

Anexos

Anexo 1. Base de datos para el muestreo

Tabla A1.1 Datos de la operación

Siberia - Llegada entre maletas															
45.43	22.74	18.70	20.21	15.79	42.15	18.43	42.68	14.14	30.90	25.73	42.72	33.91	28.17	24.32	32.01
20.22	40.26	42.14	32.12	23.53	31.71	24.20	27.55	32.28	20.97	33.64	44.38	34.91	29.91	45.91	25.87
10.01	34.85	35.87	24.47	44.60	32.58	24.05	44.00	48.85	31.66	21.37	35.31	29.17	33.12	28.03	36.90
19.11	26.14	15.80	27.67	21.90	17.18	15.81	18.61	44.64	23.35	21.95	43.43	22.09	19.64	17.78	19.92
35.02	44.88	24.38	29.48	36.90	45.76	35.75	17.01	13.07	21.91	45.03	29.84	36.46	29.85	16.29	28.19
43.37	36.02	27.80	29.80	39.33	36.42	44.30	15.41	16.16	29.10	29.60	20.14	11.84	21.60	24.65	39.12
17.51	27.45	41.85	20.13	23.73	28.13	27.04	15.08	10.88	25.17	43.15	27.76	27.07	45.51	19.03	45.36
15.77	30.25	26.96	45.15	22.09	37.73	27.64	43.95	9.68	24.89	35.03	26.64	25.16	27.95	40.69	33.11
12.60	16.16	27.69	22.93	17.02	34.78	37.06	19.63	36.99	32.92	27.23	18.34	14.27	45.66	40.21	26.21
12.73	26.18	20.22	43.90	34.52	17.57	42.42	20.30	25.73	31.77	20.32	16.16	41.13	19.34	45.88	43.13
13.67	27.40	27.32	24.06	23.63	43.46	39.03	16.91	23.67	24.45	30.97	37.62	34.55	44.64	28.52	23.38
11.78	27.03	22.99	34.02	36.63	17.23	31.11	18.43	47.25	43.24	37.68	45.81	27.11	34.96	34.07	20.15
24.29	29.57	37.38	25.27	18.50	37.49	40.78	23.56	22.12	24.32	29.82	33.86	46.10	42.04	30.14	24.08
10.83	28.20	18.40	43.16	16.21	20.77	25.55	19.39	20.84	21.31	16.51	31.29	17.24	36.20	15.00	27.81
14.88	40.46	30.05	21.78	47.88	21.96	32.79	38.94	16.79	28.36	36.74	30.50	38.63	33.61	22.18	31.95
17.75	36.07	16.76	31.96	34.69	29.19	42.27	26.52	21.85	33.72	22.57	21.15	28.05	24.92	27.93	17.46
17.57	19.95	19.88	21.28	11.70	21.81	20.19	28.48	26.79	21.89	34.88	20.47	24.40	42.02	18.51	32.76
18.87	34.97	31.58	18.43	13.18	39.48	25.93	41.82	27.49	43.72	18.14	17.04	23.82	25.04	45.81	31.89
21.04	37.06	42.32	39.05	18.20	24.01	22.87	36.73	13.64	33.38	36.54	42.34	13.74	24.31	15.71	24.35
14.74	33.43	39.89	20.37	22.35	26.84	18.19	32.12	22.32	40.93	43.01	28.01	16.13	45.15	43.27	45.16

16.17	35.76	35.30	25.10	11.05	25.44	24.45	26.47	18.71	35.22	28.39	41.98	18.08	21.30	17.35	20.58
19.20	45.83	24.78	25.55	20.65	16.88	22.61	40.64	12.23	43.49	32.99	16.68	12.73	26.57	26.59	25.97
48.93	22.74	42.49	24.69	48.79	36.85	27.02	43.72	28.12	39.82	28.08	18.61	15.26	45.00	27.77	16.76
21.52	35.21	45.78	25.12	46.83	16.61	27.37	38.38	32.07	16.21	25.11	35.49	19.86	20.36	32.06	34.30
38.91	26.67	43.83	44.37	21.26	17.85	0.96	0.96	31.09	21.06	44.81	19.97	25.05	44.69	19.56	45.04
Siberia - Colocar maleta en carreta															
6	7.73	7.39	3.93	6.23	5.73	8.01	2.83	7.76	6.35	7.30	4.24	4.37	7.45	4.15	5.03
6	6.96	5.89	2.75	8.86	5.81	2.57	7.41	3.63	7.91	8.03	6.56	5.88	7.29	8.22	6.92
7.43	7.07	11.05	8.51	7.44	6.88	7.99	8.02	5.47	4.56	5.58	7.30	8.53	7.98	6.15	7.31
8.79	7.57	7.10	5.68	6.69	7.60	7.36	7.74	6.77	6.35	5.28	8.46	7.45	5.94	5.65	4.53
9.23	6.10	6.16	3.57	9.56	6.26	4.40	6.35	5.81	5.98	9.49	3.17	8.29	11.54	4.40	4.21
6.14	7.09	9.63	4.95	6.63	7.42	4.13	10.77	7.03	5.36	8.87	4.08	5.70	5.19	4.85	4.81
8.57	7.61	5.01	5.25	8.44	7.07	3.81	6.28	7.11	6.38	4.67	6.65	7.62	5.11	6.73	7.93
6.28	7.33	9.44	4.77	4.56	6.09	6.17	5.46	8.14	7.44	7.90	5.67	5.62	6.25	6.54	6.62
8.91	7.18	7.15	3.00	8.10	5.29	4.95	8.50	7.01	3.23	9.25	6.00	5.23	5.62	4.98	5.59
5.14	5.06	6.59	3.90	6.64	6.27	8.11	5.92	4.74	6.25	10.11	8.56	6.52	10.57	5.17	5.49
4.91	6.75	4.33	6.15	5.03	4.88	6.73	4.07	5.51	5.71	5.23	5.13	6.15	5.04	5.26	3.15
4.86	5.95	4.79	6.99	6.26	5.01	7.70	8.87	7.31	5.15	8.05	7.73	2.84	7.70	7.54	5.14
6.25	7.48	10.83	8.74	5.72	6.66	2.53	6.02	5.92	3.69	6.92	6.41	2.68	5.75	8.11	8.55
3.1	6.51	6.94	7.69	4.28	3.79	6.90	7.50	6.33	7.47	4.64	3.68	7.28	4.88	4.74	5.38
2.48															
Siberia - Colocar maleta de conexión en faja															
1.09	2.93	1.37	2.40	2.62	1.64	3.24	3.08	3.52	5.13	1.08	2.33	2.18	2.81	1.58	3.89
3.02	1.50	4.55	3.28	3.79	3.35	3.02	1.70	3.36	1.99	1.00	5.07	3.42	0.96	3.13	3.09
3.86	2.85	3.70	3.87	2.37	1.29	3.96	2.82	4.31	2.59	1.80	3.96	2.74	2.41	3.60	2.17
1.36	1.68	1.34	4.04	2.11	4.91	2.64	3.45	1.92	2.58	3.67	4.09	1.07	1.93	2.34	1.45
2.79	3.79	4.78	3.63	4.64	1.08	1.40	2.60	4.19	4.52	4.01	4.13	3.25	2.07	4.34	4.90

2.52	3.62	2.40	1.79	3.53	4.22	3.55	3.89	3.33	3.24	4.08	2.24	2.06	2.64	1.36	3.03
1.48	3.34	1.09	1.16	1.80	0.93	3.88	4.42	3.54	3.52	1.87	3.84	1.24	4.47	1.94	4.21
3.24	2.88	3.61	0.96	2.79	4.20	4.32	2.71	4.52	2.53	4.39	2.81	1.26	1.08	3.74	4.64
3.61	3.97	5.11	2.71	3.87	2.61	4.51	1.27	2.57	2.02	2.90	4.77	1.59	3.22	2.69	4.36
4.39	3.57	4.05	2.96	3.49	2.43	1.25	1.04	2.99	2.26	1.46	4.11	5.05	2.41	1.57	4.43
2.12	1.08	1.93	4.17	4.68	3.79	2.77	4.49	1.74	3.83	1.56	4.38	0.91	2.73	2.29	1.95
2.23	2.80	2.84	1.63	2.96	2.78	1.09	3.56	4.89	3.29	4.42	3.39	2.61	4.99	4.89	1.89
4.92	2.92	0.96	4.30	3.09	3.67	5.07	4.44	1.12	4.55	3.99	3.57	3.49	4.39	2.90	5.18
2.56	3.11	0.99	1.06	1.20	1.29	1.65	3.74	3.03	2.13	3.23	1.98	3.36	2.41	2.18	3.35
1.91	1.02	3.17	3.09	3.02	2.19	2.60	4.85	4.88	1.61	3.03	5.10	4.55	2.45	5.11	2.39
1.16	4.98	1.19	2.43	1.77	1.90	2.53	4.90	1.91	4.67	2.58	5.13	3.14	3.24	4.44	3.86
0.90	1.41	4.45	4.44	4.17	3.52	3.08	4.31	2.37	1.60	1.52	1.32	3.75	2.53	4.14	4.87
4.37	2.47	2.13	3.12	3.90	4.79	2.27	2.10	4.76	1.70	3.37	2.73	2.45	4.85	2.35	1.22
2.59	1.64	3.72	2.19	3.23	2.61	3.20	4.27	1.63	3.40	3.88	4.00	3.55	1.23	3.77	3.71
2.91	1.66	4.92	2.72	1.14	2.22	3.88	2.23	2.25	1.64	1.69	3.77	1.53	1.24	2.39	3.06
3.85	1.53	2.98	2.43	3.71	1.36	3.29	4.08	4.63	1.10	2.71	4.49	1.51	3.96	1.24	3.58
2.54	4.90	3.94	1.08	3.46											
Estiba - Colocar maleta de la carreta a la faja															
3.11	5.36	1.50	4.42	1.80	1.32	0.90	1.70	2.01	3.92	3.83	2.28	0.89	4.22	2.83	1.65
0.24	3.98	1.89	0.54	5.83	2.15	1.12	2.27	3.38	2.41	1.11	1.34	0.73	2.00	0.88	3.94
3.42	2.55	3.18	2.02	4.75	2.09	1.15	1.54	1.68	1.23	3.37	1.95	4.39	4.21	0.83	2.28
3.92	2.24	0.88	2.90	0.87	1.46	2.50	0.93	2.30	3.50	2.49	1.98	2.02	3.59	1.58	2.82
2.14	4.46	2.44	3.92	2.30	3.88	2.97	3.77	3.87	2.59	3.49	2.34	4.40	1.60	1.33	3.66
0.12	3.72	1.25	4.52	2.35	2.98	2.30	3.03	4.77	1.03	1.54	2.85	1.48	1.98	0.94	4.02
4.04	2.03	3.26	2.07	4.90	1.66	2.45	2.15	3.48	1.74	3.78	2.88	2.25	5.39	0.69	3.14
2.48	1.78	0.60	2.95	1.12	2.23	3.21	1.77	1.75	0.03	4.98	4.21	3.89	3.95	3.38	0.14
2.06	2.78	1.96	3.51	1.50	2.15	0.98	2.51	1.57	3.04	2.18	2.78	0.70	1.81	1.62	2.01

3.43	3.47	0.84	3.96	1.27	1.52	2.76	0.82	0.54	1.52	2.40	4.98	1.60	0.08	3.73	3.57
2.08	2.48	1.90	3.04	3.57	2.71	1.48	2.06	2.94	1.90	3.43	4.98	2.49	3.11	3.38	2.04
1.51	2.46	1.43	3.87	0.65	1.83	1.27	3.28	0.72	1.73	1.10	2.29	2.30	4.44	1.91	0.90
4.29	2.42	2.90	3.69	0.87	2.85	1.49	3.18	4.04	2.07	2.35	1.37	2.20	3.43	3.24	2.46
3.72	2.91	2.24	0.86	6.30	1.28	1.57	1.79	2.89	2.69	1.48	4.34	4.36	1.57	4.09	1.62
3.60	1.95	2.14	3.79	5.20	2.31	1.32	2.70	4.57	0.52	1.90	2.50	1.27	2.23	0.81	2.48
3.60	0.79	1.45	5.09	9.70	0.65	2.60	1.79	4.48	2.36	2.50	4.36	3.57	2.43	3.28	3.14
1.70	3.94	3.06	3.58	3.20	2.27	2.80	4.23	4.31	4.42	1.00	1.63	1.11	2.89	2.27	1.67
5.30	2.72	2.34	2.51	4.22	2.63	2.70	2.19	0.50	2.98	1.55	1.59	3.49	3.24	1.96	3.37
2.40	0.22	2.50	2.48	1.10	3.07	0.90	2.85	0.70	3.01	3.20	3.40				
Estiba - Colocar maleta de la faja a la bodega															
3.47	4.81	7.23	3.41	9.41	9.10	3.64	2.17	11.23	4.21	8.56	8.90	0.06	3.54	3.10	2.05
3.46	5.07	4.47	4.28	7.55	3.00	2.91	9.44	5.82	6.10	3.31	3.30	4.22	7.22	8.19	1.24
8.93	1.69	2.86	7.68	5.89	3.80	3.09	1.54	4.51	4.65	5.57	3.44	3.04	6.10	3.55	5.18
6.11	4.23	5.65	7.04	4.47	3.54	5.81	9.48	4.67	7.50	3.24	4.92	7.56	10.08	5.57	3.52
4.74	5.33	2.30	3.00	3.33	8.20	8.05	0.14	4.67	3.90	5.62	3.43	3.47	7.80	4.63	1.37
7.68	7.89	4.00	3.65	4.76	5.76	2.58	4.48	7.34	8.60	4.87	6.49	8.77	7.62	5.75	0.84
4.36	7.52	6.63	3.57	1.81	3.90	1.77	4.77	5.66	6.94	6.79	6.78	10.63	4.36	8.30	3.75
6.75	6.45	2.42	3.45	9.18	2.10	6.86	4.81	5.97	3.10	3.16	8.37	1.70	4.35	6.39	5.27
4.30	10.76	7.67	1.76	3.74	6.60	8.17	7.86	3.69	3.60	3.92	3.17	6.06	5.40	5.00	0.15
7.30	6.76	1.81	4.21	9.85	5.11	6.70	2.61	4.12	6.87	2.15	6.89	5.53	3.65	5.42	6.86
9.84	5.73	3.78	11.65	2.97	9.92	4.11	3.92	4.61	4.29	2.79	4.70	5.98	4.32	3.04	3.03
8.64	3.42	4.64	2.56	1.36	7.06	5.70	2.30	9.11	5.70	2.97	2.32	7.19	2.35	6.62	2.73
6.90	6.16	0.38	4.81	9.11	6.27	1.24	4.23	6.98	3.15	4.83	5.83	4.30	7.56	2.59	8.15
3.89	3.23	2.32	9.67	3.01	4.46	6.98	5.86	5.86	3.49	2.91	3.56	2.80	5.41	5.17	6.84
4.62	8.59	4.14	3.44	4.20	9.12	1.89	1.26	4.38	5.17	7.21	5.66	4.19	10.32	4.46	5.21
2.42	8.70	9.25	3.63	5.31	3.12	4.74	2.83	4.73	3.81	6.92	8.90	3.96	5.00	5.74	0.83

8.60	9.10	5.55	5.69	3.05	5.23	1.16	5.10	11.40	4.55	2.43	7.40	2.98	8.79	8.21	4.70
1.81	5.49	5.51	7.08	1.73	9.77	4.19	0.63	1.95	8.90	2.53	3.20	5.06	3.82	2.83	8.72
4.51	5.43	0.86	8.49	4.43	5.31	5.13	6.10	9.30	8.96	3.25	5.10	3.79	1.47	4.09	1.86
2.74	5.71	4.13	6.30	0.87	7.35	11.26	0.41	4.36	8.68	6.49	4.10	3.90	4.73	4.39	2.62
3.11	7.30	4.57	8.93	2.11	10.35	3.09	2.95	5.23	3.50	7.77	3.50	9.09	9.02	1.06	1.97
6.64	1.45	4.17	3.00	5.33	4.27	3.39	6.64	10.60	4.91	7.08	9.21	1.60	5.05	2.70	6.05
3.36	4.08	1.75	7.55	2.65	3.65	7.49	1.38	10.29	3.14	5.22	5.40	5.03	2.65	5.24	5.04
1.35	2.75	1.11	1.99	9.43	2.90	2.73	4.01	6.23	4.13	4.06	5.40	4.63	3.94	4.40	0.55
9.72	4.97	4.06	5.53	6.58	3.45	6.24	5.35	6.27	8.90	3.54	6.20	9.30	3.27	4.10	5.44
7.40	7.41	2.97	5.10	1.48	10.26	3.20	3.77	9.29	3.30	3.20	4.50	5.92	6.39	5.68	4.70
4.05	5.66	5.30	5.46	6.39	7.67	4.66	6.92	6.95	1.82	3.44	2.80	7.10	4.46	7.35	8.80
4.70	5.41	2.68	2.78	3.26	4.70	5.97	5.78	7.61	1.65	4.92	12.39	4.89	2.40	4.78	3.39
5.60	11.20														
Desestiba - Colocar maleta de la bodega a la faja															
1.58	2.70	3.55	4.26	1.20	7.71	3.82	2.19	3.00	2.40	1.74	6.05	4.00	1.42	5.31	3.86
1.45	4.00	2.80	3.09	3.21	3.21	2.04	2.40	1.40	2.64	2.04	4.46	1.90	2.16	3.49	3.21
2.51	2.80	5.37	3.89	6.50	2.62	1.58	6.02	2.70	2.00	5.46	4.28	4.40	4.71	2.90	3.00
2.94	4.00	3.24	4.23	4.71	3.46	0.49	3.75	2.88	4.80	0.75	3.53	4.00	3.01	2.57	1.71
2.11	7.60	1.91	4.07	1.30	3.26	4.40	4.91	3.20	3.70	2.28	3.44	3.64	5.21	2.14	2.61
1.01	6.90	3.21	2.23	2.50	4.23	0.98	1.42	3.49	3.40	4.05	4.28	1.70	4.91	0.94	2.20
3.02	2.40	2.15	4.40	1.70	4.15	4.20	2.95	3.10	2.83	2.75	1.58	2.20	0.91	2.39	2.10
3.20	9.50	2.40	3.86	2.20	4.01	6.21	3.85	3.61	1.99	3.08	0.98	2.10	1.34	3.03	4.28
3.43	2.19	5.46	2.85	1.60	4.91	3.51	6.21	1.80	3.17	1.24	2.67	3.10	4.68	6.06	1.74
5.20	3.00	3.39	2.15	1.30	1.91	2.17	2.34	2.00	4.25	2.82	2.00	2.19	2.00	0.48	0.44
2.11	3.00	2.61	1.06	1.80	2.34	0.24	2.30	1.40	3.70	2.12	1.20	2.90	2.10	3.49	1.91
2.00	3.60	4.86	3.74	5.20	3.60	4.02	3.03	39.00	3.75	1.38	2.34	3.44	2.94	1.43	2.16
2.50	2.20	4.92	3.02	4.40	3.28	0.54	0.36	3.80	2.84	3.81	6.67	1.39	0.36	3.46	1.30

4.30	2.70	2.80	5.19	1.90	3.60	2.95	1.87	1.30	5.35	2.86	3.20	1.82	2.58	2.20	2.32
3.00	11.00	3.00	4.98	1.70	5.22	1.71	4.40	3.21	1.52	4.32	1.91	2.96	0.22	4.50	3.20
1.70	5.40	3.21	0.44	1.90	5.00	2.25	3.40	4.61	2.13	3.20	3.21	1.70	0.99	3.14	3.43
1.40	2.40	2.52	2.32	6.40	5.09	6.67	1.06	1.44	0.70	3.47	0.75	2.30	2.10	0.60	4.01
1.20	2.90	3.37	6.02	4.00	2.67	0.39	1.52	3.85	2.32	3.99	3.86	2.70	1.87	2.33	4.40
1.11	1.60	2.69	1.76	2.00	4.25	4.14	2.19	2.65	2.10	2.49	3.29				
Desestiba - Colocar maleta de la faja a la carreta															
2.98	3.40	5.70	3.80	3.80	3.40	3.43	2.66	3.17	2.51	3.19	3.73	3.66	3.04	3.39	3.47
3.55	4.10	5.70	2.90	3.20	2.38	3.54	3.80	3.10	3.01	2.68	3.72	2.39	4.15	3.49	3.36
2.81	4.10	4.30	5.10	1.40	2.62	2.64	4.15	3.41	3.21	2.78	3.50	3.50	3.36	2.68	2.53
4.05	3.50	3.10	2.60	7.50	3.04	3.28	2.47	4.31	3.33	3.01	3.63	2.86	3.55	3.42	3.10
2.80	3.90	6.50	2.04	2.20	3.16	3.75	2.86	3.53	3.95	3.57	3.51	3.58	3.23	3.90	3.58
4.72	4.20	4.50	2.90	2.40	5.18	3.21	3.01	3.65	3.39	2.22	3.31	4.80	3.69	3.96	3.52
2.23	6.30	2.40	3.10	2.30	2.91	3.39	3.81	3.38	2.97	2.99	2.97	2.54	4.10	2.30	3.13
2.54	6.70	3.50	2.53	2.60	3.84	3.35	3.45	3.24	2.90	3.40	3.44	2.09	3.01	3.37	4.13
1.49	5.98	2.30	2.40	2.90	3.50	2.98	3.99	3.68	2.60	2.73	2.92	4.01	3.78	3.26	2.89
4.99	7.20	3.60	4.60	2.70	3.71	3.15	2.98	4.13	3.14	2.29	3.24	7.60	2.73	3.13	2.60
4.44	6.30	2.40	3.51	4.42	4.37	3.07	3.52	3.97	3.33	3.99	3.48	4.03	8.08	2.10	3.10
3.63	8.20	2.80	2.20	1.89	3.03	3.78	2.59	3.40	3.05	3.34	2.10	3.02	3.40	3.50	3.30
5.84	8.80	2.60	3.32	5.68	3.59	3.42	3.48	4.01	3.90	2.99	5.90	2.50	8.10	2.57	5.30
5.81	5.17	3.40	2.20	9.60	3.08	3.68	2.50	3.78	3.04	3.67	8.60	3.52	2.83	2.77	2.40
6.13	8.80	3.60	3.78	4.60	3.51	2.95	4.07	2.98	2.41	3.72	3.14	3.50	4.00	6.50	2.30
3.14	3.20														
Aduanas - Colocar maleta de la carreta a la faja															
2.30	2.49	2.50	1.70	1.91	0.70	3.55	1.96	3.28	6.23	3.65	5.87	2.68	3.48	3.05	2.95
8.30	2.90	3.87	1.10	1.98	1.66	2.01	5.42	3.65	5.83	4.28	2.78	1.29	1.83	1.06	4.74
2.34	0.88	5.20	2.31	3.73	0.73	5.18	2.84	2.91	3.13	1.14	3.61	1.35	2.62	2.28	4.11

3.92	3.03	4.31	5.30	4.04	1.62	1.72	2.63	2.54	1.43	3.15	2.26	3.58	2.46	3.42	6.26
0.88	2.40	3.20	1.49	1.03	1.11	3.53	1.17	1.38	4.53	3.42	2.96	4.88	1.10	5.10	4.86
4.36	2.50	4.44	3.43	3.37	2.04	3.85	5.40	4.17	5.55	5.37	1.86	3.91	5.07	4.54	2.56
0.14	2.60	2.46	1.67	1.28	2.28	1.98	3.59	5.87	2.21	4.58	3.08	1.53	1.58	6.03	5.85
2.48	1.67	2.34	2.08	3.03	3.60	4.83	6.09	1.82	5.14	1.11	5.91	5.32	6.03	5.92	3.69
2.35	0.52	2.27	2.35	3.49	0.82	6.41	2.46	1.04	3.60	3.98	3.35	6.49	2.43	2.08	5.14
3.73	3.20	2.30	4.57	2.06	1.68	3.37	2.09	4.68	2.50	3.21	1.03	1.45	6.04	2.14	5.07
3.18	4.42	3.06	2.89	1.62	5.81	1.21	4.19	6.46	1.03	6.16	5.87	2.91	5.62	0.97	4.41
2.55	3.72	1.48	0.84	2.51	5.67	5.01	3.35	3.15	1.50	1.17	4.21	4.46	6.29	6.33	4.93
2.45	3.66	1.51	1.95	2.15	3.42	3.86	1.88	5.55	5.78	1.63	6.18	2.93	4.17	2.62	5.47
3.42	2.34	5.30	1.67	0.12	2.87	1.83	1.26	5.06	2.89	3.33	4.14	2.16	1.85	0.97	1.40
2.30	1.33	1.23	1.33	3.87	5.62	3.57	2.50	2.20	2.14	2.99	5.24	5.81	6.63	3.06	6.49
3.28	3.59	0.22	0.03	0.94	1.40	1.13	4.48	2.41	3.27	2.95	5.89	3.03	5.28	4.37	1.05
4.29	0.82	3.26	2.15	3.79	6.06	4.85	1.77	1.16	1.49	4.33	5.12	5.22	6.19	1.05	2.25
4.42	2.50	1.70	1.90	3.96	6.70	4.87	5.86	5.84	4.49	5.04	2.58	5.63	1.19	5.79	3.77
5.46	2.95	1.40	6.60	5.62	1.30	3.82	1.73	4.98	5.36	5.47	6.36	3.74	3.47	1.95	2.97
4.33	2.85	2.46	3.62	5.51	1.30	6.25	0.99	1.39	1.66	3.18	5.08	4.17	2.35	0.95	3.33
4.00	2.98	4.26	2.62	6.16	3.29	5.06	5.58	4.83	5.39						
Cantidad de maletas por vuelo															
149	135	126	65	100	108	205	131	88	100	259	105	170	95	76	135
191	117	55	209	153	73	192	291	91	177	68	96	100	105	143	99
314	135	133	108	104	145	146	143	131	124	147	71	98	90	247	139
70	99	185	133	101	78	139	204	55	115	112	89	90	99	72	78
122	260	79	89	98	57	226	100	126	101	131	158	72	151	73	63
62	253	87	100	73	73	126	54	65	157	95	112	138	143	100	68
126	228	111	168	63	103	75	91	135	217	225	127	149	129	144	178
105	83	138	122	131	73	100	91	282	98	78	156	89	92	83	114

57	166	177	101	95	129	117	103	255	135	69	150	111	141	98	102
91	131	120	56	113	84	133	83	138	153	109	240	99	264	178	129
105	196	285	154	116	106	118	91	133	83	75	84	100	74	68	141
50	145	143	97	100	91	79	81	163	171	62	135	73	103	111	127
71	82	273	75	72	71	100	78	207	139	63	234	130	130	39	55
108	155	72	65	100	150	81	63	86	287	113	138	99	244	105	58
104	90	122	138	63	210	70	78	115	153	118	255	79	130	78	91
87	118	93	122	167	90	166	86	155	240	250	293	292	315	114	212
113	96	118	87	90	91	89	63	123	100	286	266	183	163	113	125
52	77	91	170	141	169	110	28	112	22	110	100	156	232	140	167
234	78	86	342	152	36	119	114	91	75	190	146	164	61	303	130
147	93	87	141	72	104	78	213	87	93	195	76	194	159	155	246
132	196	70	78	189	145	70	76	74	95	109	93	104	68	100	75
131	39	54	146	73	72	138	106	122	95	78	100	91	132	144	131
100	101	64	146	147	165	81	133	92	91	120	92	145	65	135	100
133	92	87	117	89	82	132	100	128	70	110	99	111	71	133	92
43	73	65	212	154	124	124	93	111	130	138	85	110	101	105	83
101	77	83	127	60	52	73	76	87	75	126	87	87	111	102	71
205	82	61	70	227	96	157	91	61	123	100	92	138	99	46	83
142	165	108	86	143	60	139	171	136	112	55	64	98	81	82	109
84	69	244	129	284	125	224	76	81	122	119	98	100	109	123	124
100	124	141	100	136	49	77	104	182	95	114	273	105	63	92	150
61	137	74	75	227	328	63	33	130	103	85	96	124	77	65	95
69	39	99	113	92	274	138	85	96	286	95	131	92	93	100	100
112	146	141	60	92	253	214	69	116	84	49	100	77	221	117	95
285	237	157	143	78	123	142	101	143	182	48	100	91	95	146	128
245	45	79	115	93	149	331	63	244	146	65	152	70	86	122	163

