QANT 610-M01 A1 - Good

A1 ASSIGNMENT: BAYFIELD MUD COMPANY

QANT 610: OPERATION MANAGEMENT

Federica Pelloni Ziliani ID#0852125, Ramadhianto Danang ID#0898888, Dimpi Shah ID# 0905809,Vina Nimje ID-794260.

Bayfield Mud Company

In order to verify the bag-weight problem, the quality control staff first collected the weights of bags for three different shifts every day. We know six samples were weighted every hour, so six is the size of the samples. To monitor the variable's data in this process we will use the x-bar chart and the range chart.

Instead of having the mean calculated by POM-QM we would also input the required mean which is 50 as required in the explanation of the case.

Before implementing all the samples in the software we also have to calculate the range since we have the smallest and the largest our formula to calculate it for every samples in every shifts will be: largest-smallest.

FIRST SHIFT: MORNING

	Smallest	Largest	Range
6 am	48.7	50.7	2
7 am	49.1	51.2	2.1
8 am	49.6	51.4	1.8
9 am	50.2	51.8	1.6
10 am	49.2	52.3	3.1
11 am	48.6	51.7	3.1
12 pm	46.2	50.4	4.2
1 pm	46.4	50	3.6
6 am	47.4	52	4.6
7 am	49.2	52.2	3
8 am	49	52.4	3.4
9 am	49.4	51.7	2.3
10 am	49.6	51.8	2.2
11 am	49	52.3	3.3
12 pm	48.8	52.4	3.6
1 pm	49.4	53.6	4.2
6 am	45	49	4
7 am	44.8	49.7	4.9
8 am	48	51.8	3.8
9 am	48.1	52.7	4.6
10 am	48.1	55.2	7.1
11 am	49.5	54.1	4.6
12 pm	48.7	50.9	2.2
1 pm	47.6	51.2	3.6

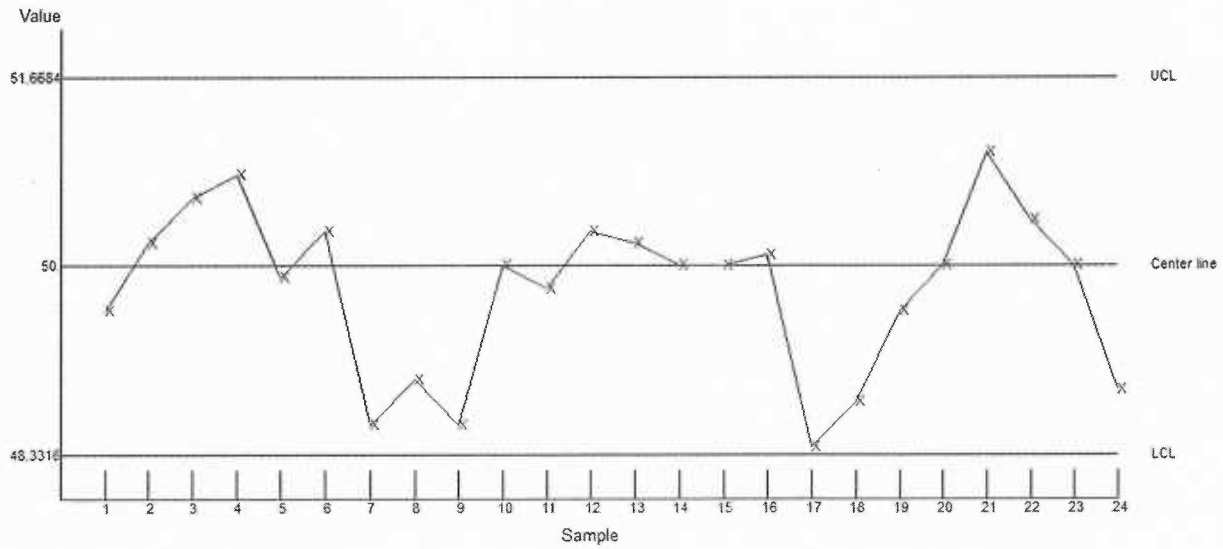
Method: 3 sigma (99.73%) | Sample Size: 6 | Center line (0 = use mean): 50

