34	0.78%	0.00%	1.72%
35	0.77%	0.00%	1.71%
36	0.76%	0.00%	1.70%
37	0.76%	0.00%	1.70%
38	0.73%	0.00%	1.67%
39	0.73%	0.00%	1.67%
40	0.72%	0.00%	1.66%
41	0.59%	0.00%	1.53%
42	0.58%	0.00%	1.52%
43	0.57%	0.00%	1.51%
44	0.57%	0.00%	1.51%
45	0.55%	0.00%	1.49%
46	0.54%	0.00%	1.48%
47	0.54%	0.00%	1.48%
48	0.54%	0.00%	1.48%
49	0.52%	0.00%	1.46%
50	0.49%	0.00%	1.43%
51	0.49%	0.00%	1.43%
52	0.48%	0.00%	1.42%
53	0.48%	0.00%	1.42%
54	0.47%	0.00%	1.41%
55	0.47%	0.00%	1.41%
56	0.46%	0.00%	1.40%
57	0.46%	0.00%	1.40%
58	0.45%	0.00%	1.39%
59	0.44%	0.00%	1.38%
60	0.43%	0.00%	1.37%

**[THE ADVERSE EFFECT OF THE NON-COMPLIANCE OF THE SMARTMATIC PCOS
MACHINES TO THE 99.995%-ACCURACY SPECIFICATION OF THE AES 2010 TO THE
PHILIPPINE PARTY LIST SYSTEM]**

61	0.43%	0.00%	1.37%
62	0.40%	0.00%	1.34%
63	0.40%	0.00%	1.34%
64	0.39%	0.00%	1.33%
65	0.39%	0.00%	1.33%
66	0.38%	0.00%	1.32%
67	0.38%	0.00%	1.32%
68	0.38%	0.00%	1.32%
69	0.38%	0.00%	1.32%
70	0.37%	0.00%	1.31%
71	0.37%	0.00%	1.31%
72	0.37%	0.00%	1.31%
73	0.36%	0.00%	1.30%
74	0.36%	0.00%	1.30%
75	0.36%	0.00%	1.30%
76	0.35%	0.00%	1.29%
77	0.35%	0.00%	1.29%
78	0.35%	0.00%	1.29%
79	0.34%	0.00%	1.28%
80	0.33%	0.00%	1.27%
81	0.32%	0.00%	1.26%
82	0.32%	0.00%	1.26%
83	0.31%	0.00%	1.25%
84	0.30%	0.00%	1.24%
85	0.30%	0.00%	1.24%
86	0.29%	0.00%	1.23%
87	0.29%	0.00%	1.23%
88	0.29%	0.00%	1.23%
89	0.29%	0.00%	1.23%
90	0.29%	0.00%	1.23%
91	0.29%	0.00%	1.23%
92	0.28%	0.00%	1.22%
93	0.27%	0.00%	1.21%
94	0.27%	0.00%	1.21%
95	0.27%	0.00%	1.21%
96	0.26%	0.00%	1.20%
97	0.26%	0.00%	1.20%
98	0.25%	0.00%	1.19%
99	0.25%	0.00%	1.19%

[THE ADVERSE EFFECT OF THE NON-COMPLIANCE OF THE SMARTMATIC PCOS MACHINES TO THE 99.995%-ACCURACY SPECIFICATION OF THE AES 2010 TO THE PHILIPPINE PARTY LIST SYSTEM]

100	0.25%	0.00%	1.19%
101	0.24%	0.00%	1.18%
102	0.24%	0.00%	1.18%
103	0.23%	0.00%	1.17%
104	0.23%	0.00%	1.17%
105	0.23%	0.00%	1.17%
106	0.23%	0.00%	1.17%
107	0.22%	0.00%	1.16%
108	0.22%	0.00%	1.16%
109	0.22%	0.00%	1.16%
110	0.21%	0.00%	1.15%
111	0.21%	0.00%	1.15%
112	0.21%	0.00%	1.15%
113	0.20%	0.00%	1.14%
114	0.19%	0.00%	1.13%
115	0.19%	0.00%	1.13%
116	0.18%	0.00%	1.12%
117	0.18%	0.00%	1.12%
118	0.18%	0.00%	1.12%
119	0.18%	0.00%	1.12%
120	0.17%	0.00%	1.11%
121	0.17%	0.00%	1.11%
122	0.17%	0.00%	1.11%
123	0.17%	0.00%	1.11%
124	0.16%	0.00%	1.10%
125	0.16%	0.00%	1.10%
126	0.15%	0.00%	1.09%
127	0.15%	0.00%	1.09%
128	0.15%	0.00%	1.09%
129	0.14%	0.00%	1.08%
130	0.14%	0.00%	1.08%
131	0.13%	0.00%	1.07%
132	0.13%	0.00%	1.07%
133	0.12%	0.00%	1.06%
134	0.12%	0.00%	1.06%
135	0.12%	0.00%	1.06%
136	0.12%	0.00%	1.06%
137	0.12%	0.00%	1.06%
138	0.12%	0.00%	1.06%

**[THE ADVERSE EFFECT OF THE NON-COMPLIANCE OF THE SMARTMATIC PCOS
MACHINES TO THE 99.995%-ACCURACY SPECIFICATION OF THE AES 2010 TO THE
PHILIPPINE PARTY LIST SYSTEM]**

139	0.12%	0.00%	1.06%
140	0.11%	0.00%	1.05%
141	0.11%	0.00%	1.05%
142	0.11%	0.00%	1.05%
143	0.11%	0.00%	1.05%
144	0.11%	0.00%	1.05%
145	0.11%	0.00%	1.05%
146	0.10%	0.00%	1.04%
147	0.10%	0.00%	1.04%
148	0.10%	0.00%	1.04%
149	0.10%	0.00%	1.04%
150	0.10%	0.00%	1.04%
151	0.10%	0.00%	1.04%
152	0.09%	0.00%	1.03%
153	0.09%	0.00%	1.03%
154	0.09%	0.00%	1.03%
155	0.09%	0.00%	1.03%
156	0.09%	0.00%	1.03%
157	0.08%	0.00%	1.02%
158	0.08%	0.00%	1.02%
159	0.08%	0.00%	1.02%
160	0.07%	0.00%	1.01%
161	0.07%	0.00%	1.01%
162	0.07%	0.00%	1.01%
163	0.07%	0.00%	1.01%
164	0.07%	0.00%	1.01%
165	0.06%	0.00%	1.00%
166	0.06%	0.00%	1.00%
167	0.06%	0.00%	1.00%
168	0.06%	0.00%	1.00%
169	0.06%	0.00%	1.00%
170	0.06%	0.00%	1.00%
171	0.05%	0.00%	0.99%
172	0.05%	0.00%	0.99%
173	0.04%	0.00%	0.98%
174	0.04%	0.00%	0.98%
175	0.04%	0.00%	0.98%
176	0.04%	0.00%	0.98%
177	0.03%	0.00%	0.97%

[THE ADVERSE EFFECT OF THE NON-COMPLIANCE OF THE SMARTMATIC PCOS MACHINES TO THE 99.995%-ACCURACY SPECIFICATION OF THE AES 2010 TO THE PHILIPPINE PARTY LIST SYSTEM]

178	0.03%	0.00%	0.97%
179	0.02%	0.00%	0.96%
180	0.02%	0.00%	0.96%
181	0.02%	0.00%	0.96%
182	0.02%	0.00%	0.96%
183	0.01%	0.00%	0.95%
184	0.01%	0.00%	0.95%
185	0.01%	0.00%	0.95%
186	0.01%	0.00%	0.95%
187	0.00%	0.00%	0.94%