218	44	78	151	73	220	205	126	64	103	59	129	73	59	126	146
117	154	193	119	83	92	290	127	98	139	103	244	60	146	98	141
144	226	120	62	93	127	48	236	143	224	118	68	100	119	103	131
104	133	84	89	100	120	114	173	168	81	69	63	113	106	49	132
225	267	72	105	100	109	87	156	245	39	97	132	74	128	87	92
112	189	108	115	90	100	122	199	147	98	149	100	77	203	179	157
166	317	37	117	114	115	84	55	286	82	208	68	86	114	59	92
73	72	140	124	105	100	71	174	168	100	84	146	142	149	150	83
64	77	103	173	100	66	109	105	288	146	86	114	177	81	83	82
193	88	61	145	147	98	119	127	144	122	130	119	61	106	92	24
100	123	314	97	99	85	61	66	176	154	240	135	75	108	182	92
77	123	199	150	185	90	95	102	86	101	103	170	199	158	177	75
102	93	122	257	143	109	76	78	135	287	146	125	108	147	38	130
151	77	159	84	158	72	51	71	112	78	252	77	286	233	90	99
91	74	101	104	163	39	58	158	116	159	261	335	173	220	254	138
104	60	83	159	86	96	105	64	150	118	100	147	243	291	100	287
117	74	183	74	118	86	189	87	156	197	120	170	211	100	287	172
44	45	151	238	110	118	59	64	88	84	84	122	83	123	210	164
88	102	119	169	220	128	73	78	114	100	111	172	127	201	186	138
115	79	88	309	91	105	147	87	108	226	85	179	79	151	43	207
70	111	150	170	139	54	70	101	131	137	92	114	112	227	176	113
160	34	86	203	101	124	119	85	78	62	116	130	106	116	74	104
125	52	122	114	101	162	66	61	231	82	99	135	102	89	152	145
115	251	102	139	126	76	76	59	101	125	87	173	91	100	98	79
57	113	88	91	129	72	160	78	141	114	111	92	97	135	90	123
123	141	84	129	146	162	47	118	157	100	91	100	117	129	105	182
204	71	87	125	104	92	140	127	92	65	93	74	99	108	135	113

78	126	113	81	150	238	59	95	187	99	60	109	119	142	96	100
62	100	105	84	342	143	45	98	141	111	226	127	99	28	84	150
146	219	69	117	259	154	78	120	114	93	95	110	111	131	108	110
143	74	81	76	176	318	78	249	223	75	129	102	222	102	90	115
285	87	73	83	155	243	101	72	75	89	86	57	145	100	100	106
130	185	77	106	157	77	308	61	122	110	142	104	125	117	111	127
181	129	126	143	230	103	120	132	84	68	130	170	117	108	222	85
260	42	100	153	86	82	130	197	128	171	83	116	100	138	111	131
291	100	65	132	130	103	154	129	185	114	210	170	198	103	108	95
74	91	66	84	111	91	204	240	158	162	129	112	135	91	177	120
138	122	89	237	125	83	85	152	105	141	104	117	168	156	119	111
96	123	66	172	169	92	92	276	100	122	56	152	102	124	100	119
92	93	164	92	93	113	140	313	124	118	100	145	128	139	209	99
132	311	219	136	122	104	73	72	345	174	33	49	88	119	138	144
50	225	77	214	76	105	88	106	334	62	143	83	89	76	160	89
95	124	92	168	115	93	174	109	248	61	98	126	114	151	63	106
71	145	150	150	109	72	88	118	160	265	138	201	117	122	167	153
63	162	192	168	108	86	55	79	138	137	124	76	136	103	52	96
109	69	111	120	104	68	144	119	255	228	141	288	196	102	170	127
105	36	267	111	68	252	89	75	129	220	275	130	322	78	100	194
76	119	159	136	102	123	116	77	130	243	228	274	91	217	83	265
116	95	226	113	86	166	119	85	72	100	172	60	146	120	100	230
77	106	235	84	138	138	57	104	114	66	187	173	146	292	311	261
230	71	75	151	60	91	101	71	90	128	193	98	206	132	197	103
108	56	90	91	155	81	75	84	82	75	103	96	212	225	154	108
137	118	87	110	123	183	125	106	160	108	78	106	139	25	204	123
147	89	120	312	95	77	101	71	50	78	109	71	95	106	217	122

100	113	135	284	160	152	116	226	76	78	137	88	119	133	105	108
137	143	72	246	254	77	69	116	113	81	99	73	119	129	95	122
91	71	75	162	82	78	130	63	78	131	100	75	123	78	153	88
95	113	110	156	99	91	127	77	84	113	162	72	87	81	143	111
182	81	60	135	145	98	185	125	100	93	100	90	142	87	139	103
139	95	123	248	260	88	85	66	149	84	65	68	147	84	131	109
62	93	69	137	146	157	88	55	84	89	187	120	104	74	88	60
89	117	92	100	251	126	106	115	89	104	110	308	75	95	92	147
45	106	76	180	223	141	114	227	102	65	93	111	114	61	104	102
55	65	105	88	83	295	197	74	115	116	100	140	66	106	150	100
98	142	260	73	221	91	115	238	122	100	108	77	105	238	153	118
146	222	127	109	187	125	95	126	58	328	99	100	105	113	218	146
85	151	115	96	100	100	75	100	59	190	97	128	50	348	139	96
156	114	116	167	138	95	83	82	122	159	68	100	90	127	124	139
89	120	156	90	173	139	83	125	258	147	93	206	93	187	112	114
44	130	114	295	100	84	145	152	103	192	96	89	97	216	180	104
105	128	158	177	124	100	108	23	172	137	71	180	74	70	86	181
220	93	110	179	109	124	101	82	294	71	183	128	145	154	199	74
112	100	125	100	95	97	85	140	235	142	312	118	189	133	114	136
300	72	151	106	174	123	105	72	100	106	69	145	286	88	133	196
135	100	90	127	162	113	103	152	142	89	100	200	207	105	101	100
263	91	147	97	100	63	104	52	97	167	166	96	149	165	159	126
69	98	125	178	132	147	168	71	106	77	187	113	149	83	140	62
84	74	236	71	150	262	48	72	84	176	90	138	138	98	120	124
89	103	276	120	81	84	139	133	71	115	136	220	117	111	145	132
142	86	119	111	106	105	115	332	95	119	235	152	106	95	122	149
91	97	122	100	133	110	114	117	92	84	60	299	120	93	118	100

88	100	99	129	126	72	83	184	102	118	146	159	114	75	123	246
66	136	128	137	108	128	155	154	71	128	33	250	113	101	217	341
145	224	168	101	126	141	173	140	65	123	128	42	88	176	192	114
103	59	105	87	111	116	82	95	91	90	86	127	85	233	171	166
85	113	132	109	70	103	97	56	103	90	56	110	146	153	135	207
88	88	100	164	97	60	206	123	159	149	144	157	110	151	146	180
111	143	100	280	167	64	135	100	266	97	278	84	113	201	275	123
140	82	95	133	111	100	302	100	100	168	341	73	98	156	114	100
259	157	100	163	156	123	268	172	145	180	135	108	112	100	130	153
141	77	100	132	78	68	156	79	116	108	145	97	130	104	113	137
100	287	129	137	147	113	60	88	149	127	179	77	99	179	213	104
165	84	143	98	109	131	129	76	156	167	222	93	68	123	143	138
123	251	105	99	138	160	74	90	100	106	137	102	104	127	324	129
149	213	109	130	243	274	118	130	82	92	162	86	96	102	174	115
62	59	91	162	135	129	84	128	163	265	149	185	160	131	186	152
96	113	92	88	93	104	77	127	103	118	170	139	93	100	144	129
120	118	89	101	126	56	88	76	178	304	118	95	178	119	201	127
83	116	164	145	251	179	101	61	100	281	214	100	127	89	128	116
133	56	179	124	131	149	104	90	73	272	106	163	112	226	156	129
86	125	183	111	268	125	84	204	93	41	86	137	85	309	81	105
99	102	143	177	179	100	155	172	124	169	136	93	151	288	133	105
118	140	125	143	174	152	90	112	136	71	119	106	265	147	122	112
36	100	151	138	82	81	82	57	108	96	106	99	125	126	122	181
144	97	264	227	128	168	62	132	126	87	109	177	62	171	79	169
262	164	155	70	92	77	124	206	110	150	77	120	142	145	179	115
149	47	158	131	83	104	100	70	116	84	109	165	51	251	113	119
133	169	125	92	103	288	193	101	181	129	71	126	207	104	129	213

100	126	110	88	158	172	127	207	90	98	88	253	139	181	156	137
109	120	133	73	83	165	146	105	109	135	110	59	130	140	268	131
151	100	179	100	222	197	126	320	110	54	90	106	100	123	166	203
145	206	180	70	143	123	104	340	138	234	113	160	127	99	100	132
96	144	243	109	83	118	124	199	83	292	158	237	139	118	143	96
68	139	234	105	146	132	111	84	140	252	139	119	98	131	150	123
100	100	123	79	163	122	104	230	98	192	127	177	98	143	160	127
133	120	146	169	265	105	136	110	78	168	137	308	179	142	92	109
90	125	140	140	252	120	145	145	49	299	100	251	118	128	100	101
110	139	122	98	236	196	136	98	105	139	84	83	192	112	118	168
103	145	162	149	142	150	145	97	154	58	170	241	111	132	93	123
138	156	82	187	305	110	96	130	149	176	100	173	133	116	118	101
123	118	163	103	100	97	106	91	81	73	145	115	102	153	187	104
130	197	144	85	109	116	113	165	128	236	133	76	139	162	111	115
100	136	99	169	117	140	201	132	186	142	165	135	113	128	160	166
100	93	140	177	112	114	282	112	272	101	140	101	151	139	120	91
162	145	84	106	112	126	97	87	265	157	160	141	261	125	311	56
124	206	88	95	128	109	112	228	267	113	162	144	173	144	305	92
346	83	132	210	76	100	124	130	286	150	113	90	118	118	133	149
151	91	150	82	115	104	219	209	130	120	137	178	267	273	200	114
117	105	92	151	76	197	140	116	246	166	139	129	139	153	164	203
146	78	90	113	81	187	147	146	243	139	90	218	128	119	182	137
128	286	125	58	102	137	149	120	116	101	142	115	127	135	170	126
158	336	137	171	84	145	98	75	149	237	271	100	150	177	145	141
155	168	90	89	52	119	85	124	156	99	112	165	129	307	123	163
163	194	143	108	110	133	92	122	131	182	105	195	160	167	150	100
173	117	138	277	135	274	185	127	261	163	85	166	187	102	124	270

128	106	144	302	98	286	100	85	115	166	137	145	262	123	60	279
112	154	113	153	126	190	123	204	96	194	104	139	89	79	112	142
142	149	221	177	149	100	86	171	168	118	106	257	122	207	92	262
133	111	246	86	140	116	115	130	157	258	115	156	138	163	82	306
286	118	106	78	145	126	72	198	318	157	198	162	129	187	102	100
136	152	176	300	212	130	137	131	112	135	176	144	151	122	142	140
114	97	108	120	140	128	194	105	92	102	160	152	113	207	118	169
124	128	165	179	62	219										
Tipos de maletas (1=conexión, 0=aduanas)															
0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0
0	0	0	1	1	1	0	0	0	1	0	0	1	1	0	1
0	0	1	0	0	0	0	0	0	0	1	0	0	1	1	0
0	1	1	0	0	0	0	0	0	0	1	0	1	0	0	0
0	0	0	0	1	1	0	1	0	0	0	1	0	1	0	0
0	0	0	0	1	1	0	0	1	0	0	0	0	0	1	1
0	0	1	0	0	1	0	0	0	0	1	1	0	1	0	1
0	1	0	0	1	0	1	0	1	0						
Tiempo en minutos entre llegada de aviones en hora punta (base de datos del mes de diciembre)															
15	0	0	5	0	5	5	0	10	0	0	5	0	0	21	0
14	0	10	5	0	0	25	5	0	5	5	0	5	5	9	0
5	5	0	14	5	5	5	10	10	7	5	5	5	5	10	0
0	0	0	1	10	5	5	20	0	3	0	15	0	0	5	5
0	5	5	0	5	5	5	10	0	0	0	0	5	0	5	0
5	0	0	0	5	0	0	10	5	0	0	5	0	5	5	5
0	5	5	0	5	5	5	0	0	10	5	25	0	0	5	0
0	0	0	5	0	15	10	0	0	5	15	5	10	0	0	5

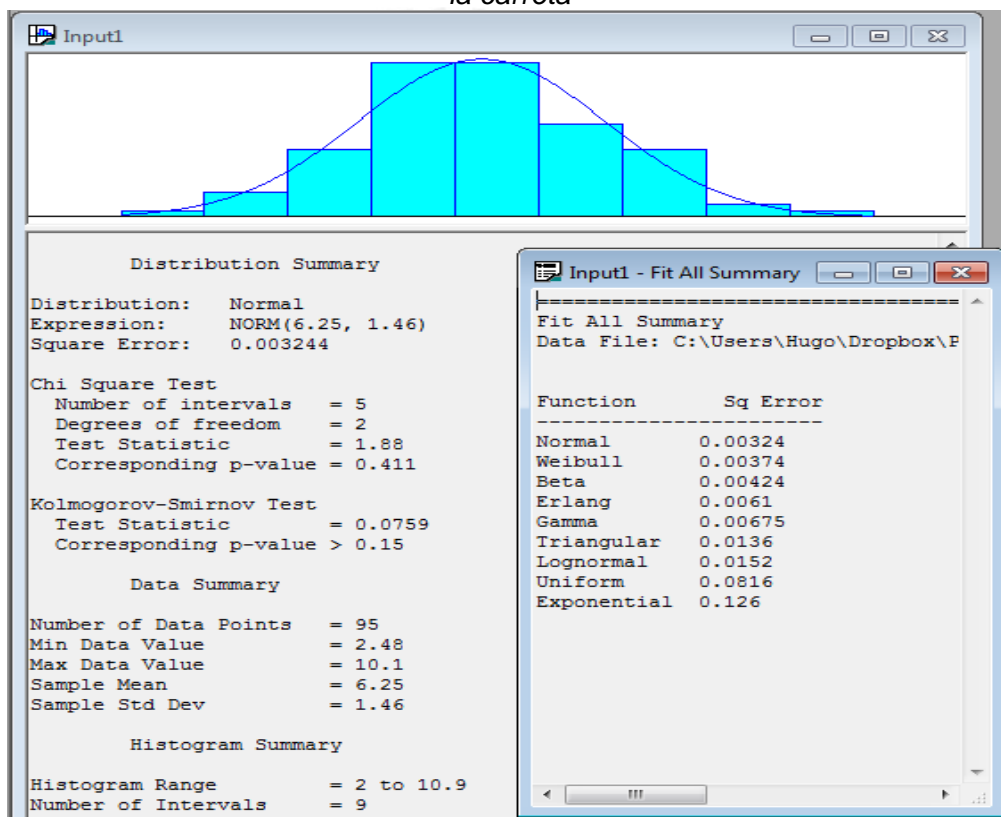
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5	5	5	15	20	5	10	0	0	0	5	5	0	0	15	0
10	0	15	0	5	5	0	5	10	5	20	10	5	5	0	5
0	0	0	5	5	5	0	0	0	5	5	5	5	5	0	0
0	5	5	25	5	15	5	0	0	15	5	25	0	10	9	5
5	0	25	5	0	10	5	0	0	0	5	10	20	5	6	5
0	10	5	5	0	20	0	5	5	5	0	0	0	25	0	5
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0	10	5	10	30	0	0	0	0	5	15	5	15	5	15	5
5	15	10	0	0	10	0	5	5	5	0	5	5	0	30	0
0	0	10	25	10	0	0	5	0	0	25	0	5	5	10	0
10	5	10	15	0	5	5	10	5	5	0	15	5	10	0	5
15	10	20	5	10	0	0	0	15	10	8	0	5	30	10	0
0	5	5	0	0	5	0	5	5	5	2	0	10	10	3	0
5	10	0	5	0	0	5	5	5	5	0	5	19	0	0	5
5	10	5	0	5	0	5	5	25	10	0	5	1	10	0	0
20	20	5	5	0	10	0	15	5	25	0	5	15	0	5	5
5	8	0	0	3	0	5	5	5	0	5	5	5	0	0	0
5	7	5	5	2	0	15	5	5	5	5	10	5	5	5	5
5	5	0	0	5	5	0	20	15	0	0	5	10	0	0	15
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8	0	10	5	5	5	0	15	0	5	5	5	5	0	10	15
17	5	0	0	5	5	5	20	0	0	5	10	0	0	15	5
0	5	10	5	5	5	10	9	5	5	5	0	0	0	0	20
5	0	0	5	0	0	15	1	0	5	0	0	3	5	5	5
5	0	5	0	5	5	10	10	5	5	0	5	2	5	25	5
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5	0	0	5	5	5	10	0	5	3	5	0	7	10	20	0
0	10	5	5	15	25	0	5	0	0	5	5	3	0	20	0
7	0	5	10	5	5	20	0	0	5	20	0	1	5	0	0
3	10	10	0	5	5	10	0	5	5	5	2	9	5	10	0
0	5	5	5	5	5	10	5	0	3	20	8	0	5	0	2
0	5	0	25	5	15	0	0	5	2	5	5	5	15	0	0
5	5	5	5	5	20	2	0	15	15	5	0	10	5	5	5
1	0	25	5	0	0	3	5	5	0	5	0	15	15	0	0
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0	15	0	10	25	5	0	5	10	10	30	5	15	5	5	0
0	0	5	20	5	5	2	0	0	5	10	0	5	0	5	5
5	5	10	15	10	0	1	15	5	5	0	10	5	15	5	5
0	25	20	5	0	5	2	0	25	10	10	15	5	0	0	5
5	5	10	5	10	0	0	5	5	0	0	0	5	5	10	5
5	5	5	0	0	0	10	5	5	15	0	5	10	5	20	0
15	5	5	5	0	0	5	5	5	25	0	20	0	25	10	5
5	25	10	0	5	0	0	10	5	0	5	5	0	5	5	4
0	5	30	0	5	0	5	10	10	5	10	10	0	5	5	1

Anexo 2. Análisis: Tiempo en llevar una maleta de la faja a la carreta

En la figura A2.1 se visualiza el reporte del Input Analyzer, del cual por menor error cuadrático se determina que la mejor distribución que se ajusta a la variable es la Normal. Asimismo, esta distribución va de acuerdo al tipo de variable continua y, por último, como el p-value es mayor a 0.05 se concluye que no hay evidencia suficiente para rechazar la hipótesis nula.

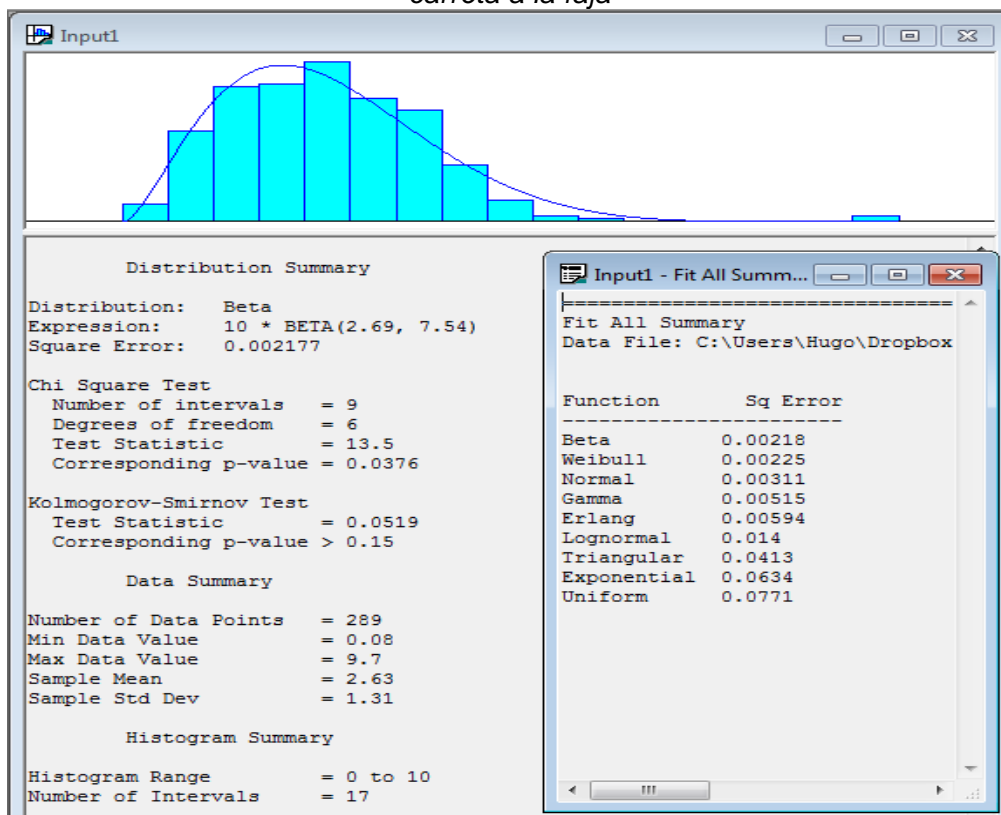
Figura A2.1 Análisis de tipo de distribución: Tiempo en llevar una maleta de la faja a la carreta



Anexo 3. Análisis: Tiempo de colocar una maleta de la carreta a la faja

A partir de la figura A3.1, se concluye que la distribución que mejor se ajusta es la Beta. Esta distribución va de acuerdo con el tipo de datos continuos; además, al analizar la prueba KS se concluye que no hay evidencia suficiente para rechazar la hipótesis nula, porque el p-value es mayor a 0.05.

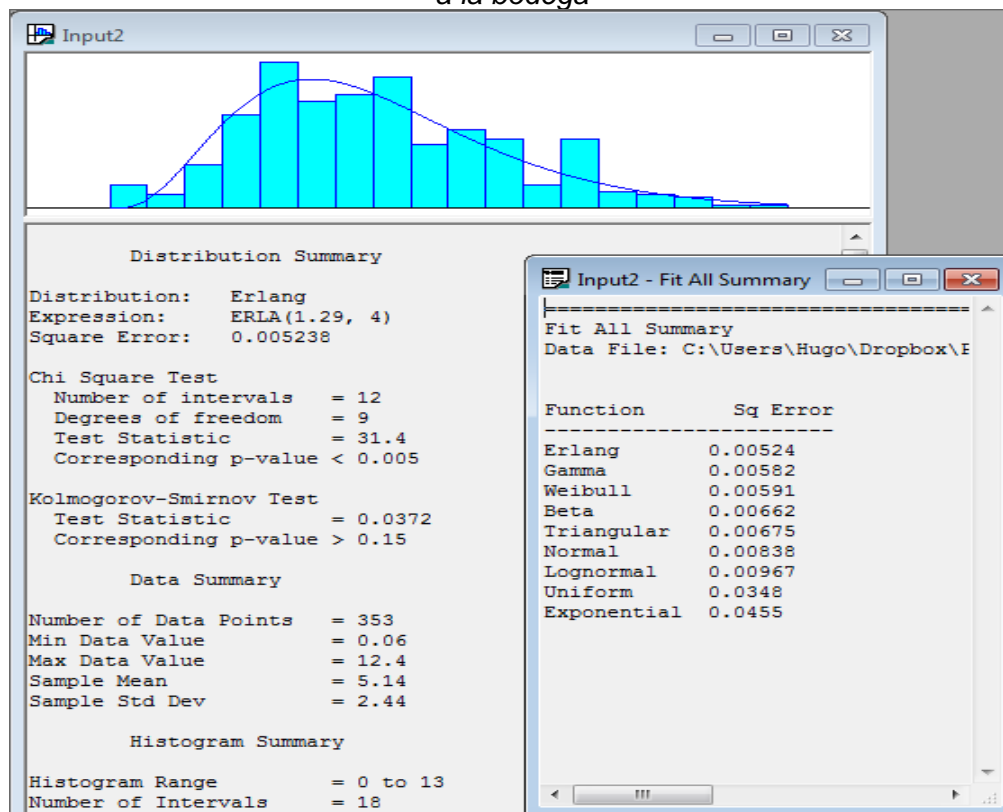
Figura A3.1 Análisis de tipo de distribución: Tiempo de colocar una maleta de la carreta a la faja



Anexo 4. Análisis: Tiempo de colocar una maleta de la faja a la bodega

En la figura A4.1 se observa el reporte del Input Analyzer, donde se concluye que la distribución que mejor se ajusta para esta variable es la Erlang. Esta va de acuerdo con el tipo de datos continuos y ya que, el p-value de la prueba KS es mayor a 0.05, no hay evidencia suficiente para rechazar la hipótesis nula.