Quality Control Results

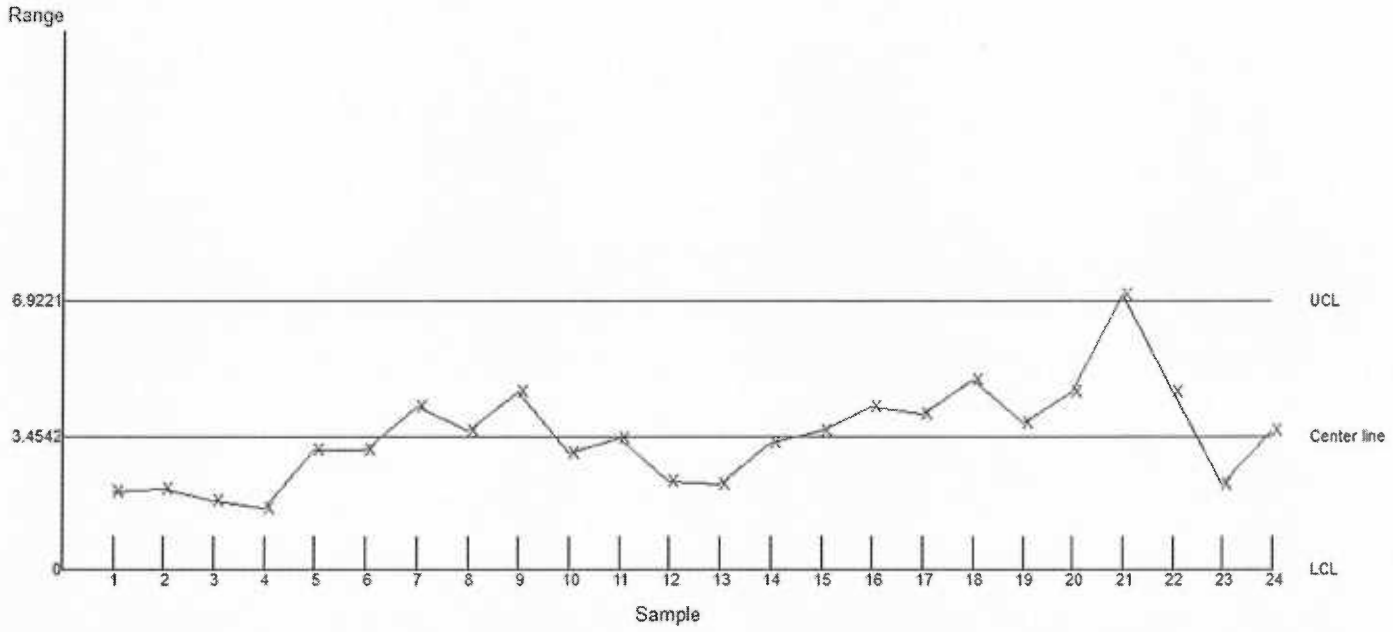
(untitled) Solution

Sample	Mean	Range	3 sigma (99.73%)	X-bar Chart	Range Chart
1	49.6	2	UCL (Upper control limit)	51.6684	6.9221
2	50.2	2.1	CL (Center line)	50	3.4542
3	50.6	1.8	LCL (Lower Control Limit)	48.3316	0
4	50.8	1.6			
5	49.9	3.1			
6	50.3	3.1			
7	48.6	4.2			
8	49	3.6			
9	48.6	4.6			
10	50	3			
11	49.8	3.4			
12	50.3	2.3			
13	50.2	2.2			
14	50	3.3			
15	50	3.6			
16	50.1	4.2			
17	48.4	4			
18	48.8	4.9			
19	49.6	3.8			
20	50	4.6			
21	51	7.1			
22	50.4	4.6			
23	50	2.2			
24	48.9	3.6			
Averages	49.7958	3.4542			

(untitled)
3 sigma (99.73%) Control Chart



(untitled)
3 sigma (99.73%) Control Chart



SECOND SHIFT: AFTERNOON

	Smallest	Largest	Range
2 pm	46	50.6	4.6
3 pm	48.2	50.8	2.6
4 pm	49.2	52.7	3.5
5 pm	50	55.3	5.3
6 pm	49.2	54.7	5.5
7 pm	50	55.6	5.6
8 pm	48.6	53.2	4.6
9 pm	49.4	52.4	3
2 pm	48.6	51	2.4
3 pm	47.2	51.7	4.5
4 pm	45.3	50.9	5.6
5 pm	44.1	49	4.9
6 pm	41	51.2	10.2
7 pm	46.2	51.7	5.5
8 pm	44	48.7	4.7
9 pm	44.2	48.9	4.7
2 pm	48.4	51	2.6
3 pm	48.8	50.8	2
4 pm	49.1	50.6	1.5
5 pm	45.2	51.2	6
6 pm	44	49.7	5.7
7 pm	44.4	50	5.6
8 pm	46.6	48.9	2.3
9 pm	47.2	49.5	2.3