Figura A4.1 Análisis de tipo de distribución: Tiempo de colocar una maleta de la faja a la bodega

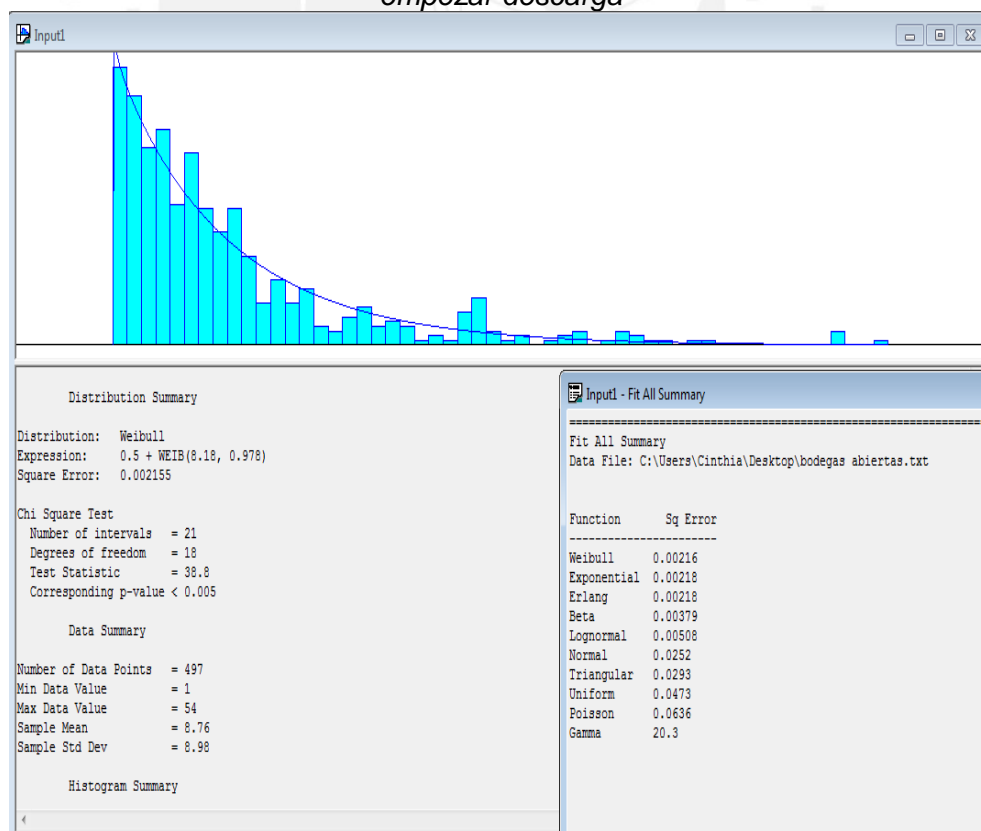


Anexo 5. Análisis: Tiempo entre aviones listos para empezar descarga

En la figura A5.1 se visualiza el reporte del Input Analyzer, la cual muestra que la distribución que mejor se ajusta es la Weibull; sin embargo, dado que el p-value es menor a 0.05 se rechaza la hipótesis nula. Por este motivo, se utiliza la siguiente distribución empírica continua:

- CONT(0.119,1.500,0.225,2.500,0.310,3.500,0.402,4.500,0.463,5.500,0.545,6.500,0.604,7.500,0.652,8.500,0.710,9.500,0.748,10.500,0.767,11.500,0.795,12.500,0.813,13.500,0.837,14.500,0.845,15.500,0.851,16.500,0.863,17.500,0.879,18.500,0.887,19.500,0.897,20.500,0.905,21.500,0.907,22.500,0.911,23.500,0.913,24.500,0.928,25.500,0.948,26.500,0.954,27.500,0.956,28.500,0.960,29.500,0.962,31.500,0.966,32.500,0.972,34.500,0.974,35.500,0.980,36.500,0.984,37.500,0.986,38.500,0.988,40.500,0.990,41.500,0.992,42.500, 0.998,54.500)

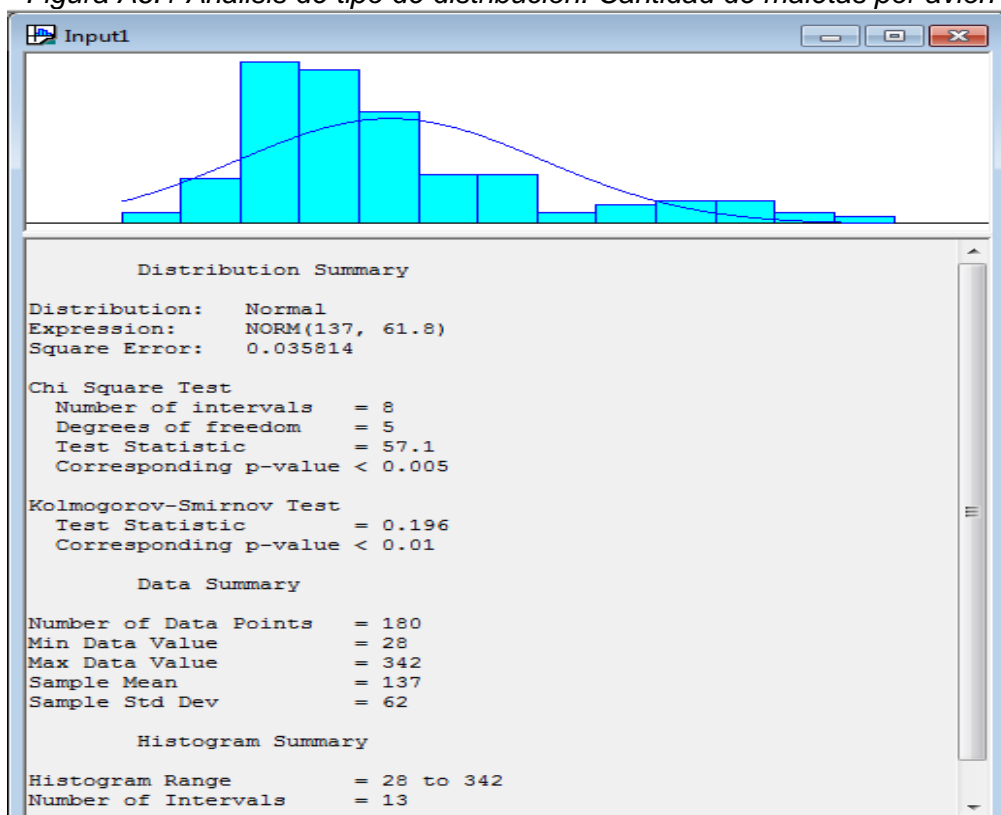
Figura A5.1 Análisis de tipo de distribución: Tiempo entre aviones listos para empezar descarga



Anexo 6. Análisis: Cantidad de maletas por avión

La cantidad de maletas por avión es una variable discreta, lo cual se tendría que ajustar a la distribución de Poisson. Sin embargo, el Input Analyzer no puede realizar dicho ajuste debido a los valores altos de la variable. Por este motivo, empleando el teorema del límite central, esta distribución se puede aproximar a la Normal, porque tiene valores altos de lambda. A continuación, en la figura A6.1 se muestra el reporte del Input Analyzer.

Figura A6.1 Análisis de tipo de distribución: Cantidad de maletas por avión



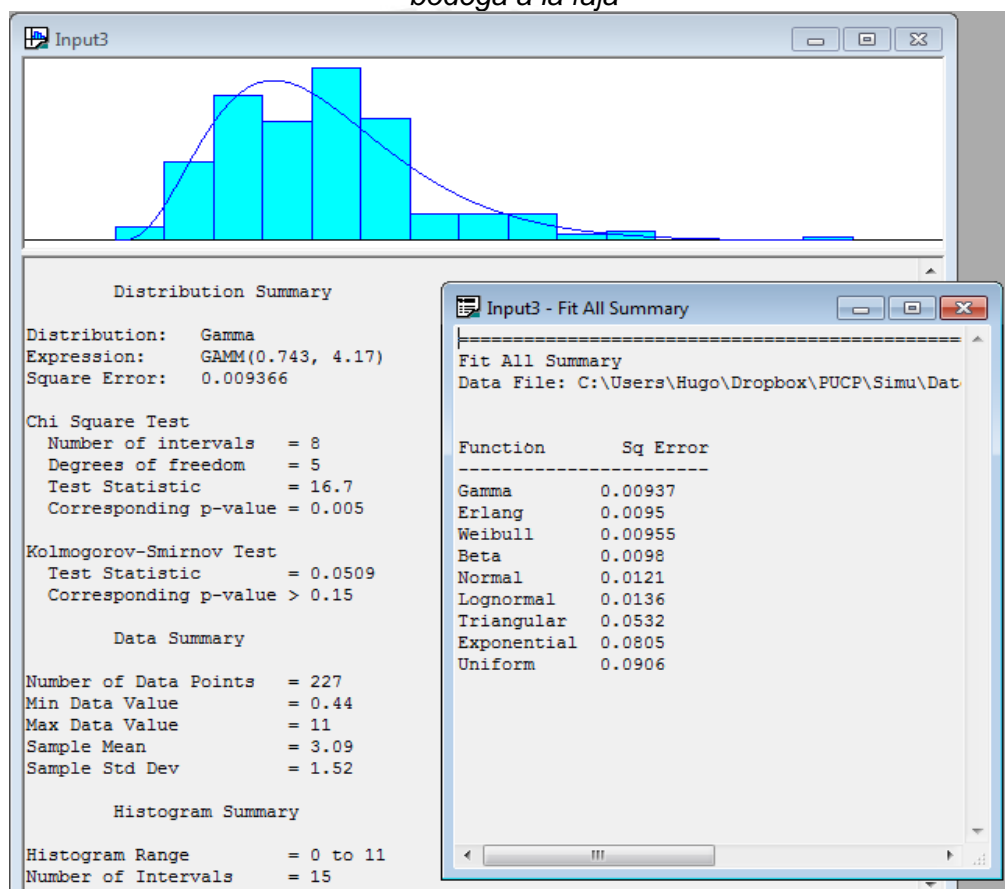
Como se puede observar en la figura 3.6, el p-value es menor a 0.05 y se rechaza la hipótesis nula. Por lo tanto, la variable toma la siguiente distribución empírica discreta:

- DISC(0.017,58,0.077,73.00,0.188,87.00,0.427,102.00,0.598,117.00,0.735,2.00,0.82,147.00,0.889,162.00,0.932,177.00)

Anexo 7. Análisis: Tiempo de colocar una maleta de la bodega a la faja

En la figura A7.1 se visualiza el reporte del Input Analyzer, por el cual se concluye que la distribución que mejor se ajusta a la variable es la Gamma. Esta va de acuerdo con el tipo de dato continuo, y ya que el p-value de la prueba KS es mayor a 0.05, no se rechaza la hipótesis nula.

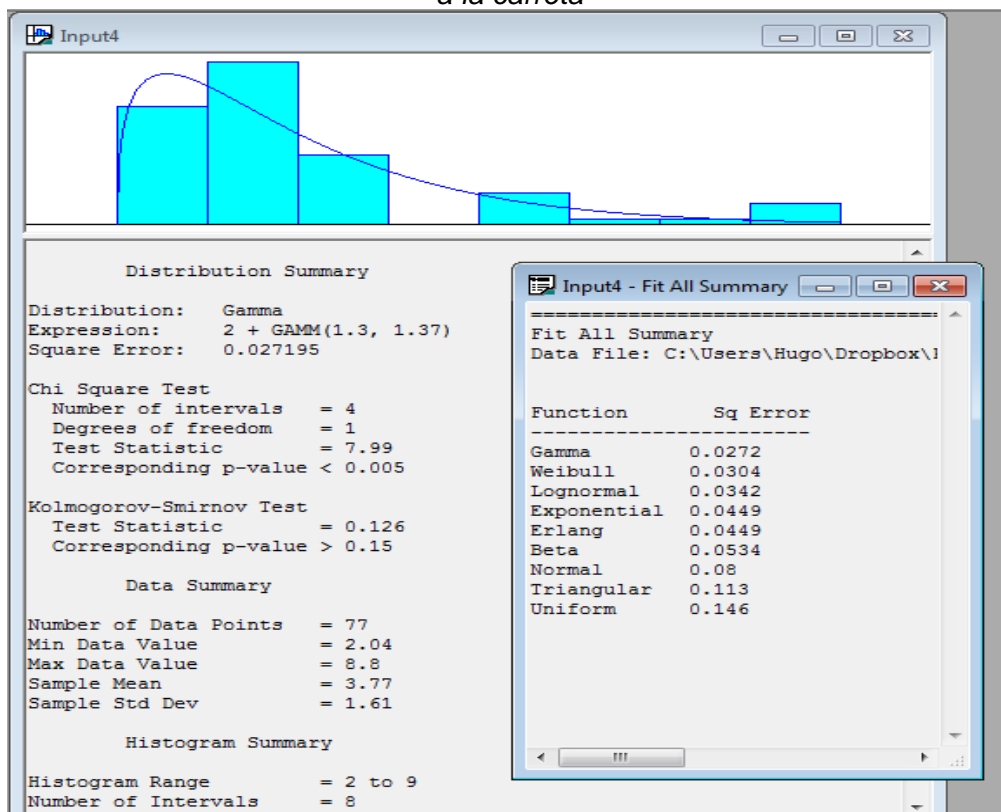
Figura A7.1 Análisis de tipo de distribución: Tiempo de colocar una maleta de la bodega a la faja



Anexo 8. Análisis: Tiempo de colocar una maleta de la faja a la carreta

En la figura A8.1 se visualiza el reporte del Input Analyzer, con el cual se concluye que la distribución que mejor se ajusta a la variable es la Gamma. Esta va de acuerdo con el tipo de datos continuos y por medio del p-value de la prueba KS, no se rechaza la hipótesis nula.

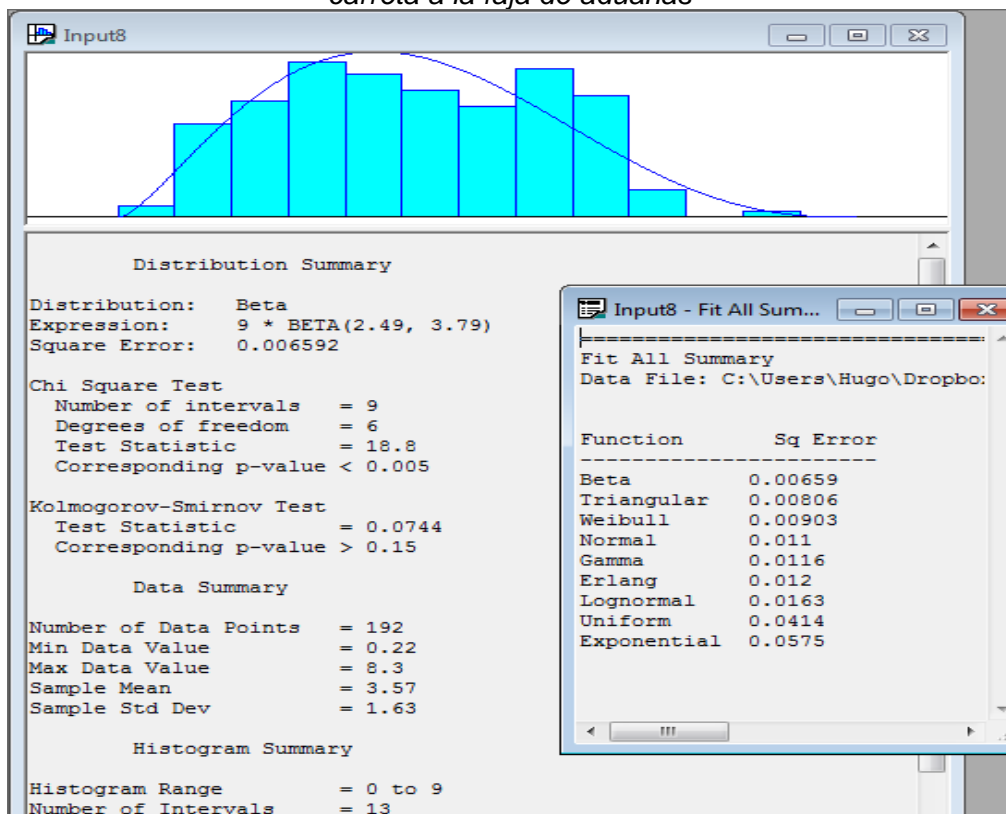
Figura A8.1 Análisis de tipo de distribución: Tiempo de colocar una maleta de la faja a la carreta



Anexo 9. Análisis: Tiempo de colocar una maleta de la carreta a la faja de aduanas

En la figura A9.1 se presenta el reporte del Input Analyzer, donde se concluye, debido al menor error cuadrático que la distribución que mejor se ajusta es la Beta. Esta va de acuerdo con el tipo de datos continuos y por medio del p-value mayor a 0.05 de la prueba Ks, no hay evidencias suficientes para rechazar la hipótesis nula.

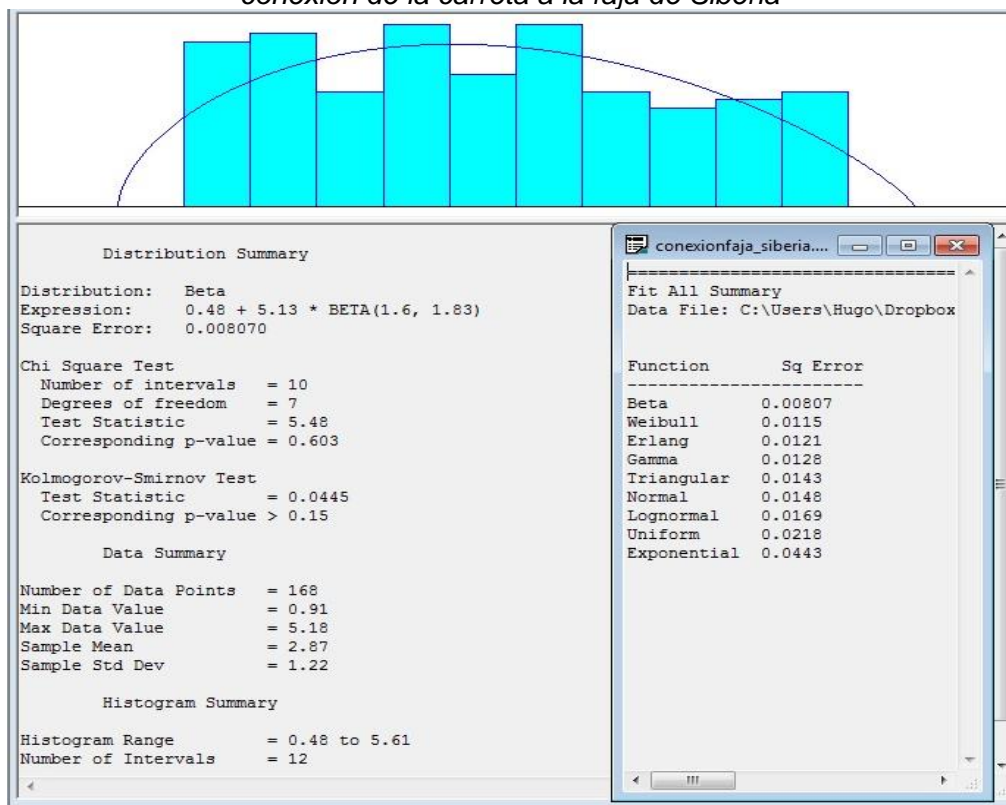
Figura A9.1 Análisis de tipo de distribución: Tiempo de colocar una maleta de la carreta a la faja de aduanas



Anexo 10. Análisis: Tiempo de colocar una maleta de conexión de la carreta a la faja de Siberia

En la figura A10.1 se observa el reporte del Input Analyzer, con el cual se llega a la conclusión que esta variable se ajusta mejor con la distribución Beta. Esta va de acuerdo con el tipo de datos continuos y dado que, el p-value es mayor a 0.05, no hay evidencia suficiente para rechazar la hipótesis nula.

Figura A10.1 Análisis de tipo de distribución: Tiempo de colocar una maleta de conexión de la carreta a la faja de Siberia



Anexo 11. Resultados del reporte Siman

El reporte presentado es el resumen de resultados luego de una simulación con 10 réplicas.

Tabla A11.1 Resumen del reporte Siman de 10 réplicas

Identifier	Average	Half-width	Min	Max
Descarga25	593.8	123.9	377.2	929.4
TAVG(t22.WaitingTime)+TAVG(desca11.Waiting	57.5	32.7	0.0	163.3
Descarga18	686.0	301.6	302.8	1568.0
TAVG(desc3.WaitingTime)	216.3	204.0	0.0	722.2
TAVG(desc22.WaitingTime)	490.5	243.8	0.0	1017.5
TAVG(colatractoristacarga12.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(t32.WaitingTime)+TAVG(desca16.Waiting	38.1	16.8	0.0	75.3
TAVG(desc45.WaitingTime)	146.8	176.3	0.0	768.1
MaxDes6	1590.8	288.2	1162.9	2457.8
TAVG(desc50.WaitingTime)	270.8	192.0	0.0	769.2
TAVG(desc29.WaitingTime)	210.1	176.5	0.0	577.9
TAVG(colatractoristacarga19.WaitingTime)	5.4	12.2	0.0	53.8
Descarga26	730.7	194.5	449.8	1251.4
TAVG(colatractoristacarga3.WaitingTime)	0.0	0.0	0.0	0.0
Descarga19	557.4	155.9	296.5	957.7
TAVG(t24.WaitingTime)+TAVG(desca12.Waiting	50.1	37.1	0.0	134.3
MaxDes7	1469.6	236.4	937.9	1831.8
TAVG(desc10.WaitingTime)	306.5	220.6	0.0	756.1
TAVG(desc9.WaitingTime)	148.8	155.4	0.0	633.0
TAVG(t56.WaitingTime)+TAVG(desca28.Waiting	175.7	48.4	84.5	289.6
TAVG(desc33.WaitingTime)	301.2	231.9	0.0	927.2
TAVG(colatractoristacarga18.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(colatractoristacarga23.WaitingTime)	61.3	84.0	0.0	284.6
TAVG(desc56.WaitingTime)	153.9	237.6	0.0	933.3
Descarga27	779.1	184.5	514.8	1311.3
TAVG(desc17.WaitingTime)	295.7	222.2	0.0	787.1
TAVG(t6.WaitingTime)+TAVG(desca3.WaitingTi	111.7	41.7	24.9	225.5
TAVG(t2.WaitingTime)+TAVG(desca1.WaitingTi	242.6	67.9	111.2	454.5
MaxDes8	1264.4	210.6	722.3	1631.8
TAVG(t41.WaitingTime)+TAVG(desca21.Waiting	84.2	51.8	0.0	140.3
Cost	5134.1	0.0	5134.1	5134.1
TAVG(t48.WaitingTime)+TAVG(desca24.Waiting	191.9	68.6	26.1	311.9
TAVG(desc2.WaitingTime)	387.2	269.3	0.0	953.7
TAVG(desc16.WaitingTime)	301.8	158.4	0.0	583.4
TAVG(t51.WaitingTime)+TAVG(desca26.Waiting	123.9	46.7	0.0	154.8

TAVG(desc21.WaitingTime)	235.8	197.5	0.0	721.7
Descarga28	628.8	115.0	421.5	978.9
TAVG(colatractoristacarga11.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(desc39.WaitingTime)	217.9	213.3	0.0	797.1
TAVG(desc44.WaitingTime)	429.7	230.4	0.0	1027.1
TAVG(t16.WaitingTime)+TAVG(desca8.WaitingT	161.1	39.0	50.3	235.3
TAVG(t12.WaitingTime)+TAVG(desca6.WaitingT	236.4	85.4	51.7	402.1
TAVG(desc28.WaitingTime)	225.1	192.3	0.0	575.6
TAVG(t34.WaitingTime)+TAVG(desca17.Waiting	45.1	31.0	4.7	116.5
MaxDes9	1362.6	255.5	909.6	1875.0
MaxDes10	1227.4	221.1	594.3	1630.0
TAVG(colatractoristacarga2.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(desc1.WaitingTime)	307.1	214.5	0.0	738.0
TAVG(tsistemacarga)	420.6	19.2	368.2	452.9
TAVG(t43.WaitingTime)+TAVG(desca22.Waiting	109.1	53.9	0.0	156.2
TAVG(colatractoristacarga9.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(desc8.WaitingTime)	378.5	192.8	0.0	887.9
TAVG(t53.WaitingTime)+TAVG(desca27.Waiting	116.9	57.7	0.0	167.3
TAVG(desc27.WaitingTime)	135.0	158.4	0.0	552.2
TAVG(desc32.WaitingTime)	301.5	241.2	0.0	797.7
TAVG(colatractoristacarga17.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(colatractoristacarga22.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(t26.WaitingTime)+TAVG(desca13.Waiting	25.2	15.6	0.0	61.8
TAVG(desc55.WaitingTime)	103.7	125.4	0.0	475.1
TAVG(t9.WaitingTime)+TAVG(desca5.WaitingTi	156.6	12.2	108.0	162.3
MaxDes11	1224.6	205.5	837.9	1735.6
TAVG(t5.WaitingTime)+TAVG(desca3.WaitingTi	86.0	42.5	0.0	123.3
TAVG(t36.WaitingTime)+TAVG(desca18.Waiting	102.0	44.8	0.0	189.1
TAVG(colatractoristacarga8.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(t45.WaitingTime)+TAVG(desca23.Waiting	172.5	50.2	0.0	257.9
TAVG(colatractoristacarga21.WaitingTime)	0.0	0.0	0.0	0.0
Descarga1	856.2	233.2	489.9	1344.4
TAVG(desc15.WaitingTime)	357.1	187.2	0.0	695.1
TAVG(desc20.WaitingTime)	399.2	189.7	0.0	758.9
TAVG(colatractoristacarga10.WaitingTime)	0.0	0.0	0.0	0.0
MaxDes12	947.9	246.9	407.1	1569.4
TAVG(desc38.WaitingTime)	282.9	193.0	0.0	687.3
TAVG(desc43.WaitingTime)	265.4	204.5	0.0	810.2
TAVG(colatractoristacarga28.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(t21.WaitingTime)+TAVG(desca11.Waiting	61.2	30.2	0.0	87.8
TAVG(t15.WaitingTime)+TAVG(desca8.WaitingT	126.1	0.0	126.1	126.1
TAVG(t28.WaitingTime)+TAVG(desca14.Waiting	29.8	19.8	0.0	63.5
TAVG(t11.WaitingTime)+TAVG(desca6.WaitingT	129.6	48.9	0.0	162.6
TAVG(t31.WaitingTime)+TAVG(desca16.Waiting	37.3	23.0	0.0	62.2
TAVG(t38.WaitingTime)+TAVG(desca19.Waiting	103.1	56.2	0.0	273.4

TAVG(colatractoristacarga1.WaitingTime)	45.2	71.1	0.0	286.4
MaxDes20	1031.8	279.6	469.8	1630.0
Descarga2	791.9	211.9	525.9	1313.9
TAVG(t1.WaitingTime)+TAVG(desca1.WaitingTi	156.1	77.1	0.0	390.6
MaxDes13	940.6	165.8	573.2	1237.2
TAVG(desc42.WaitingTime)	402.9	190.3	0.0	801.3
TAVG(desc7.WaitingTime)	130.8	148.7	0.0	640.9
TAVG(desc26.WaitingTime)	340.6	150.8	0.0	599.8
TAVG(desc31.WaitingTime)	18.7	42.3	0.0	187.0
TAVG(colatractoristacarga16.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(desc49.WaitingTime)	60.3	81.8	0.0	297.8
TAVG(desc54.WaitingTime)	321.3	200.5	0.0	728.8
TAVG(t23.WaitingTime)+TAVG(desca12.Waiting	68.8	31.1	0.0	153.6
TAVG(t55.WaitingTime)+TAVG(desca28.Waiting	167.0	0.1	166.9	167.2
MaxDes21	1416.5	260.4	685.5	2069.1
Descarga10	583.0	155.1	300.9	990.1
Descarga3	672.6	158.6	410.1	1064.5
MaxDes14	798.1	218.9	473.4	1231.3
TAVG(colatractoristacarga7.WaitingTime)	9.5	18.4	0.0	81.9
TAVG(desc6.WaitingTime)	361.4	207.6	0.0	870.9
TAVG(desc30.WaitingTime)	236.5	254.9	0.0	959.8
TAVG(colatractoristacarga20.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(desc53.WaitingTime)	152.7	168.8	0.0	756.4
TAVG(desc14.WaitingTime)	350.2	222.3	0.0	776.4
TAVG(desc37.WaitingTime)	233.0	210.2	0.0	803.6
TAVG(t47.WaitingTime)+TAVG(desca24.Waiting	138.3	55.1	0.0	243.3
TAVG(colatractoristacarga27.WaitingTime)	15.5	35.0	0.0	154.9
MaxDes22	1436.3	226.4	922.3	1964.4
Descarga11	673.3	237.1	288.7	1242.1
Descarga4	701.3	157.6	482.2	1242.5
MaxDes15	907.2	316.4	519.3	1759.2
TAVG(t18.WaitingTime)+TAVG(desca9.WaitingT	107.0	55.5	0.0	245.0
TAVG(t33.WaitingTime)+TAVG(desca17.Waiting	70.5	17.7	0.0	78.7
TAVG(desc41.WaitingTime)	101.0	135.2	0.0	572.4
TAVG(t39.WaitingTime)+TAVG(desca20.Waiting	101.1	25.4	0.0	112.6
MaxDes23	1462.4	301.8	850.8	2021.4
Descarga12	589.6	248.2	297.4	1283.9
Descarga5	725.3	169.7	479.4	1247.5
TAVG(desc25.WaitingTime)	180.8	141.9	0.0	497.6
TAVG(colatractoristacarga15.WaitingTime)	0.0	0.0	0.0	0.0
MaxDes16	901.0	247.2	478.9	1417.6
TAVG(t49.WaitingTime)+TAVG(desca25.Waiting	131.5	59.4	0.0	292.4
TAVG(desc48.WaitingTime)	211.6	149.9	0.0	554.5
TAVG(t8.WaitingTime)+TAVG(desca4.WaitingTi	109.4	60.8	0.0	260.1
TAVG(t4.WaitingTime)+TAVG(desca2.WaitingTi	119.1	69.8	0.0	271.9

TAVG(t25.WaitingTime)+TAVG(desca13.Waiting	62.4	21.1	0.0	125.4
Descarga20	655.7	225.0	374.7	1160.6
TAVG(colatractoristacarga6.WaitingTime)	2.5	5.6	0.0	24.9
TAVG(desc5.WaitingTime)	196.3	173.5	0.0	605.4
MaxDes24	1291.0	223.1	666.4	1824.7
Descarga13	536.3	147.3	254.8	940.3
TAVG(colatractoristacarga14.WaitingTime)	0.0	0.0	0.0	0.0
Descarga6	825.0	175.9	527.5	1205.1
TAVG(t35.WaitingTime)+TAVG(desca18.Waiting	63.9	31.6	0.0	91.3
TAVG(desc52.WaitingTime)	303.6	198.5	0.0	832.5
MaxDes17	1123.1	186.0	690.3	1482.8
TAVG(desc13.WaitingTime)	204.8	196.1	0.0	711.3
MaxDes1	1638.3	323.2	1092.1	2562.4
TAVG(t40.WaitingTime)+TAVG(desca20.Waiting	90.4	58.5	0.0	237.6
TAVG(desc36.WaitingTime)	432.1	306.8	0.0	1164.9
TAVG(t14.WaitingTime)+TAVG(desca7.WaitingT	171.7	79.7	91.4	422.1
TAVG(colatractoristacarga26.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(t10.WaitingTime)+TAVG(desca5.WaitingT	166.7	58.0	68.6	297.4
Descarga21	611.8	165.3	382.9	1108.7
TAVG(t50.WaitingTime)+TAVG(desca25.Waiting	154.7	60.0	0.0	254.3
MaxDes25	1268.3	182.9	1032.8	1885.2
Descarga14	514.8	170.0	256.3	954.6
Descarga7	753.5	197.6	477.0	1295.2
TAVG(t27.WaitingTime)+TAVG(desca14.Waiting	37.3	23.0	0.0	62.2
MaxDes18	1217.8	328.9	781.5	1974.2
MaxDes2	1541.7	285.9	825.2	2134.5
TAVG(desc40.WaitingTime)	261.6	236.4	0.0	981.0
TAVG(colatractoristacarga25.WaitingTime)	25.5	57.8	0.0	255.4
TAVG(t37.WaitingTime)+TAVG(desca19.Waiting	93.9	23.6	0.0	104.6
TAVG(desc19.WaitingTime)	175.0	150.8	0.0	581.8
TAVG(desc24.WaitingTime)	322.2	219.1	0.0	933.7
Descarga22	788.6	182.8	480.4	1238.9
TAVG(t42.WaitingTime)+TAVG(desca21.Waiting	108.6	42.7	24.8	186.6
TAVG(t7.WaitingTime)+TAVG(desca4.WaitingTi	148.9	85.0	0.0	326.0
TAVG(desc47.WaitingTime)	144.7	212.1	0.0	924.9
TAVG(t3.WaitingTime)+TAVG(desca2.WaitingTi	116.9	57.7	0.0	167.3
MaxDes26	1321.4	244.9	772.0	2029.3
Descarga15	514.9	177.5	278.4	948.4
TAVG(t19.WaitingTime)+TAVG(desca10.Waiting	82.8	31.2	0.0	103.7
Descarga8	810.5	200.3	417.1	1193.1
TAVG(t52.WaitingTime)+TAVG(desca26.Waiting	137.8	59.6	51.3	275.3
MaxDes19	1038.7	252.8	503.4	1589.5
MaxDes3	1267.7	248.1	724.8	1795.9
TAVG(t29.WaitingTime)+TAVG(desca15.Waiting	56.0	14.1	0.0	62.6
TAVG(colatractoristacarga5.WaitingTime)	0.0	0.0	0.0	0.0

TAVG(desc4.WaitingTime)	522.5	223.1	0.0	904.9
TAVG(desc23.WaitingTime)	232.8	211.9	0.0	736.9
TAVG(colatractoristacarga13.WaitingTime)	0.0	0.0	0.0	0.0
TAVG(desc46.WaitingTime)	175.7	185.6	0.0	740.1
Descarga23	670.0	178.2	437.9	1304.9
TAVG(desc51.WaitingTime)	200.9	210.4	0.0	850.3
TAVG(desc12.WaitingTime)	372.5	219.3	0.0	972.3
TAVG(t17.WaitingTime)+TAVG(desca9.WaitingT	112.9	38.1	0.0	226.0
MaxDes27	1483.1	175.9	1157.7	1966.4
Descarga16	385.7	77.5	281.2	579.7
TAVG(t13.WaitingTime)+TAVG(desca7.WaitingT	162.1	54.7	0.0	324.5
TAVG(desc35.WaitingTime)	304.0	304.0	0.0	1160.4
Descarga9	760.8	211.5	428.6	1213.8
TAVG(t44.WaitingTime)+TAVG(desca22.Waiting	149.5	57.4	71.7	303.7
TAVG(colatractoristacarga4.WaitingTime)	0.0	0.0	0.0	0.0
MaxDes4	1358.9	245.1	962.4	2018.1
TAVG(t54.WaitingTime)+TAVG(desca27.Waiting	212.5	72.0	47.6	327.5
TAVG(t20.WaitingTime)+TAVG(desca10.Waiting	92.8	51.4	0.0	226.1
Descarga24	695.4	235.7	469.4	1531.7
TAVG(desc11.WaitingTime)	272.7	210.2	0.0	768.9
TAVG(t30.WaitingTime)+TAVG(desca15.Waiting	58.5	38.6	0.0	193.7
TAVG(desc34.WaitingTime)	424.2	216.5	0.0	825.0
TAVG(colatractoristacarga24.WaitingTime)	20.9	33.4	0.0	137.5
MaxDes28	1244.2	226.2	887.1	1918.3
Descarga17	620.9	198.4	249.6	990.0
TAVG(tsistemadescarga)	1054.9	79.0	907.7	1269.7
TAVG(desc18.WaitingTime)	504.8	267.1	0.0	1112.7
MaxDes5	1386.4	201.2	787.0	1756.8
TAVG(t46.WaitingTime)+TAVG(desca23.Waiting	258.9	99.0	30.2	536.0
operador.NumberSeized	420.3	7.8	400.0	437.0
operador.ScheduledUtilization	0.0	0.0	0.0	0.0
seleccionador10.NumberSeized	77.3	6.3	63.0	88.0
seleccionador10.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador11.NumberSeized	81.4	4.5	73.0	91.0
seleccionador11.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador12.NumberSeized	81.0	8.0	60.0	102.0
seleccionador12.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador13.NumberSeized	82.6	8.2	67.0	98.0
seleccionador13.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador14.NumberSeized	76.4	5.2	63.0	84.0
seleccionador14.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador15.NumberSeized	77.8	7.4	65.0	96.0
seleccionador15.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador16.NumberSeized	81.6	4.9	73.0	91.0
seleccionador16.ScheduledUtilization	0.0	0.0	0.0	0.1

seleccionador17.NumberSeized	79.3	6.9	64.0	92.0
seleccionador17.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador18.NumberSeized	80.4	4.7	73.0	96.0
seleccionador18.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador19.NumberSeized	78.6	9.6	58.0	103.0
seleccionador19.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador20.NumberSeized	76.6	7.6	58.0	91.0
seleccionador20.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador21.NumberSeized	85.2	5.9	74.0	102.0
seleccionador21.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador22.NumberSeized	80.2	7.5	60.0	98.0
seleccionador22.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador23.NumberSeized	80.9	5.0	71.0	91.0
seleccionador23.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador24.NumberSeized	81.4	8.4	60.0	99.0
seleccionador24.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador25.NumberSeized	81.7	7.1	63.0	100.0
seleccionador25.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador26.NumberSeized	78.5	6.2	58.0	89.0
seleccionador26.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador27.NumberSeized	76.4	8.6	59.0	92.0
seleccionador27.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador28.NumberSeized	78.4	7.4	62.0	94.0
seleccionador28.ScheduledUtilization	0.0	0.0	0.0	0.1
carretas.NumberSeized	208.5	5.0	197.0	219.0
carretas.ScheduledUtilization	0.3	0.0	0.2	0.3
seleccionador1.NumberSeized	111.5	4.9	100.0	121.0
seleccionador1.ScheduledUtilization	0.2	0.0	0.2	0.2
seleccionador2.NumberSeized	91.6	7.7	71.0	105.0
seleccionador2.ScheduledUtilization	0.1	0.0	0.1	0.1
seleccionador3.NumberSeized	87.8	8.4	65.0	110.0
seleccionador3.ScheduledUtilization	0.1	0.0	0.0	0.1
seleccionador4.NumberSeized	78.4	7.5	61.0	99.0
seleccionador4.ScheduledUtilization	0.1	0.0	0.0	0.1
seleccionador5.NumberSeized	77.2	6.8	60.0	89.0
seleccionador5.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador6.NumberSeized	80.3	7.5	66.0	102.0
seleccionador6.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador7.NumberSeized	81.0	7.2	65.0	96.0
seleccionador7.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador8.NumberSeized	73.3	6.8	58.0	87.0
seleccionador8.ScheduledUtilization	0.0	0.0	0.0	0.1
seleccionador9.NumberSeized	74.0	7.6	59.0	93.0
seleccionador9.ScheduledUtilization	0.0	0.0	0.0	0.1

Anexo 12. Validación de resultados

Tabla A12.1 Validación de resultados

Descripción	Identifier	Promedio (min)	Half width (min)	$t_{0.975,9}$	c (min)	T_0	Conclusión
Descarga – Espera por carreta	TAVG(desc1.WaitingTime)	5.12	3.58	2.26	3.00	1.34	Aceptar H0
	TAVG(desc10.WaitingTime)	5.11	3.68	2.26	3.00	1.30	Aceptar H0
	TAVG(desc11.WaitingTime)	4.55	3.50	2.26	3.00	1.00	Aceptar H0
	TAVG(desc12.WaitingTime)	6.21	3.65	2.26	3.00	1.99	Aceptar H0
	TAVG(desc13.WaitingTime)	3.41	3.27	2.26	3.00	0.29	Aceptar H0
	TAVG(desc14.WaitingTime)	5.84	3.70	2.26	3.00	1.73	Aceptar H0
	TAVG(desc15.WaitingTime)	5.95	3.12	2.26	3.00	2.14	Aceptar H0
	TAVG(desc16.WaitingTime)	5.03	2.64	2.26	3.00	1.74	Aceptar H0
	TAVG(desc17.WaitingTime)	4.93	3.70	2.26	3.00	1.18	Aceptar H0
	TAVG(desc18.WaitingTime)	8.41	4.45	2.26	3.00	2.75	Rechazar H0
	TAVG(desc19.WaitingTime)	2.92	2.51	2.26	3.00	-0.08	Aceptar H0
	TAVG(desc2.WaitingTime)	6.45	4.49	2.26	3.00	1.74	Aceptar H0
	TAVG(desc20.WaitingTime)	6.65	3.16	2.26	3.00	2.61	Rechazar H0
	TAVG(desc21.WaitingTime)	3.93	3.29	2.26	3.00	0.64	Aceptar H0
	TAVG(desc22.WaitingTime)	8.17	4.06	2.26	3.00	2.88	Rechazar H0
	TAVG(desc23.WaitingTime)	3.88	3.53	2.26	3.00	0.56	Aceptar H0
	TAVG(desc24.WaitingTime)	5.37	3.65	2.26	3.00	1.47	Aceptar H0
	TAVG(desc25.WaitingTime)	3.01	2.37	2.26	3.00	0.01	Aceptar H0
	TAVG(desc26.WaitingTime)	5.68	2.51	2.26	3.00	2.41	Rechazar H0
	TAVG(desc27.WaitingTime)	2.25	2.64	2.26	3.00	-0.64	Aceptar H0
TAVG(desc28.WaitingTime)	3.75	3.21	2.26	3.00	0.53	Aceptar H0	
TAVG(desc29.WaitingTime)	3.50	2.94	2.26	3.00	0.39	Aceptar H0	

TAVG(desc3.WaitingTime)	3.60	3.40	2.26	3.00	0.40	Aceptar H0
TAVG(desc30.WaitingTime)	3.94	4.25	2.26	3.00	0.50	Aceptar H0
TAVG(desc31.WaitingTime)	0.31	0.70	2.26	3.00	-8.63	Aceptar H0
TAVG(desc32.WaitingTime)	5.02	4.02	2.26	3.00	1.14	Aceptar H0
TAVG(desc33.WaitingTime)	5.02	3.86	2.26	3.00	1.18	Aceptar H0
TAVG(desc34.WaitingTime)	7.07	3.61	2.26	3.00	2.55	Rechazar H0
TAVG(desc35.WaitingTime)	5.07	5.07	2.26	3.00	0.92	Aceptar H0
TAVG(desc36.WaitingTime)	7.20	5.11	2.26	3.00	1.86	Aceptar H0
TAVG(desc37.WaitingTime)	3.88	3.50	2.26	3.00	0.57	Aceptar H0
TAVG(desc38.WaitingTime)	4.71	3.22	2.26	3.00	1.21	Aceptar H0
TAVG(desc39.WaitingTime)	3.63	3.56	2.26	3.00	0.40	Aceptar H0
TAVG(desc4.WaitingTime)	8.71	3.72	2.26	3.00	3.47	Rechazar H0
TAVG(desc40.WaitingTime)	4.36	3.94	2.26	3.00	0.78	Aceptar H0
TAVG(desc41.WaitingTime)	1.68	2.25	2.26	3.00	-1.32	Aceptar H0
TAVG(desc42.WaitingTime)	6.72	3.17	2.26	3.00	2.65	Rechazar H0
TAVG(desc43.WaitingTime)	4.42	3.41	2.26	3.00	0.94	Aceptar H0
TAVG(desc44.WaitingTime)	7.16	3.84	2.26	3.00	2.45	Rechazar H0
TAVG(desc45.WaitingTime)	2.45	2.94	2.26	3.00	-0.43	Aceptar H0
TAVG(desc46.WaitingTime)	2.93	3.09	2.26	3.00	-0.05	Aceptar H0
TAVG(desc47.WaitingTime)	2.41	3.54	2.26	3.00	-0.38	Aceptar H0
TAVG(desc48.WaitingTime)	3.53	2.50	2.26	3.00	0.48	Aceptar H0
TAVG(desc49.WaitingTime)	1.00	1.36	2.26	3.00	-3.31	Aceptar H0
TAVG(desc5.WaitingTime)	3.27	2.89	2.26	3.00	0.21	Aceptar H0
TAVG(desc50.WaitingTime)	4.51	3.20	2.26	3.00	1.07	Aceptar H0
TAVG(desc51.WaitingTime)	3.35	3.51	2.26	3.00	0.22	Aceptar H0
TAVG(desc52.WaitingTime)	5.06	3.31	2.26	3.00	1.41	Aceptar H0
TAVG(desc53.WaitingTime)	2.54	2.81	2.26	3.00	-0.37	Aceptar H0

	TAVG(desc54.WaitingTime)	5.36	3.34	2.26	3.00	1.59	Aceptar H0
	TAVG(desc55.WaitingTime)	1.73	2.09	2.26	3.00	-1.38	Aceptar H0
	TAVG(desc56.WaitingTime)	2.57	3.96	2.26	3.00	-0.25	Aceptar H0
	TAVG(desc6.WaitingTime)	6.02	3.46	2.26	3.00	1.98	Aceptar H0
	TAVG(desc7.WaitingTime)	2.18	2.48	2.26	3.00	-0.75	Aceptar H0
	TAVG(desc8.WaitingTime)	6.31	3.21	2.26	3.00	2.33	Rechazar H0
	TAVG(desc9.WaitingTime)	2.48	2.59	2.26	3.00	-0.45	Aceptar H0
Siberia – Espera tractorista	TAVG(col tractorista carga 1.WaitingTime)	0.75	1.19	2.26	0.00	1.44	Aceptar H0
	TAVG(col tractorista carga 10.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 11.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 12.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 13.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 14.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 15.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 16.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 17.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 18.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 19.WaitingTime)	0.09	0.20	2.26	0.00	1.00	Aceptar H0
	TAVG(col tractorista carga 2.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 20.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 21.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 22.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 23.WaitingTime)	1.02	1.40	2.26	0.00	1.65	Aceptar H0
	TAVG(col tractorista carga 24.WaitingTime)	0.35	0.56	2.26	0.00	1.41	Aceptar H0
	TAVG(col tractorista carga 25.WaitingTime)	0.43	0.96	2.26	0.00	1.00	Aceptar H0
	TAVG(col tractorista carga 26.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
TAVG(col tractorista carga 27.WaitingTime)	0.26	0.58	2.26	0.00	1.00	Aceptar H0	

	TAVG(col tractorista carga 28.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 3.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 4.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 5.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 6.WaitingTime)	0.04	0.09	2.26	0.00	1.00	Aceptar H0
	TAVG(col tractorista carga 7.WaitingTime)	0.16	0.31	2.26	0.00	1.16	Aceptar H0
	TAVG(col tractorista carga 8.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
	TAVG(col tractorista carga 9.WaitingTime)	0.00	0.00	2.26	0.00	0.00	Aceptar H0
Tiempo máximo de descarga	MaxDes1	27.31	5.39	2.26	26.00	0.55	Aceptar H0
	MaxDes10	20.46	3.69	2.26	26.00	-3.40	Aceptar H0
	MaxDes11	20.41	3.42	2.26	26.00	-3.69	Aceptar H0
	MaxDes12	15.80	4.12	2.26	26.00	-5.61	Aceptar H0
	MaxDes13	15.68	2.76	2.26	26.00	-8.45	Aceptar H0
	MaxDes14	13.30	3.65	2.26	26.00	-7.87	Aceptar H0
	MaxDes15	15.12	5.27	2.26	26.00	-4.67	Aceptar H0
	MaxDes16	15.02	4.12	2.26	26.00	-6.03	Aceptar H0
	MaxDes17	18.72	3.10	2.26	26.00	-5.31	Aceptar H0
	MaxDes18	20.30	5.48	2.26	26.00	-2.35	Aceptar H0
	MaxDes19	17.31	4.21	2.26	26.00	-4.66	Aceptar H0
	MaxDes2	25.70	4.77	2.26	26.00	-0.14	Aceptar H0
	MaxDes20	17.20	4.66	2.26	26.00	-4.27	Aceptar H0
	MaxDes21	23.61	4.34	2.26	26.00	-1.25	Aceptar H0
	MaxDes22	23.94	3.77	2.26	26.00	-1.24	Aceptar H0
	MaxDes23	24.37	5.03	2.26	26.00	-0.73	Aceptar H0
	MaxDes24	21.52	3.72	2.26	26.00	-2.73	Aceptar H0
	MaxDes25	21.14	3.05	2.26	26.00	-3.61	Aceptar H0
MaxDes26	22.02	4.08	2.26	26.00	-2.20	Aceptar H0	

	MaxDes27	24.72	2.93	2.26	26.00	-0.99	Aceptar H0
	MaxDes28	20.74	3.77	2.26	26.00	-3.16	Aceptar H0
	MaxDes3	21.13	4.13	2.26	26.00	-2.67	Aceptar H0
	MaxDes4	22.65	4.09	2.26	26.00	-1.86	Aceptar H0
	MaxDes5	23.11	3.35	2.26	26.00	-1.95	Aceptar H0
	MaxDes6	26.51	4.80	2.26	26.00	0.24	Aceptar H0
	MaxDes7	24.49	3.94	2.26	26.00	-0.86	Aceptar H0
	MaxDes8	21.07	3.51	2.26	26.00	-3.17	Aceptar H0
	MaxDes9	22.71	4.26	2.26	26.00	-1.75	Aceptar H0
Tiempo mínimo de descarga	Descarga1	14.27	3.89	2.26	12.00	1.32	Aceptar H0
	Descarga10	9.72	2.59	2.26	12.00	-2.00	Aceptar H0
	Descarga11	11.22	3.95	2.26	12.00	-0.45	Aceptar H0
	Descarga12	9.83	4.14	2.26	12.00	-1.19	Aceptar H0
	Descarga13	8.94	2.45	2.26	12.00	-2.82	Aceptar H0
	Descarga14	8.58	2.83	2.26	12.00	-2.73	Aceptar H0
	Descarga15	8.58	2.96	2.26	12.00	-2.61	Aceptar H0
	Descarga16	6.43	1.29	2.26	12.00	-9.76	Aceptar H0
	Descarga17	10.35	3.31	2.26	12.00	-1.13	Aceptar H0
	Descarga18	11.43	5.03	2.26	12.00	-0.26	Aceptar H0
	Descarga19	9.29	2.60	2.26	12.00	-2.36	Aceptar H0
	Descarga2	13.20	3.53	2.26	12.00	0.77	Aceptar H0
	Descarga20	10.93	3.75	2.26	12.00	-0.65	Aceptar H0
	Descarga21	10.20	2.76	2.26	12.00	-1.48	Aceptar H0
	Descarga22	13.14	3.05	2.26	12.00	0.85	Aceptar H0
	Descarga23	11.17	2.97	2.26	12.00	-0.63	Aceptar H0
	Descarga24	11.59	3.93	2.26	12.00	-0.24	Aceptar H0
Descarga25	9.90	2.06	2.26	12.00	-2.31	Aceptar H0	

	Descarga26	12.18	3.24	2.26	12.00	0.12	Aceptar H0
	Descarga27	12.99	3.08	2.26	12.00	0.72	Aceptar H0
	Descarga28	10.48	1.92	2.26	12.00	-1.79	Aceptar H0
	Descarga3	11.21	2.64	2.26	12.00	-0.68	Aceptar H0
	Descarga4	11.69	2.63	2.26	12.00	-0.27	Aceptar H0
	Descarga5	12.09	2.83	2.26	12.00	0.07	Aceptar H0
	Descarga6	13.75	2.93	2.26	12.00	1.35	Aceptar H0
	Descarga7	12.56	3.29	2.26	12.00	0.38	Aceptar H0
	Descarga8	13.51	3.34	2.26	12.00	1.02	Aceptar H0
	Descarga9	12.68	3.52	2.26	12.00	0.44	Aceptar H0
Descarga – Espera por tractor	TAVG(t1.WaitingTime)+TAVG(desca1.WaitingTi	2.60	1.29	2.26	3.00	-0.70	Aceptar H0
	TAVG(t10.WaitingTime)+TAVG(desca5.Waiting	2.78	0.97	2.26	3.00	-0.52	Aceptar H0
	TAVG(t11.WaitingTime)+TAVG(desca6.Waiting	2.16	0.81	2.26	3.00	-2.33	Aceptar H0
	TAVG(t12.WaitingTime)+TAVG(desca6.Waiting	3.94	1.42	2.26	3.00	1.49	Aceptar H0
	TAVG(t13.WaitingTime)+TAVG(desca7.Waiting	2.70	0.91	2.26	3.00	-0.74	Aceptar H0
	TAVG(t14.WaitingTime)+TAVG(desca7.Waiting	2.86	1.33	2.26	3.00	-0.23	Aceptar H0
	TAVG(t15.WaitingTime)+TAVG(desca8.Waiting	2.10	0.00	2.26	3.00	0.00	Aceptar H0
	TAVG(t16.WaitingTime)+TAVG(desca8.Waiting	2.68	0.65	2.26	3.00	-1.10	Aceptar H0
	TAVG(t17.WaitingTime)+TAVG(desca9.Waiting	1.88	0.64	2.26	3.00	-3.98	Aceptar H0
	TAVG(t18.WaitingTime)+TAVG(desca9.Waiting	1.78	0.93	2.26	3.00	-2.97	Aceptar H0
	TAVG(t19.WaitingTime)+TAVG(desca10.Waiting	1.38	0.52	2.26	3.00	-7.04	Aceptar H0
	TAVG(t2.WaitingTime)+TAVG(desca1.WaitingTi	4.04	1.13	2.26	3.00	2.09	Aceptar H0
	TAVG(t20.WaitingTime)+TAVG(desca10.Waiting	1.55	0.86	2.26	3.00	-3.84	Aceptar H0
	TAVG(t21.WaitingTime)+TAVG(desca11.Waiting	1.02	0.50	2.26	3.00	-8.90	Aceptar H0
	TAVG(t22.WaitingTime)+TAVG(desca11.Waiting	0.96	0.55	2.26	3.00	-8.46	Aceptar H0
	TAVG(t23.WaitingTime)+TAVG(desca12.Waiting	1.15	0.52	2.26	3.00	-8.08	Aceptar H0
TAVG(t24.WaitingTime)+TAVG(desca12.Waiting	0.84	0.62	2.26	3.00	-7.92	Aceptar H0	

TAVG(t25.WaitingTime)+TAVG(desca13.Waiting	1.04	0.35	2.26	3.00	-12.58	Aceptar H0
TAVG(t26.WaitingTime)+TAVG(desca13.Waiting	0.42	0.26	2.26	3.00	-22.48	Aceptar H0
TAVG(t27.WaitingTime)+TAVG(desca14.Waiting	0.62	0.38	2.26	3.00	-14.05	Aceptar H0
TAVG(t28.WaitingTime)+TAVG(desca14.Waiting	0.50	0.33	2.26	3.00	-17.19	Aceptar H0
TAVG(t29.WaitingTime)+TAVG(desca15.Waiting	0.93	0.23	2.26	3.00	-19.90	Aceptar H0
TAVG(t3.WaitingTime)+TAVG(desca2.WaitingTi	1.95	0.96	2.26	3.00	-2.47	Aceptar H0
TAVG(t30.WaitingTime)+TAVG(desca15.Waiting	0.97	0.64	2.26	3.00	-7.13	Aceptar H0
TAVG(t31.WaitingTime)+TAVG(desca16.Waiting	0.62	0.38	2.26	3.00	-14.05	Aceptar H0
TAVG(t32.WaitingTime)+TAVG(desca16.Waiting	0.63	0.28	2.26	3.00	-19.08	Aceptar H0
TAVG(t33.WaitingTime)+TAVG(desca17.Waiting	1.18	0.30	2.26	3.00	-13.97	Aceptar H0
TAVG(t34.WaitingTime)+TAVG(desca17.Waiting	0.75	0.52	2.26	3.00	-9.83	Aceptar H0
TAVG(t35.WaitingTime)+TAVG(desca18.Waiting	1.07	0.53	2.26	3.00	-8.32	Aceptar H0
TAVG(t36.WaitingTime)+TAVG(desca18.Waiting	1.70	0.75	2.26	3.00	-3.94	Aceptar H0
TAVG(t37.WaitingTime)+TAVG(desca19.Waiting	1.57	0.39	2.26	3.00	-8.25	Aceptar H0
TAVG(t38.WaitingTime)+TAVG(desca19.Waiting	1.72	0.94	2.26	3.00	-3.10	Aceptar H0
TAVG(t39.WaitingTime)+TAVG(desca20.Waiting	1.69	0.42	2.26	3.00	-7.02	Aceptar H0
TAVG(t4.WaitingTime)+TAVG(desca2.WaitingTi	1.98	1.16	2.26	3.00	-1.97	Aceptar H0
TAVG(t40.WaitingTime)+TAVG(desca20.Waiting	1.51	0.98	2.26	3.00	-3.46	Aceptar H0
TAVG(t41.WaitingTime)+TAVG(desca21.Waiting	1.40	0.86	2.26	3.00	-4.18	Aceptar H0
TAVG(t42.WaitingTime)+TAVG(desca21.Waiting	1.81	0.71	2.26	3.00	-3.79	Aceptar H0
TAVG(t43.WaitingTime)+TAVG(desca22.Waiting	1.82	0.90	2.26	3.00	-2.98	Aceptar H0
TAVG(t44.WaitingTime)+TAVG(desca22.Waiting	2.49	0.96	2.26	3.00	-1.20	Aceptar H0
TAVG(t45.WaitingTime)+TAVG(desca23.Waiting	2.88	0.84	2.26	3.00	-0.34	Aceptar H0
TAVG(t46.WaitingTime)+TAVG(desca23.Waiting	4.32	1.65	2.26	3.00	1.80	Aceptar H0
TAVG(t47.WaitingTime)+TAVG(desca24.Waiting	2.31	0.92	2.26	3.00	-1.71	Aceptar H0
TAVG(t48.WaitingTime)+TAVG(desca24.Waiting	3.20	1.14	2.26	3.00	0.39	Aceptar H0
TAVG(t49.WaitingTime)+TAVG(desca25.Waiting	2.19	0.99	2.26	3.00	-1.85	Aceptar H0

TAVG(t5.WaitingTime)+TAVG(desca3.WaitingTi	1.43	0.71	2.26	3.00	-5.01	Aceptar H0
TAVG(t50.WaitingTime)+TAVG(desca25.Waiting	2.58	1.00	2.26	3.00	-0.95	Aceptar H0
TAVG(t51.WaitingTime)+TAVG(desca26.Waiting	2.06	0.78	2.26	3.00	-2.72	Aceptar H0
TAVG(t52.WaitingTime)+TAVG(desca26.Waiting	2.30	0.99	2.26	3.00	-1.60	Aceptar H0
TAVG(t53.WaitingTime)+TAVG(desca27.Waiting	1.95	0.96	2.26	3.00	-2.47	Aceptar H0
TAVG(t54.WaitingTime)+TAVG(desca27.Waiting	3.54	1.20	2.26	3.00	1.02	Aceptar H0
TAVG(t55.WaitingTime)+TAVG(desca28.Waiting	2.78	0.00	2.26	3.00	-496.61	Aceptar H0
TAVG(t56.WaitingTime)+TAVG(desca28.Waiting	2.93	0.81	2.26	3.00	-0.20	Aceptar H0
TAVG(t6.WaitingTime)+TAVG(desca3.WaitingTi	1.86	0.70	2.26	3.00	-3.70	Aceptar H0
TAVG(t7.WaitingTime)+TAVG(desca4.WaitingTi	2.48	1.42	2.26	3.00	-0.83	Aceptar H0
TAVG(t8.WaitingTime)+TAVG(desca4.WaitingTi	1.82	1.01	2.26	3.00	-2.63	Aceptar H0
TAVG(t9.WaitingTime)+TAVG(desca5.WaitingTi	2.61	0.20	2.26	3.00	-4.33	Aceptar H0
TAVG(tsisystemacarga)	7.01	0.32	2.26	7.00	0.07	Aceptar H0

Anexo 13. Validación del número de réplicas

En la tabla A13.1 se muestra el reporte Siman de una simulación con 61 réplicas. Y en la tabla A13.2 se determina si es necesario realizar más réplicas para tener el nivel de precisión del 30%.