Method

3 sigma (99.73%)

Sample Size: 6

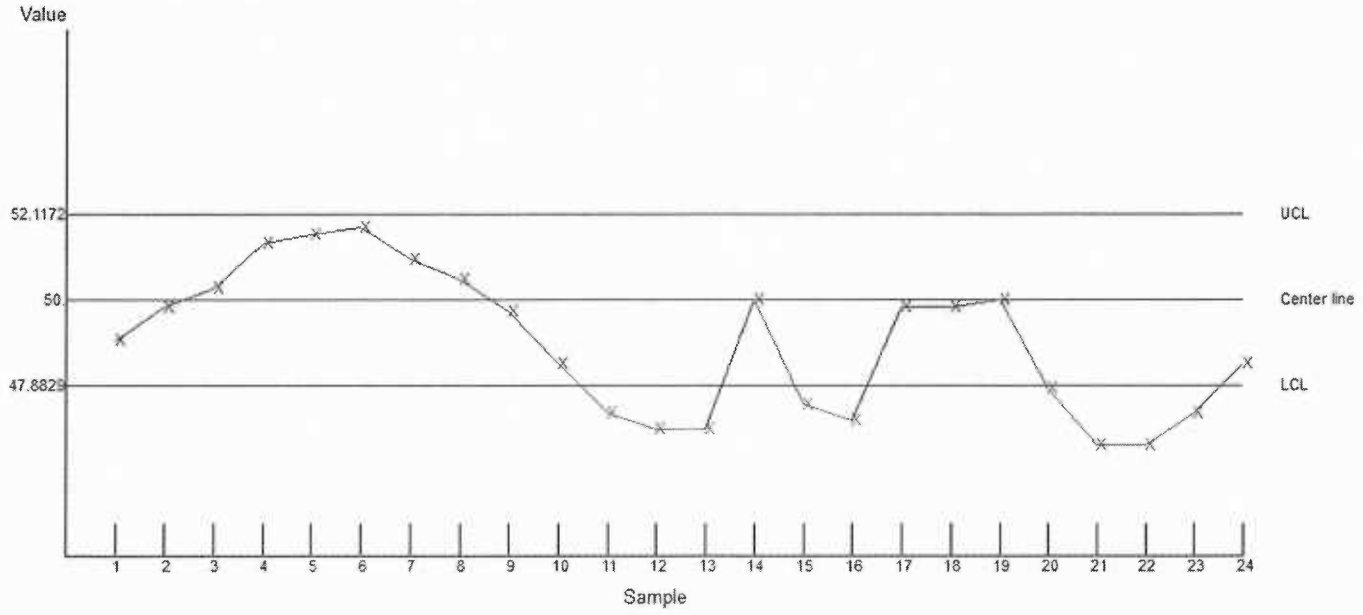
Center line (0 = use mean): 50

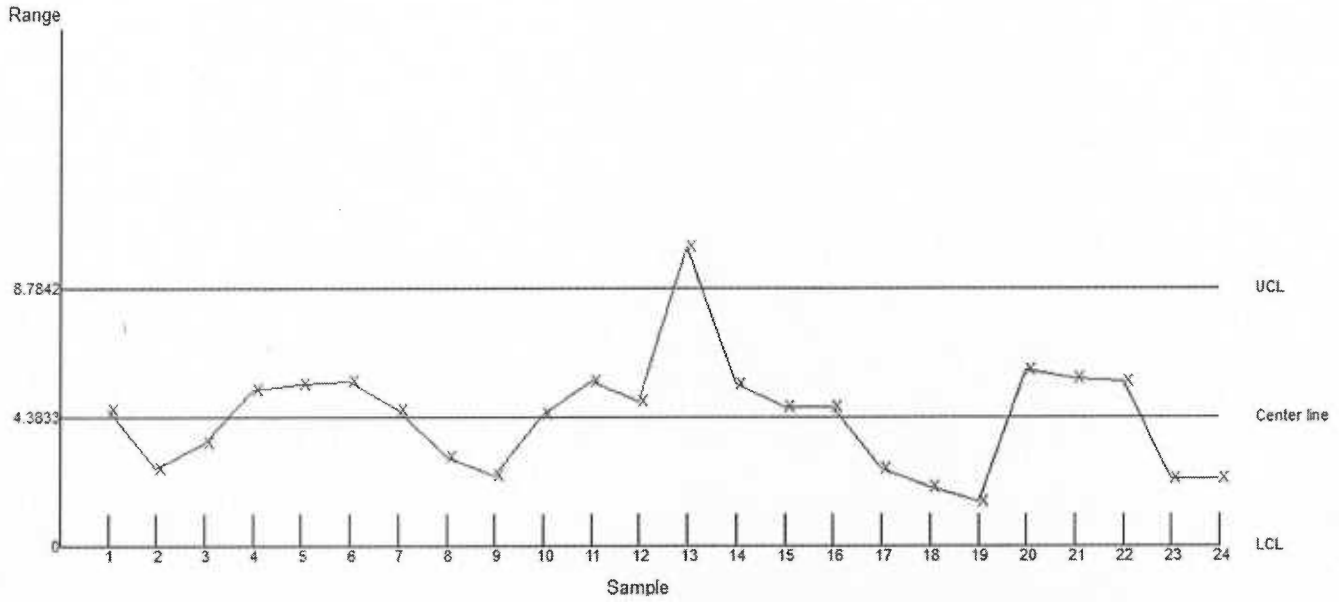
Quality Control Results

(untitled) Solution

Sample	Mean	Range	3 sigma (99.73%)	X-bar Chart	Range Chart
Sample 1	49	4.6	UCL (Upper control limit)	52.1172	8.7842
Sample 2	49.8	2.6	CL (Center line)	50	4.3833
Sample 3	50.3	3.5	LCL (Lower Control Limit)	47.8829	0
Sample 4	51.4	5.3			
Sample 5	51.6	5.5			
Sample 6	51.8	5.6			
Sample 7	51	4.6			
Sample 8	50.5	3			
Sample 9	49.7	2.4			
Sample 10	48.4	4.5			
Sample 11	47.2	5.6			
Sample 12	46.8	4.9			
Sample 13	46.8	10.2			
Sample 14	50	5.5			
Sample 15	47.4	4.7			
Sample 16	47	4.7			
Sample 17	49.8	2.6			
Sample 18	49.8	2			