Tabla A13.1 Reporte Siman – 61 réplicas

Identifier	Average	Half-width	Min	Max
Descarga1	758.89	70.734	436.67	1353.7
Descarga10	635.78	70.543	284.93	1291.1
Descarga11	605.92	74.366	0	1309.8
Descarga12	597.96	69.401	241.32	1283.9
Descarga13	501.47	66.333	0	1189.8
Descarga14	561.11	64.101	216.84	1110.9
Descarga15	521.95	64.495	0	1226.5
Descarga16	509.41	64.32	213.19	1184.2
Descarga17	546.43	64.636	0	1230.9
Descarga18	613.63	71.898	284.19	1568
Descarga19	645.11	73.431	247.01	1284.5
Descarga2	724.62	73.308	0	1404.8
Descarga20	700.19	70.349	374.06	1304.6
Descarga21	701.34	67.539	381.34	1462.7
Descarga22	728.71	67.059	405.81	1473.4
Descarga23	772.8	81.39	0	1569.4
Descarga24	671.56	55.776	430.06	1531.7
Descarga25	668.31	64.297	377.19	1438.2
Descarga26	698.95	61.49	409.21	1312.8
Descarga27	715.04	68.761	425.61	1415.2
Descarga28	711.56	57.67	421.46	1293.3
Descarga3	668.77	72.904	346.07	1387.5
Descarga4	716.46	62.993	411.08	1611.5
Descarga5	732.5	72.44	417.83	1543.7
Descarga6	730.07	64.387	416.81	1288.4
Descarga7	740.39	64.254	453.7	1335
Descarga8	700.83	69.414	376.01	1307.9
Descarga9	659.55	71.591	0	1354.5
MaxDes1	1414.3	88.317	700.75	2562.4
MaxDes10	1139.5	83.308	555.89	1851.9
MaxDes11	1028.6	86.8	0	1806.8
MaxDes12	988.66	80.652	407.14	1574.2
MaxDes13	922.55	88.131	0	1717.3
MaxDes14	911.63	87.968	303.3	1547.8

MaxDes15	875.09	87.126	0	1759.2
MaxDes16	893.68	80.882	353.73	1445.5
MaxDes17	952.12	82.883	0	1586
MaxDes18	1077.5	90.684	473.72	1974.2
MaxDes19	1075.5	81.842	503.43	1747.8
MaxDes2	1442	95.905	0	2134.5
MaxDes20	1132.3	81.91	469.81	2072.7
MaxDes21	1336.8	82.262	685.54	2079
MaxDes22	1367.6	84.917	596.64	2027.9
MaxDes23	1475.6	106.55	0	2354.9
MaxDes24	1327.7	86.227	666.41	2030.6
MaxDes25	1349.4	100.87	779.55	2298
MaxDes26	1344.2	85.515	635.73	2242.5
MaxDes27	1411.6	85.144	843.21	2428.4
MaxDes28	1374	88.44	712.91	2165.7
MaxDes3	1199.3	89.885	464.18	1909.6
MaxDes4	1362.3	79.366	634.98	2084.3
MaxDes5	1384.5	78.716	786.98	2216.4
MaxDes6	1436.7	86.534	845.82	2457.8
MaxDes7	1407.9	86.574	532.93	1954.3
MaxDes8	1207.2	92.121	412.71	2207.3
MaxDes9	1194.4	90.843	0	1964.1
operador.NumberSeized	417.78	7.2057	209	437
operador.ScheduledUtilization	0.03	6.06E-04	0.01556	0.03435
seleccionador1.NumberSeized	110.13	2.8594	80	129
seleccionador1.ScheduledUtilization	0.18343	0.00581	0.0724	0.22249
seleccionador10.NumberSeized	78.491	2.4709	58	96
seleccionador10.ScheduledUtilization	0.04553	0.00143	0.03226	0.05583
seleccionador11.NumberSeized	80.245	2.3274	58	103
seleccionador11.ScheduledUtilization	0.04631	0.00134	0.03252	0.05699
seleccionador12.NumberSeized	79.377	2.2104	60	102
seleccionador12.ScheduledUtilization	0.04623	0.0013	0.03432	0.06045
seleccionador13.NumberSeized	78.442	2.5703	58	98
seleccionador13.ScheduledUtilization	0.04545	0.00154	0.03373	0.05815
seleccionador14.NumberSeized	79.557	2.3212	60	103
seleccionador14.ScheduledUtilization	0.0461	0.00138	0.03498	0.0621
seleccionador15.NumberSeized	78.491	2.453	58	96
seleccionador15.ScheduledUtilization	0.04563	0.00149	0.03271	0.05642
seleccionador16.NumberSeized	77.967	2.5039	58	105
seleccionador16.ScheduledUtilization	0.04516	0.00152	0.03283	0.06175
seleccionador17.NumberSeized	79.163	2.781	58	104
seleccionador17.ScheduledUtilization	0.0458	0.00164	0.03321	0.0589
seleccionador18.NumberSeized	80.262	2.6491	58	103
seleccionador18.ScheduledUtilization	0.04644	0.00166	0.03311	0.05999
seleccionador19.NumberSeized	78.836	2.7502	58	103

seleccionador19.ScheduledUtilization	0.04576	0.00163	0.03276	0.06141
seleccionador2.NumberSeized	94.737	2.9537	71	125
seleccionador2.ScheduledUtilization	0.11698	0.00429	0.0575	0.15112
seleccionador20.NumberSeized	77.131	2.3603	58	96
seleccionador20.ScheduledUtilization	0.04456	0.0015	0.0321	0.05573
seleccionador21.NumberSeized	81.885	2.6199	59	102
seleccionador21.ScheduledUtilization	0.04761	0.00155	0.03279	0.05976
seleccionador22.NumberSeized	79.065	2.0598	59	98
seleccionador22.ScheduledUtilization	0.04585	0.00123	0.03392	0.05835
seleccionador23.NumberSeized	79.081	2.9033	58	106
seleccionador23.ScheduledUtilization	0.04568	0.0017	0.03193	0.06132
seleccionador24.NumberSeized	77.803	2.5969	58	99
seleccionador24.ScheduledUtilization	0.04496	0.00154	0.03379	0.05807
seleccionador25.NumberSeized	79.278	2.5062	59	100
seleccionador25.ScheduledUtilization	0.04595	0.00146	0.03407	0.05718
seleccionador26.NumberSeized	78.704	2.4744	58	97
seleccionador26.ScheduledUtilization	0.04547	0.00147	0.03305	0.05692
seleccionador27.NumberSeized	78.278	2.2431	59	92
seleccionador27.ScheduledUtilization	0.04534	0.00134	0.03381	0.05408
seleccionador28.NumberSeized	77.934	2.484	58	97
seleccionador28.ScheduledUtilization	0.04526	0.00151	0.03202	0.05864
seleccionador3.NumberSeized	85.918	2.8847	64	114
seleccionador3.ScheduledUtilization	0.07708	0.00351	0.03887	0.10874
seleccionador4.NumberSeized	79.311	2.5331	61	103
seleccionador4.ScheduledUtilization	0.05284	0.00233	0.03537	0.07703
seleccionador5.NumberSeized	80.311	2.513	58	104
seleccionador5.ScheduledUtilization	0.0484	0.00183	0.0318	0.06524
seleccionador6.NumberSeized	77.229	2.8965	58	106
seleccionador6.ScheduledUtilization	0.04511	0.00181	0.03396	0.06286
seleccionador7.NumberSeized	79.836	2.4492	59	98
seleccionador7.ScheduledUtilization	0.04659	0.00152	0.03474	0.05745
seleccionador8.NumberSeized	78.032	2.3652	58	100
seleccionador8.ScheduledUtilization	0.04503	0.00138	0.03208	0.05958
seleccionador9.NumberSeized	78	2.6666	58	97
seleccionador9.ScheduledUtilization	0.04493	0.0016	0.03211	0.05754
TAVG(col tractorista carga1.WaitingTime)	15.417	14.747	0	286.43
TAVG(col tractorista carga10.WaitingTime)	1.7483	3.3786	0	102.52
TAVG(col tractorista carga11.WaitingTime)	3.9295	5.9662	0	167.07
TAVG(col tractorista carga12.WaitingTime)	1.0929	2.1968	0	66.67
TAVG(col tractorista carga13.WaitingTime)	0	0	0	0
TAVG(col tractorista carga14.WaitingTime)	3.4893	7.0135	0	212.84

TAVG(colatractoristacarga15.WaitingTime)	0	0	0	0
TAVG(colatractoristacarga16.WaitingTime)	0.4701	0.94489	0	28.675
TAVG(colatractoristacarga17.WaitingTime)	0	0	0	0
TAVG(colatractoristacarga18.WaitingTime)	0	0	0	0
TAVG(colatractoristacarga19.WaitingTime)	1.076	1.8076	0	53.754
TAVG(colatractoristacarga2.WaitingTime)	31.195	43.329	0	1281.8
TAVG(colatractoristacarga20.WaitingTime)	16.32	19.655	0	538.64
TAVG(colatractoristacarga21.WaitingTime)	8.0131	14.057	0	422.55
TAVG(colatractoristacarga22.WaitingTime)	11.198	12.224	0	228.68
TAVG(colatractoristacarga23.WaitingTime)	31.881	21.639	0	306.95
TAVG(colatractoristacarga24.WaitingTime)	17.005	15.017	0	296.69
TAVG(colatractoristacarga25.WaitingTime)	13.024	13.723	0	290.21
TAVG(colatractoristacarga26.WaitingTime)	8.7163	11.192	0	303.43
TAVG(colatractoristacarga27.WaitingTime)	22.86	20.943	0	418.05
TAVG(colatractoristacarga28.WaitingTime)	12.861	13.729	0	270.87
TAVG(colatractoristacarga3.WaitingTime)	0.33607	0.67549	0	20.5
TAVG(colatractoristacarga4.WaitingTime)	5.2013	7.2626	0	201.86
TAVG(colatractoristacarga5.WaitingTime)	19.824	14.38	0	239.78
TAVG(colatractoristacarga6.WaitingTime)	21.179	17.374	0	308.85
TAVG(colatractoristacarga7.WaitingTime)	10.94	13.462	0	305.38
TAVG(colatractoristacarga8.WaitingTime)	13.698	20.37	0	572.65
TAVG(colatractoristacarga9.WaitingTime)	0	0	0	0
TAVG(desc1.WaitingTime)	216.29	68.556	0	765.4
TAVG(desc10.WaitingTime)	300.63	74.041	0	1070.1
TAVG(desc11.WaitingTime)	177.58	65.408	0	768.89
TAVG(desc12.WaitingTime)	280.48	69.72	0	972.34
TAVG(desc13.WaitingTime)	173.93	59.99	0	795.02
TAVG(desc14.WaitingTime)	303.23	77.457	0	944.75
TAVG(desc15.WaitingTime)	259.04	73.966	0	914.47
TAVG(desc16.WaitingTime)	299.38	77.075	0	951.48
TAVG(desc17.WaitingTime)	223.79	66.327	0	815.09
TAVG(desc18.WaitingTime)	334.39	78.642	0	1112.7
TAVG(desc19.WaitingTime)	218.54	67.855	0	874.94
TAVG(desc2.WaitingTime)	289.32	73.783	0	953.68
TAVG(desc20.WaitingTime)	327.24	76.883	0	852.91

TAVG(desc21.WaitingTime)	213.39	70.367	0	946.97
TAVG(desc22.WaitingTime)	322.62	80.42	0	1040.3
TAVG(desc23.WaitingTime)	231.04	68.699	0	934.85
TAVG(desc24.WaitingTime)	361.26	74.484	0	938.66
TAVG(desc25.WaitingTime)	181.51	65.934	0	872.18
TAVG(desc26.WaitingTime)	336.86	76.853	0	1087.2
TAVG(desc27.WaitingTime)	217.53	63.624	0	769.49
TAVG(desc28.WaitingTime)	328.94	81.058	0	867.07
TAVG(desc29.WaitingTime)	198.64	64.922	0	931.92
TAVG(desc3.WaitingTime)	161.37	63.702	0	788.74
TAVG(desc30.WaitingTime)	267.21	71.932	0	959.83
TAVG(desc31.WaitingTime)	173.33	64.295	0	850.23
TAVG(desc32.WaitingTime)	300.67	76.583	0	901.05
TAVG(desc33.WaitingTime)	212.61	65.4	0	927.23
TAVG(desc34.WaitingTime)	315.32	72.666	0	872.26
TAVG(desc35.WaitingTime)	220.65	71.924	0	1160.4
TAVG(desc36.WaitingTime)	321.14	80.948	0	1164.9
TAVG(desc37.WaitingTime)	263.88	76.833	0	1055.2
TAVG(desc38.WaitingTime)	313.27	72.792	0	912.16
TAVG(desc39.WaitingTime)	233.81	69.801	0	894.21
TAVG(desc4.WaitingTime)	363.02	74.34	0	904.92
TAVG(desc40.WaitingTime)	310.02	77.439	0	1042.7
TAVG(desc41.WaitingTime)	190.6	62.388	0	907.15
TAVG(desc42.WaitingTime)	337.07	72.207	0	928.41
TAVG(desc43.WaitingTime)	203.9	63.002	0	810.21
TAVG(desc44.WaitingTime)	325.96	76.633	0	1027.1
TAVG(desc45.WaitingTime)	222.85	76.716	0	947.27
TAVG(desc46.WaitingTime)	285.81	77.758	0	876.83
TAVG(desc47.WaitingTime)	117.73	54.986	0	924.89
TAVG(desc48.WaitingTime)	219.18	62.453	0	921.66
TAVG(desc49.WaitingTime)	181.27	63.982	0	759.89
TAVG(desc5.WaitingTime)	203.06	71.973	0	797.17
TAVG(desc50.WaitingTime)	307.51	67.661	0	820.09
TAVG(desc51.WaitingTime)	156.13	58.219	0	850.34
TAVG(desc52.WaitingTime)	308.86	69.311	0	956.8
TAVG(desc53.WaitingTime)	160.11	65.81	0	961.39
TAVG(desc54.WaitingTime)	276.14	70.722	0	856.76
TAVG(desc55.WaitingTime)	153.25	57.718	0	692.3
TAVG(desc56.WaitingTime)	214.33	69.35	0	933.27
TAVG(desc6.WaitingTime)	330.4	71.559	0	870.91
TAVG(desc7.WaitingTime)	175.56	62.561	0	839.13
TAVG(desc8.WaitingTime)	291.82	69.635	0	887.87
TAVG(desc9.WaitingTime)	191.34	66.052	0	828.54
TAVG(t1.WaitingTime)+TAVG(desca1.W aitingTi	151.69	17.342	0	390.59

TAVG(t10.WaitingTime)+TAVG(desca5.WaitingT	178.15	23.143	0	396.81
TAVG(t11.WaitingTime)+TAVG(desca6.WaitingT	142.46	16.619	0	324.81
TAVG(t12.WaitingTime)+TAVG(desca6.WaitingT	200.09	24.597	41.016	430.02
TAVG(t13.WaitingTime)+TAVG(desca7.WaitingT	145.89	17.189	0	324.51
TAVG(t14.WaitingTime)+TAVG(desca7.WaitingT	179.46	23.271	0	422.11
TAVG(t15.WaitingTime)+TAVG(desca8.WaitingT	117.27	11.306	0	264.98
TAVG(t16.WaitingTime)+TAVG(desca8.WaitingT	135.69	20.356	0	398.94
TAVG(t17.WaitingTime)+TAVG(desca9.WaitingT	99.952	10.742	0	226
TAVG(t18.WaitingTime)+TAVG(desca9.WaitingT	109.86	17.288	0	289.65
TAVG(t19.WaitingTime)+TAVG(desca10.Waiting	96.7	11.759	0	207.66
TAVG(t2.WaitingTime)+TAVG(desca1.WaitingTi	194.34	25.039	0	454.54
TAVG(t20.WaitingTime)+TAVG(desca10.Waiting	101.41	15.091	0	226.1
TAVG(t21.WaitingTime)+TAVG(desca11.Waiting	78.381	10.39	0	175.32
TAVG(t22.WaitingTime)+TAVG(desca11.Waiting	73.675	13.941	0	238.33
TAVG(t23.WaitingTime)+TAVG(desca12.Waiting	70.972	7.701	0	154.12
TAVG(t24.WaitingTime)+TAVG(desca12.Waiting	47.872	11.476	0	198.44
TAVG(t25.WaitingTime)+TAVG(desca13.Waiting	45.939	7.695	0	125.43
TAVG(t26.WaitingTime)+TAVG(desca13.Waiting	27.464	6.708	0	102.87
TAVG(t27.WaitingTime)+TAVG(desca14.Waiting	54.425	6.9329	0	125.55
TAVG(t28.WaitingTime)+TAVG(desca14.Waiting	37.721	9.4403	0	127.13
TAVG(t29.WaitingTime)+TAVG(desca15.Waiting	53.052	6.4336	0	124.75
TAVG(t3.WaitingTime)+TAVG(desca2.WaitingTi	108.13	21.234	0	245.93
TAVG(t30.WaitingTime)+TAVG(desca15.Waiting	43.245	9.6483	0	193.72
TAVG(t31.WaitingTime)+TAVG(desca16.Waiting	48.104	6.728	0	62.804
TAVG(t32.WaitingTime)+TAVG(desca16.Waiting	38.136	8.0416	0	109.99
TAVG(t33.WaitingTime)+TAVG(desca17.Waiting	71.946	7.6374	0	157

TAVG(t34.WaitingTime)+TAVG(desca17.Waiting	47.324	10.273	0	147.14
TAVG(t35.WaitingTime)+TAVG(desca18.Waiting	75.915	10.681	0	183.13
TAVG(t36.WaitingTime)+TAVG(desca18.Waiting	80.368	16.483	0	299.36
TAVG(t37.WaitingTime)+TAVG(desca19.Waiting	101.82	8.6543	0	209.86
TAVG(t38.WaitingTime)+TAVG(desca19.Waiting	108.42	16.126	0	273.44
TAVG(t39.WaitingTime)+TAVG(desca20.Waiting	98.657	11.175	0	182.14
TAVG(t4.WaitingTime)+TAVG(desca2.WaitingTi	150.05	27.664	0	464.34
TAVG(t40.WaitingTime)+TAVG(desca20.Waiting	99.482	17.756	0	296.93
TAVG(t41.WaitingTime)+TAVG(desca21.Waiting	116.44	15.846	0	281
TAVG(t42.WaitingTime)+TAVG(desca21.Waiting	146.75	21.276	0	414.86
TAVG(t43.WaitingTime)+TAVG(desca22.Waiting	129.04	15.907	0	232.56
TAVG(t44.WaitingTime)+TAVG(desca22.Waiting	157.86	22.077	0	335.92
TAVG(t45.WaitingTime)+TAVG(desca23.Waiting	166.98	19.274	0	402.61
TAVG(t46.WaitingTime)+TAVG(desca23.Waiting	215.64	26.882	0	535.99
TAVG(t47.WaitingTime)+TAVG(desca24.Waiting	144.17	16.847	0	326
TAVG(t48.WaitingTime)+TAVG(desca24.Waiting	183.99	27.443	0	448.83
TAVG(t49.WaitingTime)+TAVG(desca25.Waiting	111.36	18.029	0	292.42
TAVG(t5.WaitingTime)+TAVG(desca3.WaitingTi	100.06	14.728	0	246.09
TAVG(t50.WaitingTime)+TAVG(desca25.Waiting	174.5	24.846	0	473.73
TAVG(t51.WaitingTime)+TAVG(desca26.Waiting	132.45	17.884	0	310
TAVG(t52.WaitingTime)+TAVG(desca26.Waiting	153.92	23.195	0	379.74
TAVG(t53.WaitingTime)+TAVG(desca27.Waiting	137.76	20.72	0	373.41
TAVG(t54.WaitingTime)+TAVG(desca27.Waiting	192.97	27.385	0	486.68
TAVG(t55.WaitingTime)+TAVG(desca28.Waiting	167.24	18.589	0	483.75
TAVG(t56.WaitingTime)+TAVG(desca28.Waiting	205.44	25.211	37.914	509.02
TAVG(t6.WaitingTime)+TAVG(desca3.WaitingTi	114.94	17.272	0	271.06

TAVG(t7.WaitingTime)+TAVG(desca4.WaitingTi)	149.34	18.294	0	326
TAVG(t8.WaitingTime)+TAVG(desca4.WaitingTi)	160.84	23.444	0	358.72
TAVG(t9.WaitingTime)+TAVG(desca5.WaitingTi)	146.03	14.641	0	269.56
TAVG(tsistemacarga)	406.8	14.694	0	452.94



Tabla A13.2 Análisis de resultados - 61 réplicas

Descripción	Promedio (min)	Half width (min)	$t_{0.975,9}$	c (min)	T_0	n	Precisión (h/prom)	h^*	n^*	Comentario
Descarga - Espera carreta	4.20	1.17	2.26	3	2.32	61	28%	-	-	Nivel de precisión óptimo.
Siberia - Espera tractor	0.16	0.18	2.26	0	2.08	61	109%	-	-	No se halla h^* ya que estos tiempos son muy pequeños y no afectan al resultado.
Descarga- Espera tractor	1.97	0.27	2.26	3	-8.54	61	14%	-	-	Nivel de precisión óptimo.
Tiempo de carga	6.78	0.24	2.26	7	-2.03	61	4%	-	-	
Tiempo máximo de descarga	20.26	1.45	2.26	26	-8.94	61	7%	-	-	
Tiempo mínimo de descarga	11.04	1.13	2.26	12	-1.93	61	10%	-	-	
Cantidad de réplicas por simulación									0	

Anexo 14. Resultado de la optimización del modelo 1

Tabla A14.1 Resultado luego de optimizar el modelo 1 – Simulación 1 al 12

Iteration	1	2	3	4	5	6	7	8	9	10	11	12
Feasible	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas
[carretas]	80	75	85	78	83	85	75	85	80	79	75	82
[operador]	140	112	168	140	168	112	168	140	112	168	140	112
Objective	4,747.49	4,360.82	5,134.17	4,747.49	5,134.17	4,360.82	5,134.17	4,747.49	4,360.82	5,134.17	4,747.49	4,360.82
[Descarga1]	9.37	9.54	9.32	9.58	9.40	9.32	9.54	9.32	9.37	9.38	9.54	9.38
[Descarga10]	7.15	7.42	6.91	7.26	7.28	6.91	7.42	6.91	7.15	7.28	7.42	7.29
[Descarga11]	6.88	7.25	6.90	7.09	6.93	6.90	7.25	6.90	6.88	6.87	7.25	6.77
[Descarga12]	6.02	6.31	5.91	6.16	6.02	5.91	6.31	5.91	6.02	6.04	6.31	5.95
[Descarga13]	5.58	5.80	5.27	5.66	5.38	5.27	5.80	5.27	5.58	5.55	5.80	5.44
[Descarga14]	5.82	6.22	5.85	5.88	6.01	5.85	6.22	5.85	5.82	5.93	6.22	5.88
[Descarga15]	5.93	6.15	5.76	5.90	5.76	5.76	6.15	5.76	5.93	5.99	6.15	5.67
[Descarga16]	5.76	5.82	5.61	5.78	5.68	5.61	5.82	5.61	5.76	5.81	5.82	5.69
[Descarga17]	6.19	6.35	6.08	6.31	6.16	6.08	6.35	6.08	6.19	6.27	6.35	6.16
[Descarga18]	6.81	6.88	6.76	6.76	6.74	6.76	6.88	6.76	6.81	6.78	6.88	6.75
[Descarga19]	6.56	6.80	6.32	6.48	6.45	6.32	6.80	6.32	6.56	6.49	6.80	6.32
[Descarga2]	9.46	9.60	9.38	9.56	9.48	9.38	9.60	9.38	9.46	9.60	9.60	9.45
[Descarga20]	7.55	7.87	7.55	7.57	7.65	7.55	7.87	7.55	7.55	7.55	7.87	7.45
[Descarga21]	8.24	8.55	8.27	8.35	8.30	8.27	8.55	8.27	8.24	8.22	8.55	8.32
[Descarga22]	9.19	9.46	9.14	9.38	9.24	9.14	9.46	9.14	9.19	9.28	9.46	9.31
[Descarga23]	9.59	9.98	9.62	9.83	9.70	9.62	9.98	9.62	9.59	9.66	9.98	9.66
[Descarga24]	9.34	9.46	9.22	9.40	9.17	9.22	9.46	9.22	9.34	9.26	9.46	9.19
[Descarga25]	8.39	8.41	8.62	8.41	8.59	8.62	8.41	8.62	8.39	8.46	8.41	8.51

[Descarga26]	8.95	9.09	8.79	9.04	8.74	8.79	9.09	8.79	8.95	8.94	9.09	8.76
[Descarga27]	9.51	9.74	9.46	9.57	9.34	9.46	9.74	9.46	9.51	9.54	9.74	9.54
[Descarga28]	9.70	9.55	9.46	9.64	9.48	9.46	9.55	9.46	9.70	9.62	9.55	9.47
[Descarga3]	7.97	8.05	7.91	7.97	7.96	7.91	8.05	7.91	7.97	7.89	8.05	7.87
[Descarga4]	9.38	9.37	9.32	9.46	9.22	9.32	9.37	9.32	9.38	9.46	9.37	9.41
[Descarga5]	9.22	9.44	9.14	9.40	9.24	9.14	9.44	9.14	9.22	9.06	9.44	9.38
[Descarga6]	9.39	9.47	9.18	9.49	9.17	9.18	9.47	9.18	9.39	9.43	9.47	9.29
[Descarga7]	9.61	9.60	9.37	9.58	9.44	9.37	9.60	9.37	9.61	9.39	9.60	9.47
[Descarga8]	8.26	8.29	8.03	8.15	8.01	8.03	8.29	8.03	8.26	8.40	8.29	8.08
[Descarga9]	7.33	7.51	7.16	7.48	7.24	7.16	7.51	7.16	7.33	7.42	7.51	7.41
[MaxDes1]	19.72	19.70	19.44	19.54	19.71	19.44	19.70	19.44	19.72	19.78	19.70	19.68
[MaxDes10]	14.02	14.53	14.19	14.51	14.48	14.19	14.53	14.19	14.02	14.24	14.53	14.45
[MaxDes11]	12.87	13.24	12.80	12.78	12.89	12.80	13.24	12.80	12.87	12.88	13.24	12.70
[MaxDes12]	11.53	11.68	11.06	11.39	11.38	11.06	11.68	11.06	11.53	11.27	11.68	11.39
[MaxDes13]	10.63	10.94	10.37	10.79	10.45	10.37	10.94	10.37	10.63	10.67	10.94	10.55
[MaxDes14]	10.28	10.90	10.36	10.62	10.25	10.36	10.90	10.36	10.28	10.48	10.90	10.41
[MaxDes15]	10.40	11.00	10.40	10.93	10.42	10.40	11.00	10.40	10.40	10.87	11.00	10.41
[MaxDes16]	10.66	10.73	10.30	10.36	10.29	10.30	10.73	10.30	10.66	10.77	10.73	10.31
[MaxDes17]	11.73	12.19	11.67	12.10	11.71	11.67	12.19	11.67	11.73	11.65	12.19	11.59
[MaxDes18]	13.43	13.45	13.32	13.53	13.20	13.32	13.45	13.32	13.43	13.26	13.45	13.14
[MaxDes19]	13.32	13.71	13.24	13.48	13.21	13.24	13.71	13.24	13.32	13.11	13.71	13.10
[MaxDes2]	18.68	19.20	18.58	19.39	18.78	18.58	19.20	18.58	18.68	19.24	19.20	18.83
[MaxDes20]	14.97	15.44	14.91	15.04	15.01	14.91	15.44	14.91	14.97	14.98	15.44	14.78
[MaxDes21]	18.50	18.51	18.35	18.54	18.61	18.35	18.51	18.35	18.50	18.60	18.51	18.52
[MaxDes22]	18.53	18.82	18.36	18.57	18.45	18.36	18.82	18.36	18.53	18.61	18.82	18.56
[MaxDes23]	21.01	20.61	21.07	20.70	21.06	21.07	20.61	21.07	21.01	21.01	20.61	20.89
[MaxDes24]	19.66	19.58	19.48	19.72	19.88	19.48	19.58	19.48	19.66	19.63	19.58	19.65

[MaxDes25]	18.42	18.24	18.03	18.70	17.91	18.03	18.24	18.03	18.42	18.31	18.24	18.21
[MaxDes26]	18.73	18.45	18.56	18.45	18.36	18.56	18.45	18.56	18.73	18.62	18.45	18.42
[MaxDes27]	19.56	20.24	19.26	19.84	19.49	19.26	20.24	19.26	19.56	19.52	20.24	19.68
[MaxDes28]	19.62	20.23	18.93	19.45	19.18	18.93	20.23	18.93	19.62	19.55	20.23	19.27
[MaxDes3]	15.51	15.19	15.14	15.21	15.44	15.14	15.19	15.14	15.51	15.48	15.19	15.19
[MaxDes4]	18.88	18.92	18.94	18.91	19.04	18.94	18.92	18.94	18.88	19.54	18.92	19.25
[MaxDes5]	19.51	19.71	19.41	20.03	19.95	19.41	19.71	19.41	19.51	19.79	19.71	19.67
[MaxDes6]	19.44	19.69	19.16	19.50	19.53	19.16	19.69	19.16	19.44	19.69	19.69	19.51
[MaxDes7]	19.63	20.16	19.44	19.96	19.43	19.44	20.16	19.44	19.63	19.73	20.16	19.55
[MaxDes8]	16.00	16.53	16.18	16.31	16.21	16.18	16.53	16.18	16.00	16.13	16.53	16.17
[MaxDes9]	15.82	15.80	15.58	15.36	15.45	15.58	15.80	15.58	15.82	15.67	15.80	15.43
[tsistemacarga]	6.91	6.98	6.95	6.94	7.00	6.95	6.98	6.95	6.91	6.89	6.98	6.96

Tabla A14.2 Resultado luego de optimizar el modelo 1 – Simulación 13 al 24

Iteration	13	14	15	16	17	18	19	20	21	22	23	24
Feasible	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas
[carretas]	83	78	81	82	78	79	77	81	83	76	81	80
[operador]	140	112	168	140	168	112	112	112	112	168	140	168
Objective	4,747.49	4,360.82	5,134.17	4,747.49	5,134.17	4,360.82	4,360.82	4,360.82	4,360.82	5,134.17	4,747.49	5,134.17
[Descarga1]	9.40	9.58	9.44	9.38	9.58	9.38	9.31	9.44	9.40	9.69	9.44	9.37
[Descarga10]	7.28	7.26	7.07	7.29	7.26	7.28	7.52	7.07	7.28	7.35	7.07	7.15
[Descarga11]	6.93	7.09	7.02	6.77	7.09	6.87	7.03	7.02	6.93	6.94	7.02	6.88
[Descarga12]	6.02	6.16	6.05	5.95	6.16	6.04	6.10	6.05	6.02	6.10	6.05	6.02
[Descarga13]	5.38	5.66	5.58	5.44	5.66	5.55	5.53	5.58	5.38	5.88	5.58	5.58
[Descarga14]	6.01	5.88	5.84	5.88	5.88	5.93	6.07	5.84	6.01	5.99	5.84	5.82
[Descarga15]	5.76	5.90	5.91	5.67	5.90	5.99	6.01	5.91	5.76	6.01	5.91	5.93

[Descarga16]	5.68	5.78	5.73	5.69	5.78	5.81	5.80	5.73	5.68	5.83	5.73	5.76
[Descarga17]	6.16	6.31	6.22	6.16	6.31	6.27	6.24	6.22	6.16	6.45	6.22	6.19
[Descarga18]	6.74	6.76	6.71	6.75	6.76	6.78	6.83	6.71	6.74	6.79	6.71	6.81
[Descarga19]	6.45	6.48	6.35	6.32	6.48	6.49	6.61	6.35	6.45	6.48	6.35	6.56
[Descarga2]	9.48	9.56	9.55	9.45	9.56	9.60	9.68	9.55	9.48	9.66	9.55	9.46
[Descarga20]	7.65	7.57	7.52	7.45	7.57	7.55	7.66	7.52	7.65	7.86	7.52	7.55
[Descarga21]	8.30	8.35	8.40	8.32	8.35	8.22	8.57	8.40	8.30	8.29	8.40	8.24
[Descarga22]	9.24	9.38	9.41	9.31	9.38	9.28	9.22	9.41	9.24	9.36	9.41	9.19
[Descarga23]	9.70	9.83	9.62	9.66	9.83	9.66	9.92	9.62	9.70	9.86	9.62	9.59
[Descarga24]	9.17	9.40	9.23	9.19	9.40	9.26	9.38	9.23	9.17	9.45	9.23	9.34
[Descarga25]	8.59	8.41	8.54	8.51	8.41	8.46	8.53	8.54	8.59	8.63	8.54	8.39
[Descarga26]	8.74	9.04	9.03	8.76	9.04	8.94	9.02	9.03	8.74	9.16	9.03	8.95
[Descarga27]	9.34	9.57	9.44	9.54	9.57	9.54	9.65	9.44	9.34	9.60	9.44	9.51
[Descarga28]	9.48	9.64	9.52	9.47	9.64	9.62	9.55	9.52	9.48	9.87	9.52	9.70
[Descarga3]	7.96	7.97	7.94	7.87	7.97	7.89	8.05	7.94	7.96	8.08	7.94	7.97
[Descarga4]	9.22	9.46	9.25	9.41	9.46	9.46	9.45	9.25	9.22	9.40	9.25	9.38
[Descarga5]	9.24	9.40	9.28	9.38	9.40	9.06	9.25	9.28	9.24	9.27	9.28	9.22
[Descarga6]	9.17	9.49	9.33	9.29	9.49	9.43	9.54	9.33	9.17	9.47	9.33	9.39
[Descarga7]	9.44	9.58	9.55	9.47	9.58	9.39	9.50	9.55	9.44	9.64	9.55	9.61
[Descarga8]	8.01	8.15	8.19	8.08	8.15	8.40	8.05	8.19	8.01	8.24	8.19	8.26
[Descarga9]	7.24	7.48	7.19	7.41	7.48	7.42	7.62	7.19	7.24	7.61	7.19	7.33
[MaxDes1]	19.71	19.54	19.86	19.68	19.54	19.78	20.31	19.86	19.71	20.05	19.86	19.72
[MaxDes10]	14.48	14.51	14.38	14.45	14.51	14.24	14.46	14.38	14.48	14.51	14.38	14.02
[MaxDes11]	12.89	12.78	12.99	12.70	12.78	12.88	13.15	12.99	12.89	13.14	12.99	12.87
[MaxDes12]	11.38	11.39	11.33	11.39	11.39	11.27	11.47	11.33	11.38	11.59	11.33	11.53
[MaxDes13]	10.45	10.79	10.62	10.55	10.79	10.67	10.74	10.62	10.45	10.93	10.62	10.63

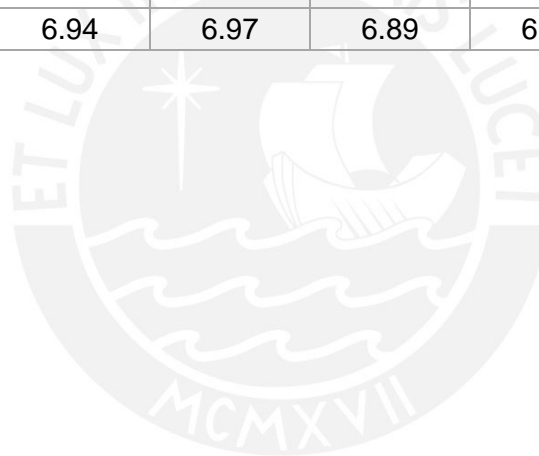
[MaxDes14]	10.25	10.62	10.50	10.41	10.62	10.48	10.65	10.50	10.25	10.68	10.50	10.28
[MaxDes15]	10.42	10.93	10.79	10.41	10.93	10.87	10.90	10.79	10.42	11.28	10.79	10.40
[MaxDes16]	10.29	10.36	10.36	10.31	10.36	10.77	10.96	10.36	10.29	10.75	10.36	10.66
[MaxDes17]	11.71	12.10	11.67	11.59	12.10	11.65	11.93	11.67	11.71	12.33	11.67	11.73
[MaxDes18]	13.20	13.53	13.21	13.14	13.53	13.26	13.36	13.21	13.20	13.39	13.21	13.43
[MaxDes19]	13.21	13.48	13.43	13.10	13.48	13.11	13.78	13.43	13.21	13.62	13.43	13.32
[MaxDes2]	18.78	19.39	19.00	18.83	19.39	19.24	19.43	19.00	18.78	19.43	19.00	18.68
[MaxDes20]	15.01	15.04	15.08	14.78	15.04	14.98	14.78	15.08	15.01	14.99	15.08	14.97
[MaxDes21]	18.61	18.54	18.70	18.52	18.54	18.60	18.12	18.70	18.61	18.56	18.70	18.50
[MaxDes22]	18.45	18.57	18.57	18.56	18.57	18.61	18.78	18.57	18.45	19.03	18.57	18.53
[MaxDes23]	21.06	20.70	21.46	20.89	20.70	21.01	20.90	21.46	21.06	21.44	21.46	21.01
[MaxDes24]	19.88	19.72	19.40	19.65	19.72	19.63	19.63	19.40	19.88	19.81	19.40	19.66
[MaxDes25]	17.91	18.70	18.02	18.21	18.70	18.31	18.35	18.02	17.91	18.62	18.02	18.42
[MaxDes26]	18.36	18.45	18.48	18.42	18.45	18.62	18.66	18.48	18.36	18.54	18.48	18.73
[MaxDes27]	19.49	19.84	19.14	19.68	19.84	19.52	20.32	19.14	19.49	20.40	19.14	19.56
[MaxDes28]	19.18	19.45	19.44	19.27	19.45	19.55	19.46	19.44	19.18	20.35	19.44	19.62
[MaxDes3]	15.44	15.21	15.29	15.19	15.21	15.48	15.28	15.29	15.44	15.68	15.29	15.51
[MaxDes4]	19.04	18.91	18.73	19.25	18.91	19.54	19.06	18.73	19.04	18.80	18.73	18.88
[MaxDes5]	19.95	20.03	19.96	19.67	20.03	19.79	19.97	19.96	19.95	19.70	19.96	19.51
[MaxDes6]	19.53	19.50	19.63	19.51	19.50	19.69	19.67	19.63	19.53	19.84	19.63	19.44
[MaxDes7]	19.43	19.96	19.29	19.55	19.96	19.73	19.74	19.29	19.43	19.99	19.29	19.63
[MaxDes8]	16.21	16.31	16.18	16.17	16.31	16.13	16.13	16.18	16.21	16.34	16.18	16.00
[MaxDes9]	15.45	15.36	15.40	15.43	15.36	15.67	15.89	15.40	15.45	15.75	15.40	15.82
[tsistematicarga]	7.00	6.94	6.96	6.96	6.94	6.89	6.94	6.96	7.00	6.95	6.96	6.91

Tabla A14.3 Resultado luego de optimizar el modelo 1 – Simulación 25 al 33

Iteration	25	26	27	28	29	30	31	32	33
Feasible	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas	infeas
[carretas]	76	84	77	84	79	76	82	84	77
[operador]	112	140	168	112	140	140	168	168	140
Objective	4,360.82	4,747.49	5,134.17	4,360.82	4,747.49	4,747.49	5,134.17	5,134.17	4,747.49
[Descarga1]	9.69	9.46	9.31	9.46	9.38	9.69	9.38	9.46	9.31
[Descarga10]	7.35	7.18	7.52	7.18	7.28	7.35	7.29	7.18	7.52
[Descarga11]	6.94	6.84	7.03	6.84	6.87	6.94	6.77	6.84	7.03
[Descarga12]	6.10	5.98	6.10	5.98	6.04	6.10	5.95	5.98	6.10
[Descarga13]	5.88	5.44	5.53	5.44	5.55	5.88	5.44	5.44	5.53
[Descarga14]	5.99	5.92	6.07	5.92	5.93	5.99	5.88	5.92	6.07
[Descarga15]	6.01	5.79	6.01	5.79	5.99	6.01	5.67	5.79	6.01
[Descarga16]	5.83	5.53	5.80	5.53	5.81	5.83	5.69	5.53	5.80
[Descarga17]	6.45	6.21	6.24	6.21	6.27	6.45	6.16	6.21	6.24
[Descarga18]	6.79	6.82	6.83	6.82	6.78	6.79	6.75	6.82	6.83
[Descarga19]	6.48	6.35	6.61	6.35	6.49	6.48	6.32	6.35	6.61
[Descarga2]	9.66	9.42	9.68	9.42	9.60	9.66	9.45	9.42	9.68
[Descarga20]	7.86	7.45	7.66	7.45	7.55	7.86	7.45	7.45	7.66
[Descarga21]	8.29	8.42	8.57	8.42	8.22	8.29	8.32	8.42	8.57
[Descarga22]	9.36	9.16	9.22	9.16	9.28	9.36	9.31	9.16	9.22
[Descarga23]	9.86	9.56	9.92	9.56	9.66	9.86	9.66	9.56	9.92
[Descarga24]	9.45	9.18	9.38	9.18	9.26	9.45	9.19	9.18	9.38
[Descarga25]	8.63	8.55	8.53	8.55	8.46	8.63	8.51	8.55	8.53
[Descarga26]	9.16	8.74	9.02	8.74	8.94	9.16	8.76	8.74	9.02
[Descarga27]	9.60	9.36	9.65	9.36	9.54	9.60	9.54	9.36	9.65

[Descarga28]	9.87	9.28	9.55	9.28	9.62	9.87	9.47	9.28	9.55
[Descarga3]	8.08	7.82	8.05	7.82	7.89	8.08	7.87	7.82	8.05
[Descarga4]	9.40	9.32	9.45	9.32	9.46	9.40	9.41	9.32	9.45
[Descarga5]	9.27	9.22	9.25	9.22	9.06	9.27	9.38	9.22	9.25
[Descarga6]	9.47	9.28	9.54	9.28	9.43	9.47	9.29	9.28	9.54
[Descarga7]	9.64	9.42	9.50	9.42	9.39	9.64	9.47	9.42	9.50
[Descarga8]	8.24	7.93	8.05	7.93	8.40	8.24	8.08	7.93	8.05
[Descarga9]	7.61	7.22	7.62	7.22	7.42	7.61	7.41	7.22	7.62
[MaxDes1]	20.05	19.44	20.31	19.44	19.78	20.05	19.68	19.44	20.31
[MaxDes10]	14.51	14.44	14.46	14.44	14.24	14.51	14.45	14.44	14.46
[MaxDes11]	13.14	12.74	13.15	12.74	12.88	13.14	12.70	12.74	13.15
[MaxDes12]	11.59	11.33	11.47	11.33	11.27	11.59	11.39	11.33	11.47
[MaxDes13]	10.93	10.39	10.74	10.39	10.67	10.93	10.55	10.39	10.74
[MaxDes14]	10.68	10.19	10.65	10.19	10.48	10.68	10.41	10.19	10.65
[MaxDes15]	11.28	10.45	10.90	10.45	10.87	11.28	10.41	10.45	10.90
[MaxDes16]	10.75	10.28	10.96	10.28	10.77	10.75	10.31	10.28	10.96
[MaxDes17]	12.33	11.68	11.93	11.68	11.65	12.33	11.59	11.68	11.93
[MaxDes18]	13.39	13.30	13.36	13.30	13.26	13.39	13.14	13.30	13.36
[MaxDes19]	13.62	13.20	13.78	13.20	13.11	13.62	13.10	13.20	13.78
[MaxDes2]	19.43	18.60	19.43	18.60	19.24	19.43	18.83	18.60	19.43
[MaxDes20]	14.99	14.80	14.78	14.80	14.98	14.99	14.78	14.80	14.78
[MaxDes21]	18.56	18.24	18.12	18.24	18.60	18.56	18.52	18.24	18.12
[MaxDes22]	19.03	18.28	18.78	18.28	18.61	19.03	18.56	18.28	18.78
[MaxDes23]	21.44	21.20	20.90	21.20	21.01	21.44	20.89	21.20	20.90
[MaxDes24]	19.81	19.61	19.63	19.61	19.63	19.81	19.65	19.61	19.63
[MaxDes25]	18.62	17.79	18.35	17.79	18.31	18.62	18.21	17.79	18.35

[MaxDes26]	18.54	18.44	18.66	18.44	18.62	18.54	18.42	18.44	18.66
[MaxDes27]	20.40	19.38	20.32	19.38	19.52	20.40	19.68	19.38	20.32
[MaxDes28]	20.35	19.13	19.46	19.13	19.55	20.35	19.27	19.13	19.46
[MaxDes3]	15.68	15.27	15.28	15.27	15.48	15.68	15.19	15.27	15.28
[MaxDes4]	18.80	19.05	19.06	19.05	19.54	18.80	19.25	19.05	19.06
[MaxDes5]	19.70	19.47	19.97	19.47	19.79	19.70	19.67	19.47	19.97
[MaxDes6]	19.84	19.40	19.67	19.40	19.69	19.84	19.51	19.40	19.67
[MaxDes7]	19.99	19.32	19.74	19.32	19.73	19.99	19.55	19.32	19.74
[MaxDes8]	16.34	16.01	16.13	16.01	16.13	16.34	16.17	16.01	16.13
[MaxDes9]	15.75	15.48	15.89	15.48	15.67	15.75	15.43	15.48	15.89
[tsistemacarga]	6.95	6.97	6.94	6.97	6.89	6.95	6.96	6.97	6.94



Anexo 15. Cálculo del número de réplicas

Tabla A15.1 Reporte SIMAN del modelo 2 – 10 réplicas

Identifier	Average	Half-width	Minimum	Maximum
Descarga25	617.48	218.76	349.57	1108.60
TAVG(t22.WaitingTime)+TAVG(desca11.Waiting	65.54	24.07	24.54	129.55
Descarga18	623.08	366.15	0.00	1564.50
TAVG(desc3.WaitingTime)	317.86	278.37	0.00	1000.50
TAVG(desc22.WaitingTime)	690.76	259.00	43.84	1301.40
TAVG(col tractoristacarga12.WaitingTime)	0.00	0.00	0.00	0.00
TAVG(t32.WaitingTime)+TAVG(desca16.Waiting	53.13	31.79	6.14	153.78
TAVG(desc45.WaitingTime)	182.31	276.95	0.00	1114.00
MaxDes6	1824.60	401.95	1156.00	2773.30
TAVG(desc50.WaitingTime)	489.65	269.41	0.00	959.14
TAVG(desc29.WaitingTime)	301.90	254.34	0.00	897.05
TAVG(col tractoristacarga19.WaitingTime)	33.23	50.13	0.00	169.67
Descarga26	705.75	340.77	0.00	1368.40
TAVG(col tractoristacarga3.WaitingTime)	19.00	33.93	0.00	148.89
Descarga19	604.55	223.15	261.42	1209.00
TAVG(t24.WaitingTime)+TAVG(desca12.Waiting	64.54	25.79	14.63	134.20
MaxDes7	1782.10	344.22	1242.90	2379.70
TAVG(desc10.WaitingTime)	532.40	342.43	0.00	1067.60
TAVG(desc9.WaitingTime)	163.90	195.02	0.00	726.37
TAVG(t56.WaitingTime)+TAVG(desca28.Waiting	264.76	98.16	73.30	444.53
TAVG(desc33.WaitingTime)	613.53	259.50	0.00	1044.60
TAVG(col tractoristacarga18.WaitingTime)	11.61	26.25	0.00	116.06
TAVG(col tractoristacarga23.WaitingTime)	9.70	21.95	0.00	97.03
TAVG(desc56.WaitingTime)	391.80	327.96	0.00	1103.30
Descarga27	763.75	253.92	398.57	1473.50
TAVG(desc17.WaitingTime)	507.72	270.55	0.00	1210.80
TAVG(t6.WaitingTime)+TAVG(desca3.WaitingTi	193.89	90.39	96.81	424.24
TAVG(t2.WaitingTime)+TAVG(desca1.WaitingTi	141.86	60.05	8.64	255.62
MaxDes8	1583.10	530.33	0.00	2591.70
TAVG(t41.WaitingTime)+TAVG(desca21.Waiting	105.17	54.12	0.00	209.60
Cost	5134.10	0.00	5134.10	5134.10
TAVG(t48.WaitingTime)+TAVG(desca24.Waiting	235.05	102.60	73.02	573.04
TAVG(desc2.WaitingTime)	584.88	334.79	0.00	1275.70
TAVG(desc16.WaitingTime)	618.61	311.36	0.00	1410.30
TAVG(t51.WaitingTime)+TAVG(desca26.Waiting	131.56	52.43	0.00	231.06
TAVG(desc21.WaitingTime)	436.98	219.49	0.00	1000.30
Descarga28	571.99	183.57	400.81	1148.50
TAVG(col tractoristacarga11.WaitingTime)	0.00	0.00	0.00	0.00
TAVG(desc39.WaitingTime)	394.84	389.47	0.00	1328.00