Sample 19	50	1.5			
Sample 20	47.8	6			
Sample 21	46.4	5.7			
Sample 22	46.4	5.6			
Sample 23	47.2	2.3			
Sample 24	48.4	2.3			
Averages	48.9375	4.3833			

(untitled)
3 sigma (99.73%) Control Chart





THIRD SHIFT: NIGHT

	Smallest	Largest	Range
10 pm	46.1	50.7	4.6
11 pm	46.3	50.8	4.5
12 am	45.4	50.2	4.8
1 am	44.3	49.7	5.4
2 am	44.1	49.6	5.5
3 am	45.2	49	3.8
4 am	45.5	49.1	3.6
5 am	47.1	49.6	2.5
10 pm	46.6	50.2	3.6
11 pm	47	50	3
12 am	48.2	50.4	2.2
1 am	48.4	51.7	3.3
2 am	49	52.2	3.2
3 am	49.2	50	0.8
4 am	46.3	50.5	4.2
5 am	44.1	49.7	5.6
10 pm	48.1	50.7	2.6
11 pm	47	50.8	3.8
12 am	46.4	49.2	2.8
1 am	46.8	49	2.2
2 am	47.2	51.4	4.2
3 am	49	50.6	1.6
4 am	50.5	51.5	1
5 am	50	51.9	1.9

Method: 3 sigma (99.73%)