TAVG(desc44.WaitingTime)	609.21	310.07	0.00	1190.80
TAVG(t16.WaitingTime)+TAVG(desca8.WaitingT	200.54	70.76	0.00	305.70
TAVG(t12.WaitingTime)+TAVG(desca6.WaitingT	284.78	80.06	142.15	402.14
TAVG(desc28.WaitingTime)	341.50	272.93	0.00	1111.30
TAVG(t34.WaitingTime)+TAVG(desca17.Waiting	72.91	29.22	27.22	169.03
MaxDes9	1642.00	325.99	948.91	2370.70
MaxDes10	1323.90	403.75	0.00	1891.40
TAVG(colatractoristacarga2.WaitingTime)	0.00	0.00	0.00	0.00
TAVG(desc1.WaitingTime)	416.59	282.28	0.00	1023.60
TAVG(tsistemacarga)	372.68	96.25	0.00	456.34
TAVG(t43.WaitingTime)+TAVG(desca22.Waiting	132.42	52.78	0.00	232.66
TAVG(colatractoristacarga9.WaitingTime)	0.00	0.00	0.00	0.00
TAVG(desc8.WaitingTime)	472.55	310.59	0.00	1085.00
TAVG(t53.WaitingTime)+TAVG(desca27.Waiting	148.57	80.37	0.00	272.43
TAVG(desc27.WaitingTime)	228.76	219.39	0.00	924.35
TAVG(desc32.WaitingTime)	440.59	352.34	0.00	1192.20
TAVG(colatractoristacarga17.WaitingTime)	0.00	0.00	0.00	0.00
TAVG(colatractoristacarga22.WaitingTime)	10.22	17.99	0.00	78.62
TAVG(t26.WaitingTime)+TAVG(desca13.Waiting	37.48	14.67	13.09	77.04
TAVG(desc55.WaitingTime)	158.11	189.20	0.00	743.99
TAVG(t9.WaitingTime)+TAVG(desca5.WaitingTi	124.15	48.33	0.00	161.95
MaxDes11	1336.60	281.73	566.45	1930.50
TAVG(t5.WaitingTime)+TAVG(desca3.WaitingTi	119.07	54.97	0.00	255.09
TAVG(t36.WaitingTime)+TAVG(desca18.Waiting	118.24	50.47	0.00	218.01
TAVG(colatractoristacarga8.WaitingTime)	17.21	21.28	0.00	91.49
TAVG(t45.WaitingTime)+TAVG(desca23.Waiting	178.57	63.88	0.00	376.55
TAVG(colatractoristacarga21.WaitingTime)	4.68	10.58	0.00	46.78
Descarga1	633.37	284.05	190.06	1251.20
TAVG(desc15.WaitingTime)	576.75	324.70	0.00	1334.90
TAVG(desc20.WaitingTime)	453.56	257.62	0.00	891.85
TAVG(colatractoristacarga10.WaitingTime)	1.98	4.49	0.00	19.83
MaxDes12	1228.30	273.52	677.22	1729.20
TAVG(desc38.WaitingTime)	364.22	242.54	0.00	833.17
TAVG(desc43.WaitingTime)	445.52	284.44	0.00	901.43
TAVG(colatractoristacarga28.WaitingTime)	0.00	0.00	0.00	0.00
TAVG(t21.WaitingTime)+TAVG(desca11.Waiting	78.60	19.75	0.00	87.46
TAVG(t15.WaitingTime)+TAVG(desca8.WaitingT	136.44	42.94	0.00	202.68
TAVG(t28.WaitingTime)+TAVG(desca14.Waiting	49.65	22.46	19.12	127.05
TAVG(t11.WaitingTime)+TAVG(desca6.WaitingT	182.52	64.69	0.00	338.56
TAVG(t31.WaitingTime)+TAVG(desca16.Waiting	49.78	18.77	0.00	62.53
TAVG(t38.WaitingTime)+TAVG(desca19.Waiting	175.36	35.24	92.37	240.90
TAVG(colatractoristacarga1.WaitingTime)	22.65	51.22	0.00	226.45
MaxDes20	1289.00	406.97	661.83	2340.60
Descarga2	670.81	284.50	316.49	1343.90
TAVG(t1.WaitingTime)+TAVG(desca1.WaitingTi	137.13	0.09	137.06	137.40

MaxDes13	1035.10	365.60	376.70	1664.40
TAVG(desc42.WaitingTime)	435.47	257.00	0.00	1051.30
TAVG(desc7.WaitingTime)	267.26	218.73	0.00	729.94
TAVG(desc26.WaitingTime)	543.90	321.86	0.00	1123.90
TAVG(desc31.WaitingTime)	148.20	208.92	0.00	906.31
TAVG(colatractoristacarga16.WaitingTime)	0.00	0.00	0.00	0.00
TAVG(desc49.WaitingTime)	216.98	207.43	0.00	684.17
TAVG(desc54.WaitingTime)	538.55	256.71	0.00	1052.20
TAVG(t23.WaitingTime)+TAVG(desca12.Waiting	84.09	17.32	76.31	153.00
TAVG(t55.WaitingTime)+TAVG(desca28.Waiting	150.28	37.77	0.00	167.17
MaxDes21	1374.20	466.34	0.00	2511.90
Descarga10	495.53	241.98	0.00	1140.00
Descarga3	766.98	307.10	327.41	1679.40
MaxDes14	927.76	289.59	491.70	1582.10
TAVG(colatractoristacarga7.WaitingTime)	20.30	39.55	0.00	175.74
TAVG(desc6.WaitingTime)	582.11	276.58	0.00	1124.60
TAVG(desc30.WaitingTime)	500.26	284.88	0.00	1003.30
TAVG(colatractoristacarga20.WaitingTime)	24.32	37.12	0.00	138.58
TAVG(desc53.WaitingTime)	345.46	264.46	0.00	1064.60
TAVG(desc14.WaitingTime)	501.25	312.71	0.00	965.65
TAVG(desc37.WaitingTime)	324.61	219.28	0.00	911.45
TAVG(t47.WaitingTime)+TAVG(desca24.Waiting	143.53	61.67	0.00	295.47
TAVG(colatractoristacarga27.WaitingTime)	42.01	61.80	0.00	260.85
MaxDes22	1774.10	285.49	1094.90	2261.60
Descarga11	691.06	219.82	224.16	1224.30
Descarga4	661.94	212.34	393.76	1124.10
MaxDes15	941.42	300.23	328.29	1509.20
TAVG(t18.WaitingTime)+TAVG(desca9.WaitingT	115.84	56.01	39.57	253.10
TAVG(t33.WaitingTime)+TAVG(desca17.Waiting	70.65	17.76	0.00	78.86
TAVG(desc41.WaitingTime)	192.49	244.17	0.00	976.54
TAVG(t39.WaitingTime)+TAVG(desca20.Waiting	118.00	12.48	112.31	167.64
MaxDes23	1562.20	509.03	0.00	2484.70
Descarga12	607.77	242.62	198.85	1131.30
Descarga5	563.22	196.84	377.81	1139.90
TAVG(desc25.WaitingTime)	255.49	234.75	0.00	751.53
TAVG(colatractoristacarga15.WaitingTime)	2.54	5.75	0.00	25.43
MaxDes16	982.27	355.59	466.77	1860.70
TAVG(t49.WaitingTime)+TAVG(desca25.Waiting	122.12	68.43	0.00	292.51
TAVG(desc48.WaitingTime)	462.03	316.97	0.00	1385.70
TAVG(t8.WaitingTime)+TAVG(desca4.WaitingTi	226.57	99.85	60.20	445.55
TAVG(t4.WaitingTime)+TAVG(desca2.WaitingTi	138.82	32.31	79.73	219.65
TAVG(t25.WaitingTime)+TAVG(desca13.Waiting	49.75	18.76	0.00	62.24
Descarga20	688.05	391.22	282.97	1610.70
TAVG(colatractoristacarga6.WaitingTime)	9.92	19.78	0.00	87.97
TAVG(desc5.WaitingTime)	429.74	306.22	0.00	1329.70

MaxDes24	1493.90	313.30	906.95	2423.40
Descarga13	458.08	233.34	176.73	955.42
TAVG(col tractorista carga14.WaitingTime)	0.00	0.00	0.00	0.00
Descarga6	837.57	343.79	392.32	1748.00
TAVG(t35.WaitingTime)+TAVG(desca18.Waiting	63.97	31.58	0.00	91.85
TAVG(desc52.WaitingTime)	558.02	322.93	0.00	1142.20
MaxDes17	1302.60	262.68	599.34	1864.60
TAVG(desc13.WaitingTime)	408.84	306.07	0.00	1064.90
MaxDes1	1595.40	333.53	945.95	2263.20
TAVG(t40.WaitingTime)+TAVG(desca20.Waiting	177.57	39.59	72.27	246.44
TAVG(desc36.WaitingTime)	515.49	358.25	0.00	1337.30
TAVG(t14.WaitingTime)+TAVG(desca7.WaitingT	311.53	85.56	90.11	488.25
TAVG(col tractorista carga26.WaitingTime)	6.57	14.86	0.00	65.70
TAVG(t10.WaitingTime)+TAVG(desca5.WaitingT	257.06	91.88	79.24	453.03
Descarga21	516.40	270.78	0.00	1355.20
TAVG(t50.WaitingTime)+TAVG(desca25.Waiting	252.08	65.63	95.37	402.16
MaxDes25	1711.80	293.77	1303.10	2284.60
Descarga14	432.86	230.58	187.95	1153.90
Descarga7	821.48	307.86	396.51	1480.20
TAVG(t27.WaitingTime)+TAVG(desca14.Waiting	49.75	18.76	0.00	62.19
MaxDes18	1262.20	465.22	0.00	2316.40
MaxDes2	1469.80	242.44	915.45	2007.00
TAVG(desc40.WaitingTime)	406.38	349.73	0.00	1325.90
TAVG(col tractorista carga25.WaitingTime)	0.00	0.00	0.00	0.00
TAVG(t37.WaitingTime)+TAVG(desca19.Waiting	93.96	23.62	0.00	104.73
TAVG(desc19.WaitingTime)	319.86	279.03	0.00	1051.00
TAVG(desc24.WaitingTime)	544.51	273.90	0.00	1100.00
Descarga22	818.78	278.13	374.77	1268.30
TAVG(t42.WaitingTime)+TAVG(desca21.Waiting	211.94	84.77	0.00	366.79
TAVG(t7.WaitingTime)+TAVG(desca4.WaitingTi	138.06	86.03	0.00	401.11
TAVG(desc47.WaitingTime)	183.19	239.48	0.00	1067.70
TAVG(t3.WaitingTime)+TAVG(desca2.WaitingTi	104.69	39.47	0.00	131.08
MaxDes26	1647.90	501.57	0.00	2346.90
Descarga15	504.21	249.63	177.78	1087.60
TAVG(t19.WaitingTime)+TAVG(desca10.Waiting	87.26	53.97	0.00	250.95
Descarga8	888.28	361.76	0.00	1654.90
TAVG(t52.WaitingTime)+TAVG(desca26.Waiting	234.96	101.06	0.00	407.71
MaxDes19	1209.20	210.51	895.24	1672.10
MaxDes3	1568.20	364.45	948.95	2465.90
TAVG(t29.WaitingTime)+TAVG(desca15.Waiting	49.87	18.80	0.00	63.36
TAVG(col tractorista carga5.WaitingTime)	22.67	51.29	0.00	226.72
TAVG(desc4.WaitingTime)	616.11	310.86	0.00	1212.90
TAVG(desc23.WaitingTime)	370.56	243.75	0.00	859.44
TAVG(col tractorista carga13.WaitingTime)	0.00	0.00	0.00	0.00
TAVG(desc46.WaitingTime)	295.72	232.85	0.00	1031.40

Descarga23	565.59	296.76	0.00	1490.00
TAVG(desc51.WaitingTime)	329.24	285.38	0.00	937.53
TAVG(desc12.WaitingTime)	588.93	335.80	0.00	1342.90
TAVG(t17.WaitingTime)+TAVG(desca9.WaitingT	112.83	0.05	112.81	113.04
MaxDes27	1786.40	345.25	1102.70	2523.10
Descarga16	364.70	205.52	191.44	1108.20
TAVG(t13.WaitingTime)+TAVG(desca7.WaitingT	181.01	61.74	0.00	324.58
TAVG(desc35.WaitingTime)	509.37	395.66	0.00	1356.00
Descarga9	816.50	274.95	273.47	1487.40
TAVG(t44.WaitingTime)+TAVG(desca22.Waiting	229.13	77.92	106.72	389.80
TAVG(col tractoristacarga4.WaitingTime)	0.00	0.00	0.00	0.00
MaxDes4	1673.80	294.14	1124.10	2450.80
TAVG(t54.WaitingTime)+TAVG(desca27.Waiting	316.07	89.92	114.32	462.50
TAVG(t20.WaitingTime)+TAVG(desca10.Waiting	132.46	48.30	0.00	226.06
Descarga24	598.09	241.40	379.07	1477.30
TAVG(desc11.WaitingTime)	431.20	338.65	0.00	1318.80
TAVG(t30.WaitingTime)+TAVG(desca15.Waiting	38.57	22.52	5.99	89.18
TAVG(desc34.WaitingTime)	744.55	286.31	0.00	1171.00
TAVG(col tractoristacarga24.WaitingTime)	52.51	80.46	0.00	304.85
MaxDes28	1552.00	225.29	1070.30	2140.20
Descarga17	849.54	258.24	239.41	1300.80
TAVG(tsistemadescarga)	1268.90	125.17	891.78	1529.80
TAVG(desc18.WaitingTime)	801.79	295.72	0.00	1333.10
MaxDes5	1636.60	319.30	842.32	2243.70
TAVG(t46.WaitingTime)+TAVG(desca23.Waiting	302.66	120.93	0.00	522.51
operador.NumberSeized	454.30	43.97	280.00	483.00
operador.ScheduledUtilization	0.03	0.00	0.02	0.03
seleccionador10.NumberSeized	77.30	6.33	63.00	88.00
seleccionador10.ScheduledUtilization	0.05	0.00	0.04	0.05
seleccionador11.NumberSeized	81.40	4.49	73.00	91.00
seleccionador11.ScheduledUtilization	0.05	0.00	0.04	0.05
seleccionador12.NumberSeized	81.00	8.04	60.00	102.00
seleccionador12.ScheduledUtilization	0.05	0.00	0.03	0.06
seleccionador13.NumberSeized	82.60	8.24	67.00	98.00
seleccionador13.ScheduledUtilization	0.05	0.00	0.04	0.06
seleccionador14.NumberSeized	76.40	5.19	63.00	84.00
seleccionador14.ScheduledUtilization	0.04	0.00	0.04	0.05
seleccionador15.NumberSeized	77.80	7.37	65.00	96.00
seleccionador15.ScheduledUtilization	0.05	0.00	0.04	0.06
seleccionador16.NumberSeized	81.60	4.88	73.00	91.00
seleccionador16.ScheduledUtilization	0.05	0.00	0.04	0.05
seleccionador17.NumberSeized	79.30	6.86	64.00	92.00
seleccionador17.ScheduledUtilization	0.05	0.00	0.04	0.06
seleccionador18.NumberSeized	80.40	4.67	73.00	96.00
seleccionador18.ScheduledUtilization	0.05	0.00	0.04	0.06

seleccionador19.NumberSeized	78.60	9.59	58.00	103.00
seleccionador19.ScheduledUtilization	0.05	0.01	0.03	0.06
seleccionador20.NumberSeized	76.60	7.56	58.00	91.00
seleccionador20.ScheduledUtilization	0.04	0.01	0.03	0.06
seleccionador21.NumberSeized	85.20	5.89	74.00	102.00
seleccionador21.ScheduledUtilization	0.05	0.00	0.04	0.06
seleccionador22.NumberSeized	80.20	7.52	60.00	98.00
seleccionador22.ScheduledUtilization	0.05	0.00	0.03	0.06
seleccionador23.NumberSeized	80.90	5.03	71.00	91.00
seleccionador23.ScheduledUtilization	0.05	0.00	0.04	0.05
seleccionador24.NumberSeized	81.40	8.37	60.00	99.00
seleccionador24.ScheduledUtilization	0.05	0.01	0.03	0.06
seleccionador25.NumberSeized	81.70	7.06	63.00	100.00
seleccionador25.ScheduledUtilization	0.05	0.00	0.04	0.06
seleccionador26.NumberSeized	78.50	6.22	58.00	89.00
seleccionador26.ScheduledUtilization	0.05	0.00	0.03	0.05
seleccionador27.NumberSeized	76.40	8.60	59.00	92.00
seleccionador27.ScheduledUtilization	0.04	0.01	0.03	0.05
seleccionador28.NumberSeized	78.40	7.44	62.00	94.00
seleccionador28.ScheduledUtilization	0.05	0.00	0.04	0.06
carretas.NumberSeized	225.20	23.04	134.00	239.00
carretas.ScheduledUtilization	0.34	0.08	0.29	0.64
seleccionador1.NumberSeized	110.90	6.39	91.00	120.00
seleccionador1.ScheduledUtilization	0.19	0.02	0.11	0.21
seleccionador2.NumberSeized	90.50	5.71	77.00	99.00
seleccionador2.ScheduledUtilization	0.11	0.01	0.08	0.13
seleccionador3.NumberSeized	86.50	7.61	67.00	106.00
seleccionador3.ScheduledUtilization	0.07	0.01	0.06	0.09
seleccionador4.NumberSeized	77.30	7.78	61.00	99.00
seleccionador4.ScheduledUtilization	0.05	0.01	0.04	0.06
seleccionador5.NumberSeized	77.20	6.64	61.00	89.00
seleccionador5.ScheduledUtilization	0.05	0.01	0.04	0.06
seleccionador6.NumberSeized	80.50	7.51	66.00	102.00
seleccionador6.ScheduledUtilization	0.05	0.00	0.04	0.06
seleccionador7.NumberSeized	81.10	7.27	65.00	96.00
seleccionador7.ScheduledUtilization	0.05	0.00	0.04	0.06
seleccionador8.NumberSeized	73.30	6.79	58.00	87.00
seleccionador8.ScheduledUtilization	0.04	0.00	0.03	0.05
seleccionador9.NumberSeized	74.00	7.56	59.00	93.00
seleccionador9.ScheduledUtilization	0.04	0.00	0.03	0.05
seleccionador9.ScheduledUtilization	0.04	0.00	0.03	0.05

Tabla A15.2 Análisis de resultados del modelo

Descripción	Promedio (min)	Half width (min)	$t_{0.975,9}$	c (min)	T_0	n	Precisión (h/prom)	h^*	n^*	Comentario
Descarga - Espera carreta	7.17	4.71	2.26	3	2.00	10	66%	1.79	69	Se pide una precisión del 25%
Siberia - Espera tractor	0.19	0.33	2.26	0	1.28	10	176%	-	-	No se halla h^* ya que estos tiempos son muy pequeños y no afectan al resultado.
Descarga conexión - Espera tractor	1.90	0.63	2.26	3	-3.94	10	33%	-	-	Como la variación del promedio es alta se pide una precisión del 30%.
Descarga aduanas - Espera tractor	2.88	1.08	2.26	3	-0.24	10	37%	0.87	16	Se pide una precisión del 30%
Tiempo de carga	6.21	1.60	2.26	7	-1.11	10	26%	-	-	El nivel actual de precisión es óptimo, lo cual no se halla h^*
Tiempo máximo de descarga	24.12	5.78	2.26	26	-0.74	10	24%	-	-	
Tiempo mínimo de descarga	10.80	4.48	2.26	12	-0.61	10	41%	1.62	77	Se pide una precisión de 15% ya que el valor real es 12.
Cantidad de réplicas por simulación									77	

Tabla A15.3 Reporte siman del modelo 2 – 77 réplicas

Identifier	Average	Half-width
TAVG(desc1.WaitingTime)	362.53	86.436
TAVG(desc10.WaitingTime)	517.35	96.178
TAVG(desc11.WaitingTime)	295.72	85.166
TAVG(desc12.WaitingTime)	471.6	93.293
TAVG(desc13.WaitingTime)	308.33	80.155
TAVG(desc14.WaitingTime)	450.9	86.785
TAVG(desc15.WaitingTime)	377.87	84.951
TAVG(desc16.WaitingTime)	494.83	93.783
TAVG(desc17.WaitingTime)	365.66	90.135
TAVG(desc18.WaitingTime)	574.03	96.598
TAVG(desc19.WaitingTime)	409.73	92.698
TAVG(desc2.WaitingTime)	496.46	84.962
TAVG(desc20.WaitingTime)	548.86	88.022
TAVG(desc21.WaitingTime)	349.96	90.472
TAVG(desc22.WaitingTime)	530.72	92.606
TAVG(desc23.WaitingTime)	389.36	87.352
TAVG(desc24.WaitingTime)	511.01	83.337
TAVG(desc25.WaitingTime)	336.34	92.239
TAVG(desc26.WaitingTime)	572.38	95.835
TAVG(desc27.WaitingTime)	370.51	87.344
TAVG(desc28.WaitingTime)	503.4	81.229
TAVG(desc29.WaitingTime)	324.82	77.614
TAVG(desc3.WaitingTime)	303.53	87.573
TAVG(desc30.WaitingTime)	520.44	84.97
TAVG(desc31.WaitingTime)	287	81.641
TAVG(desc32.WaitingTime)	466.73	92.539
TAVG(desc33.WaitingTime)	399.39	95.874
TAVG(desc34.WaitingTime)	572.31	96.986
TAVG(desc35.WaitingTime)	390.51	86.767
TAVG(desc36.WaitingTime)	561.12	92.786
TAVG(desc37.WaitingTime)	417.44	96.199
TAVG(desc38.WaitingTime)	498.77	95.877
TAVG(desc39.WaitingTime)	348.44	89.796
TAVG(desc4.WaitingTime)	590.58	86.172
TAVG(desc40.WaitingTime)	487.99	93.596
TAVG(desc41.WaitingTime)	307.05	78.616
TAVG(desc42.WaitingTime)	512.69	80.09
TAVG(desc43.WaitingTime)	349.72	84.26
TAVG(desc44.WaitingTime)	471.42	84.799
TAVG(desc45.WaitingTime)	284.51	91.862
TAVG(desc46.WaitingTime)	441.17	96.951
TAVG(desc47.WaitingTime)	223.37	71.979
TAVG(desc48.WaitingTime)	419.7	83.835

TAVG(desc49.WaitingTime)	296.54	80.459
TAVG(desc5.WaitingTime)	313.59	82.132
TAVG(desc50.WaitingTime)	450.44	85.813
TAVG(desc51.WaitingTime)	316.85	83.511
TAVG(desc52.WaitingTime)	502.72	95.288
TAVG(desc53.WaitingTime)	274.95	78.429
TAVG(desc54.WaitingTime)	492.68	90.25
TAVG(desc55.WaitingTime)	252.92	78.193
TAVG(desc56.WaitingTime)	427.75	88.167
TAVG(desc6.WaitingTime)	529.33	90.982
TAVG(desc7.WaitingTime)	332.59	80.708
TAVG(desc8.WaitingTime)	488.53	84.38
TAVG(desc9.WaitingTime)	313.61	80.256
TAVG(col tractoristacarga1.WaitingTime)	8.7983	9.1678
TAVG(col tractoristacarga10.WaitingTime)	5.3667	5.7216
TAVG(col tractoristacarga11.WaitingTime)	3.0088	3.6704
TAVG(col tractoristacarga12.WaitingTime)	4.6068	5.3204
TAVG(col tractoristacarga13.WaitingTime)	0	0
TAVG(col tractoristacarga14.WaitingTime)	2.0099	2.9398
TAVG(col tractoristacarga15.WaitingTime)	0.3303	0.6639
TAVG(col tractoristacarga16.WaitingTime)	1.5431	3.1017
TAVG(col tractoristacarga17.WaitingTime)	1.6126	2.8094
TAVG(col tractoristacarga18.WaitingTime)	1.5073	3.0298
TAVG(col tractoristacarga19.WaitingTime)	7.8523	7.8699
TAVG(col tractoristacarga2.WaitingTime)	21.053	22.49
TAVG(col tractoristacarga20.WaitingTime)	10.769	12.024
TAVG(col tractoristacarga21.WaitingTime)	17.99	12.844
TAVG(col tractoristacarga22.WaitingTime)	29.598	16.343
TAVG(col tractoristacarga23.WaitingTime)	56.534	25.547
TAVG(col tractoristacarga24.WaitingTime)	17.468	14.227
TAVG(col tractoristacarga25.WaitingTime)	10.025	8.8311
TAVG(col tractoristacarga26.WaitingTime)	46.442	22.189
TAVG(col tractoristacarga27.WaitingTime)	44.615	24.563
TAVG(col tractoristacarga28.WaitingTime)	27.906	17.801
TAVG(col tractoristacarga3.WaitingTime)	7.4645	7.2157
TAVG(col tractoristacarga4.WaitingTime)	27.801	16.136
TAVG(col tractoristacarga5.WaitingTime)	42.392	20.487
TAVG(col tractoristacarga6.WaitingTime)	29.822	15.907
TAVG(col tractoristacarga7.WaitingTime)	29.082	15.795
TAVG(col tractoristacarga8.WaitingTime)	40.268	31.131
TAVG(col tractoristacarga9.WaitingTime)	4.6152	5.182
MaxDes1	1478.8	93.296
MaxDes10	1408.1	98.609
MaxDes11	1288.2	90.08
MaxDes12	1203.1	83.604

MaxDes13	1167.5	100.07
MaxDes14	1121.6	89.467
MaxDes15	1118.5	87.924
MaxDes16	1065.2	94.221
MaxDes17	1238.2	98.736
MaxDes18	1350.6	95.549
MaxDes19	1367.9	91.721
MaxDes2	1520.5	82.11
MaxDes20	1395.6	92.942
MaxDes21	1587.5	92.731
MaxDes22	1689.3	85.334
MaxDes23	1756.9	108.81
MaxDes24	1563.4	80.557
MaxDes25	1621.5	89.074
MaxDes26	1718.5	104.36
MaxDes27	1776.5	86.924
MaxDes28	1715.8	81.667
MaxDes3	1459.9	95.309
MaxDes4	1757.6	100.01
MaxDes5	1734.2	91.365
MaxDes6	1710.2	98.484
MaxDes7	1729.2	87.088
MaxDes8	1494.8	100.88
MaxDes9	1495.1	98.907
Descarga1	565.55	87.584
Descarga10	681.24	90.977
Descarga11	609.4	88.968
Descarga12	624.98	84.839
Descarga13	540.91	91.765
Descarga14	577.83	88.289
Descarga15	534.33	76.593
Descarga16	497.57	83.436
Descarga17	635.71	94.684
Descarga18	639.68	84.548
Descarga19	707.67	98.549
Descarga2	650.11	87.503
Descarga20	659.46	88.877
Descarga21	669.3	80.818
Descarga22	728.25	83.085
Descarga23	705.83	93.667
Descarga24	628.71	69.305
Descarga25	674.88	80.41
Descarga26	716.22	86.121
Descarga27	696.14	78.616
Descarga28	676.44	77.124

Descarga3	646.18	82.887
Descarga4	735.59	81.378
Descarga5	725.89	81.849
Descarga6	702.67	85.495
Descarga7	718.8	78.285
Descarga8	705.34	86.053
Descarga9	682.28	89.347
TAVG(t1.WaitingTime)+TAVG(desca1.WaitingTi	121.86	13.025
TAVG(t10.WaitingTime)+TAVG(desca5.WaitingT	260.09	25.365
TAVG(t11.WaitingTime)+TAVG(desca6.WaitingT	160.06	16.093
TAVG(t12.WaitingTime)+TAVG(desca6.WaitingT	269.52	25.848
TAVG(t13.WaitingTime)+TAVG(desca7.WaitingT	158.94	14.405
TAVG(t14.WaitingTime)+TAVG(desca7.WaitingT	286.24	25.021
TAVG(t15.WaitingTime)+TAVG(desca8.WaitingT	127.65	10.101
TAVG(t16.WaitingTime)+TAVG(desca8.WaitingT	191.02	19.485
TAVG(t17.WaitingTime)+TAVG(desca9.WaitingT	104.1	6.9775
TAVG(t18.WaitingTime)+TAVG(desca9.WaitingT	153.74	17.919
TAVG(t19.WaitingTime)+TAVG(desca10.Waiting	93.366	10.985
TAVG(t2.WaitingTime)+TAVG(desca1.WaitingTi	118.35	16.085
TAVG(t20.WaitingTime)+TAVG(desca10.Waiting	130.23	16.08
TAVG(t21.WaitingTime)+TAVG(desca11.Waiting	80.571	7.7994
TAVG(t22.WaitingTime)+TAVG(desca11.Waiting	97.297	13.31
TAVG(t23.WaitingTime)+TAVG(desca12.Waiting	71.337	6.3711
TAVG(t24.WaitingTime)+TAVG(desca12.Waiting	72.365	10.248
TAVG(t25.WaitingTime)+TAVG(desca13.Waiting	51.195	6.2939
TAVG(t26.WaitingTime)+TAVG(desca13.Waiting	45.234	8.1595
TAVG(t27.WaitingTime)+TAVG(desca14.Waiting	53.349	5.9992
TAVG(t28.WaitingTime)+TAVG(desca14.Waiting	55.704	9.4638
TAVG(t29.WaitingTime)+TAVG(desca15.Waiting	54.161	6.2806
TAVG(t3.WaitingTime)+TAVG(desca2.WaitingTi	96.421	13.977
TAVG(t30.WaitingTime)+TAVG(desca15.Waiting	52.798	9.1483
TAVG(t31.WaitingTime)+TAVG(desca16.Waiting	54.534	5.4414
TAVG(t32.WaitingTime)+TAVG(desca16.Waiting	52.395	9.2983
TAVG(t33.WaitingTime)+TAVG(desca17.Waiting	72.425	6.485
TAVG(t34.WaitingTime)+TAVG(desca17.Waiting	71.358	10.611
TAVG(t35.WaitingTime)+TAVG(desca18.Waiting	80.718	7.5764
TAVG(t36.WaitingTime)+TAVG(desca18.Waiting	115.76	14.77
TAVG(t37.WaitingTime)+TAVG(desca19.Waiting	94.18	7.5123
TAVG(t38.WaitingTime)+TAVG(desca19.Waiting	173.29	17.044
TAVG(t39.WaitingTime)+TAVG(desca20.Waiting	113.16	14.818
TAVG(t4.WaitingTime)+TAVG(desca2.WaitingTi	150.25	15.933
TAVG(t40.WaitingTime)+TAVG(desca20.Waiting	161.82	16.31
TAVG(t41.WaitingTime)+TAVG(desca21.Waiting	127.09	14.259
TAVG(t42.WaitingTime)+TAVG(desca21.Waiting	214.19	24.296
TAVG(t43.WaitingTime)+TAVG(desca22.Waiting	146.47	14.984