Sample Size: 6

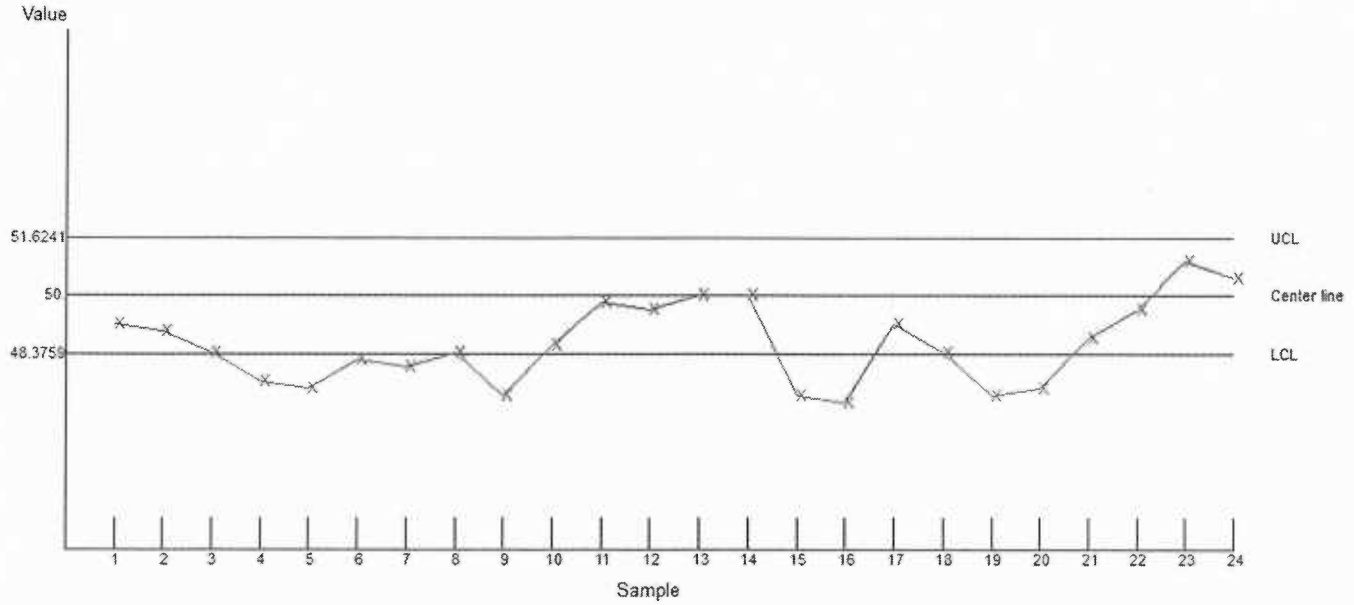
Center line (0 = use mean): 50

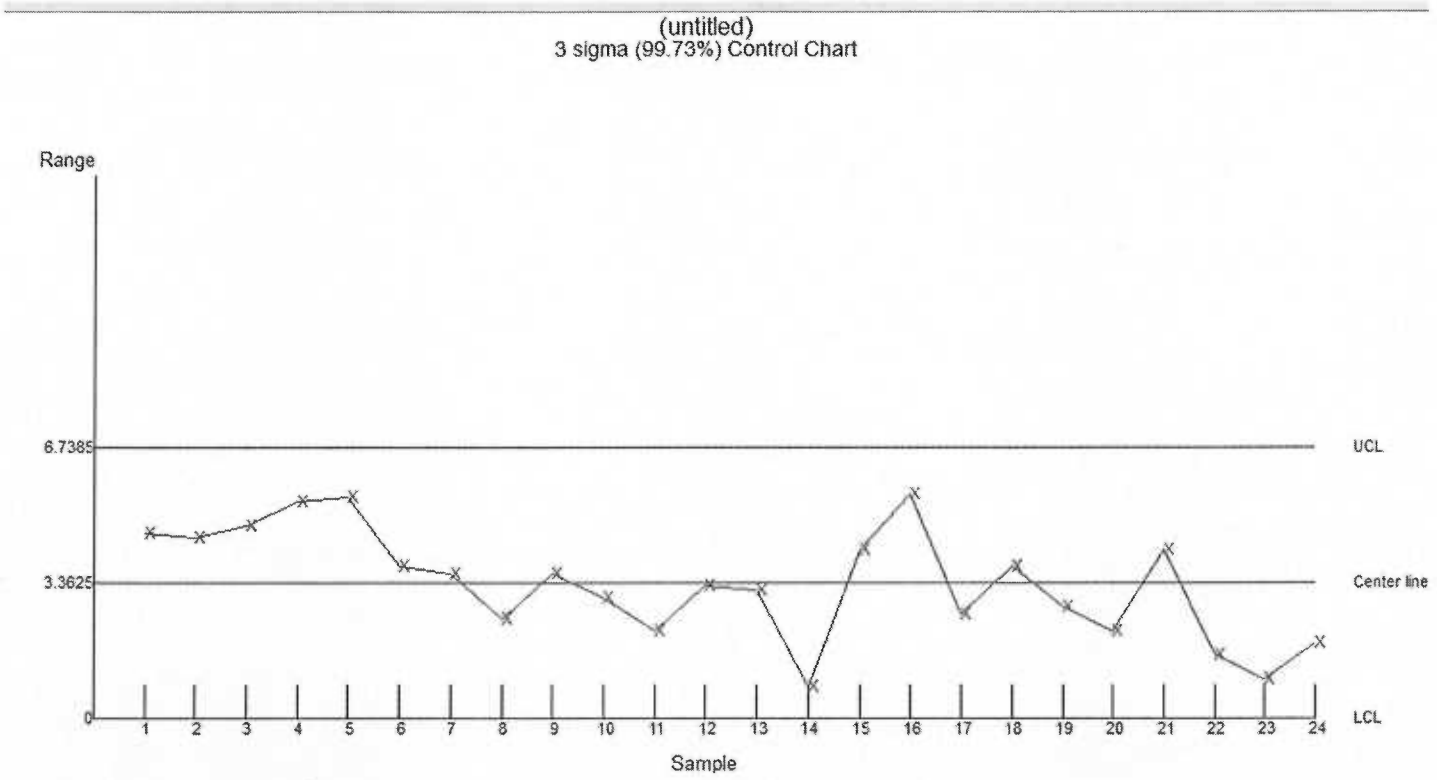
Quality Control Results

(untitled) Solution

Sample	Mean	Range	3 sigma (99.73%)	X-bar Chart	Range Chart
Sample 1	49.2	4.6	UCL (Upper control limit)	51.6241	6.7385
Sample 2	49	4.5	CL (Center line)	50	3.3625
Sample 3	48.4	4.8	LCL (Lower Control Limit)	48.3759	0
Sample 4	47.6	5.4			
Sample 5	47.4	5.5			
Sample 6	48.2	3.8			
Sample 7	48	3.6			
Sample 8	48.4	2.5			
Sample 9	47.2	3.6			
Sample 10	48.6	3			
Sample 11	49.8	2.2			
Sample 12	49.6	3.3			
Sample 13	50	3.2			
Sample 14	50	.8			
Sample 15	47.2	4.2			
Sample 16	47	5.6			
Sample 17	49.2	2.6			
Sample 18	48.4	3.8			
Sample 19	47.2	2.8			
Sample 20	47.4	2.2			
Sample 21	48.8	4.2			
Sample 22	49.6	1.6			
Sample 23	51	1			
Sample 24	50.5	1.9			
Averages	48.6542	3.3625			

(untitled)
3 sigma (99.73%) Control Chart





Analysis

If we analyze the result for the three different shift we can instantly notice that the second and the third shifts are consistently out of control; the only shift that is in control regarding the mean is the first shift the morning one. Although the first shift is out of control in sample 21 for the range chart. The range of sample 21 in fact is 7.1 which is more than the upper control limit for the range which is 6.9221.

If we keep observing our results and we observe the second shift, we notice that the x-bar chart shows that the process is consistently out of control nine samples out of twenty-four are in fact out of control. All of the samples that are not in control are below the lower control limit, which is 47.8829. In the second shift for the Range chart the process is out of control again, only for one sample (13) which is above the upper control limit with a range of 10.2 while the limit is 8.7842.

Again the x-bar chart shows that the third shift is consistently out of control. Once again nine of twenty-four samples are out of control, all of them are below the lower control limit that is 48.3759. However the range chart of the third shift is perfectly in control in all the samples.

Recommendations

At this point the company should review its Total Quality Management plan. One priority for the company should be to improve its own machinery and Bayfield should do this on a regular basis since any machinery problem could cause serious and consistent errors in the execution of the process.

Bayfield should hire a quality control specialist who can initiate periodic auditing with the appropriate document for tracking every problems in a more efficient way. Another solution for the company could be to implement automated testing devices that can inspect the weight of the bags, with this kind of device operations managers can track every variations really precisely.