TAVG(t44.WaitingTime)+TAVG(desca22.Waiting	261.66	22.137
TAVG(t45.WaitingTime)+TAVG(desca23.Waiting	168.97	17.468
TAVG(t46.WaitingTime)+TAVG(desca23.Waiting	310.52	28.371
TAVG(t47.WaitingTime)+TAVG(desca24.Waiting	157.94	15.47
TAVG(t48.WaitingTime)+TAVG(desca24.Waiting	241.76	23.617
TAVG(t49.WaitingTime)+TAVG(desca25.Waiting	137.68	15.386
TAVG(t5.WaitingTime)+TAVG(desca3.WaitingTi	109.13	10.55
TAVG(t50.WaitingTime)+TAVG(desca25.Waiting	243.52	22.03
TAVG(t51.WaitingTime)+TAVG(desca26.Waiting	148.63	15.923
TAVG(t52.WaitingTime)+TAVG(desca26.Waiting	263.68	25.862
TAVG(t53.WaitingTime)+TAVG(desca27.Waiting	163.74	20.499
TAVG(t54.WaitingTime)+TAVG(desca27.Waiting	286.58	26.075
TAVG(t55.WaitingTime)+TAVG(desca28.Waiting	173.12	15.149
TAVG(t56.WaitingTime)+TAVG(desca28.Waiting	286.21	26.294
TAVG(t6.WaitingTime)+TAVG(desca3.WaitingTi	166.48	19.424
TAVG(t7.WaitingTime)+TAVG(desca4.WaitingTi	155.58	18.162
TAVG(t8.WaitingTime)+TAVG(desca4.WaitingTi	284.8	25.547
TAVG(t9.WaitingTime)+TAVG(desca5.WaitingTi	175.41	21.151
TAVG(tsistemacarga)	398.81	11.974

Tabla A15.4 Validación de número de réplicas del modelo 2

Descripción	Promedio (min)	Half width (min)	$t_{0.975,9}$	c (min)	T_0	N	Precisión (h/prom)	h^*	n^*	Comentario
Descarga - Espera carreta	6.97	1.46	2.26	3	6.15	77	21%	-	-	Nivel de precisión óptimo.
Siberia - Espera tractor	0.30	0.20	2.26	0	3.40	77	67%	-	-	No se halla h^* ya que estos tiempos son muy pequeños y no afectan al resultado.
Descarga conexion - Espera tractor	1.88	0.21	2.26	3	- 12.30	77	11%	-	-	Nivel de precisión óptimo.
Descarga aduanas - Espera tractor	3.04	0.31	2.26	3	0.32	77	10%	-	-	
Tiempo de carga	6.65	0.20	2.26	7	-4.00	77	3%	-	-	
Tiempo máximo de descarga	24.72	1.55	2.26	26	-1.87	77	6%	-	-	
Tiempo mínimo de descarga	10.91	1.42	2.26	12	-1.73	77	13%	-	-	
Cantidad de réplicas por simulación									0	

Anexo 16. Resultados de la optimización del modelo 2

Tabla A16.1 Resultado luego de optimizar el modelo 2 – Simulación 1 al 12

Iteration	1	2	3	4	5	6	7	8	9	10	11	12
Feasible		infeas		infeas		infeas				infeas		
Objective	4,356.48	4,356.48	4,356.48	4,356.48	4,356.48	4,356.48	4,356.48	4,356.48	4,356.48	4,356.48	4,356.48	4,746.16
[carretas]	80	75	85	78	83	76	82	84	81	77	79	80
[operador]	112	112	112	112	112	112	112	112	112	112	112	140
[Descarga1]	4.28	4.73	3.93	4.46	4.04	4.54	4.10	4.01	4.08	4.50	4.35	4.20
[Descarga10]	5.69	6.23	5.48	5.95	5.46	6.16	5.56	5.51	5.69	6.01	5.85	5.71
[Descarga11]	5.30	5.76	5.06	5.50	5.10	5.73	5.16	4.98	5.26	5.59	5.39	5.21
[Descarga12]	4.97	5.28	4.65	5.03	4.75	5.13	4.81	4.64	4.86	5.15	5.04	4.89
[Descarga13]	4.27	4.72	4.01	4.44	4.05	4.53	4.15	3.96	4.19	4.48	4.28	4.36
[Descarga14]	4.18	4.59	3.97	4.29	4.09	4.61	4.17	4.01	4.17	4.49	4.27	4.15
[Descarga15]	4.19	4.65	3.99	4.36	4.06	4.53	4.18	4.06	4.22	4.40	4.28	4.10
[Descarga16]	4.31	4.53	4.05	4.29	4.15	4.53	4.18	4.09	4.25	4.32	4.34	4.29
[Descarga17]	5.04	5.47	4.80	5.16	4.89	5.32	4.98	4.85	5.01	5.24	5.16	5.00
[Descarga18]	5.29	5.76	5.05	5.48	5.16	5.77	5.20	5.07	5.21	5.55	5.41	5.28
[Descarga19]	5.86	6.38	5.61	5.96	5.64	6.23	5.69	5.64	5.84	6.10	5.91	5.98
[Descarga2]	6.52	6.80	6.30	6.58	6.36	6.77	6.49	6.30	6.54	6.71	6.46	6.50
[Descarga20]	6.01	6.30	5.76	6.03	5.81	6.24	5.86	5.79	5.94	6.19	6.13	6.09
[Descarga21]	6.95	7.34	6.79	7.03	6.73	7.25	6.81	6.73	6.77	7.09	7.03	6.88
[Descarga22]	7.66	7.79	7.18	7.80	7.35	7.83	7.47	7.29	7.54	7.75	7.59	7.63
[Descarga23]	7.96	8.21	7.76	8.05	7.86	8.18	7.88	7.71	7.89	8.11	7.95	8.00
[Descarga24]	7.38	7.50	7.28	7.41	7.31	7.41	7.33	7.29	7.30	7.41	7.35	7.39
[Descarga25]	7.01	7.35	6.75	7.11	6.91	7.25	6.93	6.76	6.84	7.21	7.03	6.97
[Descarga26]	7.18	7.53	7.11	7.38	7.15	7.46	7.22	7.13	7.25	7.34	7.23	7.18

[Descarga27]	7.64	7.98	7.50	7.82	7.56	7.90	7.62	7.53	7.70	7.74	7.73	7.65
[Descarga28]	7.67	7.97	7.40	7.77	7.47	7.86	7.58	7.47	7.59	7.78	7.72	7.62
[Descarga3]	6.24	6.66	5.97	6.47	6.15	6.56	6.17	6.07	6.25	6.56	6.35	6.21
[Descarga4]	7.49	7.98	7.27	7.68	7.37	7.81	7.43	7.31	7.46	7.81	7.62	7.51
[Descarga5]	7.54	7.95	7.27	7.78	7.34	7.77	7.40	7.32	7.44	7.75	7.59	7.57
[Descarga6]	7.47	7.94	7.22	7.60	7.30	7.65	7.33	7.28	7.41	7.61	7.54	7.55
[Descarga7]	7.39	7.68	7.17	7.60	7.26	7.64	7.34	7.23	7.36	7.59	7.42	7.40
[Descarga8]	6.32	6.76	6.20	6.63	6.24	6.63	6.27	6.19	6.30	6.66	6.47	6.41
[Descarga9]	6.21	6.66	5.83	6.27	5.94	6.56	6.06	5.88	5.95	6.42	6.21	6.34
[MaxDes1]	18.31	18.71	18.18	18.64	17.92	18.74	17.94	17.53	18.14	18.49	18.55	18.03
[MaxDes10]	16.10	17.08	15.86	16.36	16.01	16.94	16.28	16.16	16.00	16.91	16.29	16.38
[MaxDes11]	14.78	15.10	14.09	14.98	14.09	15.01	14.43	13.89	14.44	14.73	14.72	14.79
[MaxDes12]	13.57	13.61	12.95	13.07	12.66	13.59	12.93	12.88	12.83	13.60	13.31	13.46
[MaxDes13]	11.95	12.70	11.82	12.46	11.77	12.74	11.96	11.50	12.13	12.31	12.19	12.04
[MaxDes14]	11.36	11.92	10.95	11.68	11.16	11.79	11.53	11.10	11.44	11.97	11.51	11.19
[MaxDes15]	11.65	12.45	11.44	11.95	11.50	12.35	11.45	11.29	11.60	11.83	11.95	11.54
[MaxDes16]	11.58	12.18	11.28	11.69	11.40	11.98	11.47	11.40	11.49	11.90	11.68	11.55
[MaxDes17]	13.81	14.31	13.15	13.82	13.63	14.20	13.27	13.52	13.55	13.76	13.84	13.60
[MaxDes18]	15.33	15.95	14.85	15.35	14.82	15.76	15.19	14.90	15.26	15.54	15.32	15.44
[MaxDes19]	16.52	17.09	16.37	16.64	16.41	16.72	16.10	15.98	16.31	16.83	16.68	16.67
[MaxDes2]	18.49	18.90	17.96	18.67	18.34	18.78	18.27	18.16	18.69	18.86	18.79	18.49
[MaxDes20]	17.76	17.67	16.98	17.67	17.31	17.69	17.16	17.01	17.22	17.58	17.44	17.69
[MaxDes21]	20.87	21.23	20.65	20.92	20.53	21.07	20.86	20.95	20.68	21.22	20.97	20.96
[MaxDes22]	23.13	23.20	22.23	23.03	22.93	23.22	22.98	22.53	22.99	23.27	23.10	22.89
[MaxDes23]	24.70	24.70	24.32	24.80	24.35	25.23	24.58	24.41	24.66	24.89	24.35	24.98
[MaxDes24]	22.69	23.41	22.82	22.83	22.83	23.16	23.04	22.51	23.12	23.06	22.67	22.47
[MaxDes25]	21.27	22.19	21.16	21.54	21.05	21.91	21.32	21.45	21.26	21.90	21.46	21.18

[MaxDes26]	22.62	22.87	22.21	22.55	22.62	22.96	22.83	22.15	22.43	22.32	22.59	22.52
[MaxDes27]	23.88	24.53	23.64	24.80	23.97	24.54	23.87	23.95	24.13	24.20	24.36	23.89
[MaxDes28]	23.98	24.49	24.16	24.34	23.54	24.34	23.68	23.90	23.99	24.07	24.16	23.95
[MaxDes3]	18.74	19.06	18.09	18.82	18.27	19.06	18.30	18.12	18.71	18.85	18.86	18.48
[MaxDes4]	23.33	24.08	23.52	23.53	23.35	23.45	23.38	23.50	23.55	23.62	23.49	23.27
[MaxDes5]	23.48	24.08	23.17	23.61	23.32	23.85	23.46	23.39	23.15	23.61	23.28	23.71
[MaxDes6]	23.75	23.70	23.22	23.60	23.51	23.48	23.50	23.46	23.75	23.30	23.70	23.86
[MaxDes7]	23.17	23.44	22.90	23.59	22.92	23.78	23.43	23.07	22.89	23.40	23.15	23.29
[MaxDes8]	18.75	19.58	18.31	19.14	18.72	19.08	18.49	18.85	18.50	18.52	18.76	18.81
[MaxDes9]	18.04	18.30	17.63	18.18	17.81	18.33	17.70	17.28	17.40	18.14	17.80	18.14
[tsistematicarga]	6.71	6.72	6.83	6.72	6.75	6.78	6.80	6.75	6.73	6.77	6.77	6.72

Tabla A16.2 Resultado luego de optimizar el modelo 2 – Simulación 13 al 24

Iteration	13	14	15	16	17	18	19	20	21	22	23	24
Feasible		infeas		infeas			infeas	infeas				infeas
Objective	5,134.17	4,746.16	5,134.17	4,746.16	5,134.17	4,746.16	5,134.17	5,134.17	4,746.16	4,746.16	4,746.16	4,746.16
[carretas]	80	75	85	78	83	85	75	77	82	81	84	76
[operador]	168	140	168	140	168	140	168	168	140	140	140	140
[Descarga1]	4.20	4.52	3.91	4.40	3.98	3.91	4.52	4.41	4.09	4.03	3.96	4.41
[Descarga10]	5.71	6.26	5.51	5.94	5.49	5.51	6.26	6.01	5.58	5.70	5.53	6.16
[Descarga11]	5.21	5.60	4.92	5.44	4.95	4.92	5.60	5.51	5.05	5.15	4.90	5.62
[Descarga12]	4.89	5.22	4.53	5.00	4.69	4.53	5.22	5.06	4.72	4.81	4.55	5.10
[Descarga13]	4.36	4.82	4.07	4.55	4.10	4.07	4.82	4.58	4.22	4.26	4.01	4.64
[Descarga14]	4.15	4.52	3.99	4.31	4.12	3.99	4.52	4.49	4.20	4.18	4.01	4.58
[Descarga15]	4.10	4.49	3.92	4.20	3.98	3.92	4.49	4.27	4.07	4.11	4.02	4.36
[Descarga16]	4.29	4.49	4.02	4.28	4.15	4.02	4.49	4.27	4.13	4.24	4.09	4.49
[Descarga17]	5.00	5.43	4.75	5.13	4.89	4.75	5.43	5.28	4.93	5.00	4.84	5.28

[Descarga18]	5.28	5.78	5.05	5.49	5.15	5.05	5.78	5.54	5.17	5.20	5.06	5.75
[Descarga19]	5.98	6.58	5.68	6.06	5.72	5.68	6.58	6.24	5.77	5.96	5.69	6.40
[Descarga2]	6.50	6.80	6.28	6.56	6.33	6.28	6.80	6.69	6.47	6.51	6.28	6.74
[Descarga20]	6.09	6.44	5.79	6.12	5.86	5.79	6.44	6.30	5.89	6.02	5.85	6.35
[Descarga21]	6.88	7.25	6.66	6.93	6.67	6.66	7.25	7.01	6.75	6.69	6.64	7.16
[Descarga22]	7.63	7.77	7.15	7.73	7.34	7.15	7.77	7.70	7.39	7.52	7.25	7.76
[Descarga23]	8.00	8.27	7.80	8.13	7.91	7.80	8.27	8.19	7.91	7.92	7.77	8.24
[Descarga24]	7.39	7.54	7.30	7.46	7.35	7.30	7.54	7.43	7.38	7.33	7.30	7.45
[Descarga25]	6.97	7.31	6.71	7.07	6.86	6.71	7.31	7.19	6.92	6.78	6.73	7.23
[Descarga26]	7.18	7.56	7.11	7.42	7.17	7.11	7.56	7.36	7.20	7.25	7.13	7.50
[Descarga27]	7.65	8.01	7.51	7.87	7.57	7.51	8.01	7.79	7.65	7.72	7.54	7.93
[Descarga28]	7.62	7.86	7.37	7.71	7.44	7.37	7.86	7.69	7.56	7.58	7.44	7.78
[Descarga3]	6.21	6.59	5.98	6.44	6.12	5.98	6.59	6.46	6.15	6.23	6.09	6.49
[Descarga4]	7.51	8.00	7.29	7.70	7.42	7.29	8.00	7.83	7.45	7.48	7.32	7.84
[Descarga5]	7.57	8.02	7.27	7.83	7.36	7.27	8.02	7.76	7.40	7.46	7.35	7.81
[Descarga6]	7.55	8.15	7.29	7.73	7.37	7.29	8.15	7.72	7.41	7.51	7.36	7.78
[Descarga7]	7.40	7.70	7.17	7.61	7.26	7.17	7.70	7.64	7.37	7.35	7.22	7.68
[Descarga8]	6.41	6.91	6.23	6.78	6.33	6.23	6.91	6.80	6.39	6.41	6.25	6.77
[Descarga9]	6.34	6.82	5.91	6.39	6.04	5.91	6.82	6.57	6.15	6.03	5.97	6.71
[MaxDes1]	18.03	18.61	17.99	18.50	17.85	17.99	18.61	18.22	17.81	18.13	17.21	18.51
[MaxDes10]	16.38	17.22	16.03	16.46	16.08	16.03	17.22	17.11	16.43	16.12	16.30	17.14
[MaxDes11]	14.79	15.10	14.08	15.12	14.13	14.08	15.10	14.65	14.55	14.31	14.00	15.14
[MaxDes12]	13.46	13.54	12.85	13.03	12.52	12.85	13.54	13.47	12.85	12.86	12.85	13.59
[MaxDes13]	12.04	12.75	11.78	12.53	11.82	11.78	12.75	12.35	12.04	12.25	11.50	12.87
[MaxDes14]	11.19	11.72	10.86	11.57	11.07	10.86	11.72	11.88	11.44	11.32	11.00	11.65
[MaxDes15]	11.54	12.29	11.47	11.87	11.45	11.47	12.29	11.66	11.31	11.65	11.34	12.24
[MaxDes16]	11.55	12.29	11.28	11.62	11.42	11.28	12.29	11.78	11.51	11.50	11.39	11.89

[MaxDes17]	13.60	14.31	13.13	13.71	13.61	13.13	14.31	13.78	13.21	13.52	13.42	14.21
[MaxDes18]	15.44	16.05	14.80	15.34	14.94	14.80	16.05	15.56	15.14	15.24	14.99	15.87
[MaxDes19]	16.67	17.26	16.46	16.79	16.44	16.46	17.26	17.04	16.20	16.41	16.00	16.92
[MaxDes2]	18.49	18.95	18.04	18.68	18.48	18.04	18.95	18.88	18.31	18.63	18.14	18.92
[MaxDes20]	17.69	17.71	16.82	17.69	17.16	16.82	17.71	17.52	17.03	17.23	17.04	17.70
[MaxDes21]	20.96	21.08	20.56	20.86	20.61	20.56	21.08	21.35	21.00	20.78	20.93	21.15
[MaxDes22]	22.89	23.21	22.19	22.82	22.81	22.19	23.21	22.98	22.74	22.83	22.36	22.94
[MaxDes23]	24.98	25.03	24.58	25.00	24.53	24.58	25.03	25.22	24.89	24.92	24.79	25.37
[MaxDes24]	22.47	23.20	22.72	22.82	22.75	22.72	23.20	22.87	22.96	22.93	22.41	22.94
[MaxDes25]	21.18	22.37	21.25	21.57	21.10	21.25	22.37	22.00	21.32	21.35	21.46	21.84
[MaxDes26]	22.52	22.78	22.13	22.54	22.64	22.13	22.78	22.22	22.71	22.49	21.92	23.08
[MaxDes27]	23.89	24.30	23.51	24.76	24.03	23.51	24.30	24.20	23.91	24.16	23.98	24.59
[MaxDes28]	23.95	24.44	24.13	24.39	23.53	24.13	24.44	24.17	23.61	24.07	23.91	24.34
[MaxDes3]	18.48	18.82	17.89	18.61	18.00	17.89	18.82	18.59	18.21	18.47	18.05	18.76
[MaxDes4]	23.27	24.07	23.59	23.44	23.31	23.59	24.07	23.58	23.25	23.36	23.43	23.28
[MaxDes5]	23.71	24.23	23.43	23.80	23.46	23.43	24.23	23.55	23.70	23.14	23.60	23.94
[MaxDes6]	23.86	23.84	23.41	23.68	23.80	23.41	23.84	23.45	23.75	24.05	23.60	23.46
[MaxDes7]	23.29	23.58	22.97	23.53	22.97	22.97	23.58	23.31	23.70	23.03	23.28	23.91
[MaxDes8]	18.81	19.74	18.35	19.29	18.89	18.35	19.74	18.72	18.69	18.81	18.94	19.42
[MaxDes9]	18.14	18.37	17.70	18.25	17.97	17.70	18.37	18.28	17.85	17.42	17.24	18.44
[tsistemacarga]	6.72	6.75	6.86	6.72	6.76	6.86	6.75	6.78	6.82	6.76	6.76	6.78

Tabla A16.3 Resultado luego de optimizar el modelo 2 – Simulación 25 al 33

Iteration	25	26	27	28	29	30	31	32	33
Feasible	infeas					infeas	infeas		
Objective	4,746.16	5,134.17	4,746.16	5,134.17	4,746.16	5,134.17	5,134.17	5,134.17	5134.17
[carretas]	77	81	79	82	83	76	78	79	84

[operador]	140	168	140	168	140	168	168	168	168
[Descarga1]	4.41	4.03	4.29	4.09	3.98	4.41	4.40	4.29	3.96
[Descarga10]	6.01	5.70	5.84	5.58	5.49	6.16	5.94	5.84	5.53
[Descarga11]	5.51	5.15	5.27	5.05	4.95	5.62	5.44	5.27	4.90
[Descarga12]	5.06	4.81	4.95	4.72	4.69	5.10	5.00	4.95	4.55
[Descarga13]	4.58	4.26	4.37	4.22	4.10	4.64	4.55	4.37	4.01
[Descarga14]	4.49	4.18	4.28	4.20	4.12	4.58	4.31	4.28	4.01
[Descarga15]	4.27	4.11	4.18	4.07	3.98	4.36	4.20	4.18	4.02
[Descarga16]	4.27	4.24	4.32	4.13	4.15	4.49	4.28	4.32	4.09
[Descarga17]	5.28	5.00	5.09	4.93	4.89	5.28	5.13	5.09	4.84
[Descarga18]	5.54	5.20	5.39	5.17	5.15	5.75	5.49	5.39	5.06
[Descarga19]	6.24	5.96	6.03	5.77	5.72	6.40	6.06	6.03	5.69
[Descarga2]	6.69	6.51	6.43	6.47	6.33	6.74	6.56	6.43	6.28
[Descarga20]	6.30	6.02	6.21	5.89	5.86	6.35	6.12	6.21	5.85
[Descarga21]	7.01	6.69	6.93	6.75	6.67	7.16	6.93	6.93	6.64
[Descarga22]	7.70	7.52	7.58	7.39	7.34	7.76	7.73	7.58	7.25
[Descarga23]	8.19	7.92	7.99	7.91	7.91	8.24	8.13	7.99	7.77
[Descarga24]	7.43	7.33	7.39	7.38	7.35	7.45	7.46	7.39	7.30
[Descarga25]	7.19	6.78	7.00	6.92	6.86	7.23	7.07	7.00	6.73
[Descarga26]	7.36	7.25	7.24	7.20	7.17	7.50	7.42	7.24	7.13
[Descarga27]	7.79	7.72	7.77	7.65	7.57	7.93	7.87	7.77	7.54
[Descarga28]	7.69	7.58	7.68	7.56	7.44	7.78	7.71	7.68	7.44
[Descarga3]	6.46	6.23	6.31	6.15	6.12	6.49	6.44	6.31	6.09
[Descarga4]	7.83	7.48	7.66	7.45	7.42	7.84	7.70	7.66	7.32
[Descarga5]	7.76	7.46	7.61	7.40	7.36	7.81	7.83	7.61	7.35
[Descarga6]	7.72	7.51	7.66	7.41	7.37	7.78	7.73	7.66	7.36
[Descarga7]	7.64	7.35	7.42	7.37	7.26	7.68	7.61	7.42	7.22

[Descarga8]	6.80	6.41	6.60	6.39	6.33	6.77	6.78	6.60	6.25
[Descarga9]	6.57	6.03	6.34	6.15	6.04	6.71	6.39	6.34	5.97
[MaxDes1]	18.22	18.13	18.28	17.81	17.85	18.51	18.50	18.28	17.21
[MaxDes10]	17.11	16.12	16.56	16.43	16.08	17.14	16.46	16.56	16.30
[MaxDes11]	14.65	14.31	14.79	14.55	14.13	15.14	15.12	14.79	14.00
[MaxDes12]	13.47	12.86	12.99	12.85	12.52	13.59	13.03	12.99	12.85
[MaxDes13]	12.35	12.25	12.22	12.04	11.82	12.87	12.53	12.22	11.50
[MaxDes14]	11.88	11.32	11.40	11.44	11.07	11.65	11.57	11.40	11.00
[MaxDes15]	11.66	11.65	11.90	11.31	11.45	12.24	11.87	11.90	11.34
[MaxDes16]	11.78	11.50	11.60	11.51	11.42	11.89	11.62	11.60	11.39
[MaxDes17]	13.78	13.52	13.72	13.21	13.61	14.21	13.71	13.72	13.42
[MaxDes18]	15.56	15.24	15.39	15.14	14.94	15.87	15.34	15.39	14.99
[MaxDes19]	17.04	16.41	16.71	16.20	16.44	16.92	16.79	16.71	16.00
[MaxDes2]	18.88	18.63	18.82	18.31	18.48	18.92	18.68	18.82	18.14
[MaxDes20]	17.52	17.23	17.39	17.03	17.16	17.70	17.69	17.39	17.04
[MaxDes21]	21.35	20.78	20.97	21.00	20.61	21.15	20.86	20.97	20.93
[MaxDes22]	22.98	22.83	22.87	22.74	22.81	22.94	22.82	22.87	22.36
[MaxDes23]	25.22	24.92	24.66	24.89	24.53	25.37	25.00	24.66	24.79
[MaxDes24]	22.87	22.93	22.58	22.96	22.75	22.94	22.82	22.58	22.41
[MaxDes25]	22.00	21.35	21.52	21.32	21.10	21.84	21.57	21.52	21.46
[MaxDes26]	22.22	22.49	22.66	22.71	22.64	23.08	22.54	22.66	21.92
[MaxDes27]	24.20	24.16	24.36	23.91	24.03	24.59	24.76	24.36	23.98
[MaxDes28]	24.17	24.07	24.33	23.61	23.53	24.34	24.39	24.33	23.91
[MaxDes3]	18.59	18.47	18.64	18.21	18.00	18.76	18.61	18.64	18.05
[MaxDes4]	23.58	23.36	23.42	23.25	23.31	23.28	23.44	23.42	23.43
[MaxDes5]	23.55	23.14	23.39	23.70	23.46	23.94	23.80	23.39	23.60
[MaxDes6]	23.45	24.05	23.78	23.75	23.80	23.46	23.68	23.78	23.60

[MaxDes7]	23.31	23.03	23.22	23.70	22.97	23.91	23.53	23.22	23.28
[MaxDes8]	18.72	18.81	18.83	18.69	18.89	19.42	19.29	18.83	18.94
[MaxDes9]	18.28	17.42	17.86	17.85	17.97	18.44	18.25	17.86	17.24
[tsistemacarga]	6.78	6.76	6.77	6.82	6.76	6.78	6.72	6.77	6.76

