Appendix A   References & Questionnaire

A.1   References

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A.2   Questionnaire

I'm presently following a Master of Science Degree in Financial Mathematics conducted by department of Mathematics, University of Moratuwa. I intend to do my research related to the bank.

I shall be thankful and greatly appreciate if you could kindly helpful to carry out my project by filling this questionnaire.

(01)   What is the time that you entered this queue to obtain a service?
        …………………………

(02)   Put a "X" to the suitable answer.

   i.   Which kind of transaction do you hope to do from this counter?

        a)   Deposit money   ☐

        b)   Withdraw money   ☐

        c)   Cheque transaction   ☐

        d)   Pawning transactions & pay the interests
              for pawning juwellaries   ☐

        e)   Bill payments   ☐

        f)   University payments   ☐

        g)   Other payments   ☐

   ii.   How much of money do you hope to spend for your transactions?
        A)   Rs.100.00 – Rs.1000.00   ☐   C) Rs.10000.00 – Rs. 50000.00 ☐
        B)   Rs.1000.00 – Rs.10000.00   ☐   D) Over Rs.50000.00   ☐

(03)   What is the time that you enter to counter after waiting the queue?
        …………………………

(04)   What is the time that you leave the counter after obtaining the service?
        …………………………

Thank You

Appendix B   Raw Data

Table B.1   Summary of the collected data in the counter C1

Date	Day	Time	# of wating customers	# of served customers	Time spent to service in mins	Time not served	Arrival rate	Service rate
6/2/2012	Monday	8.30-9.30am	30	26	47.3333	12.6667	0.5	0.549296
9/2/2012	Thusday	10.00-11.00am	23	19	41.3833	18.6167	0.383333	0.459122
10/2/2012	Friday	9.00-10.00 am	24	16	35.2166	24.7834	0.4	0.454331
14/2/2012	Tuesday	3.00-4.00 pm	16	16	37.4	22.6	0.266667	0.427807
15/2/2012	Wednesday	2.30-3.30 pm	21	17	14:24	16.4	0.35	0.389908
16/2/2012	Thursday	1.45-2.45 pm	20	19	39.7666	20.2334	0.333333	0.477788
17/2/2012	Friday	2.00-3.00 pm	23	18	31.9	28.1	0.383333	0.564263
20/2/2012	Monday	1.00-2.00pm	29	23	41.75	18.25	0.466667	0.550898
21/2/2012	Tuesday	1.00-2.00 pm	27	23	42.2	17.8	0.45	0.545024
22/2/2012	Wednesday	1.00-2.00 pm	23	20	44.2166	15.7834	0.383333	0.452319
23/2/2012	Thursday	8.45-9.45 am	26	21	50.4833	9.5167	0.433333	0.415979
24/2/2012	Friday	8.30-9.30 am	33	27	52.1833	7.8167	0.55	0.517407
25/2/2012	Saturday	9.00-10.00 am						
27/2/2012	Tuesday	11.00-12.00 pm	37	32	48.8	11.2	0.616667	0.655738
28/2/2012	Wednesday	12.00-1.00 pm	33	28	43.6833	16.3167	0.55	0.640977
	Total sum		365	305	599.9163	240.0837	6.066667	7.100858
	Average		26.07142857	21.7857143	42.8511643	17.14884	0.433333	0.507204

Table B.2   Summary of the collected data in counter C2

Date	Day	Time	# of wating customers	# of served customers	Time spent to service in mins	Time not served	Arrival rate	Service rate
6/2/2012	Monday	8.30-9.30am	43	35	47	13	0.716667	0.744681
9/2/2012	Thursday	10.00-11.00am	29	22	41.3833	18.6167	0.483333	0.531615
10/2/2012	Friday	9.00-10.00 am	51	43	50.65	9.35	0.85	0.848963
14/2/2012	Tuesday	3.00-4.00 pm	21	20	32.45	27.55	0.35	0.616333
15/2/2012	Wednesday	2.30-3.30 pm	26	21	15:36	9.35	0.433333	0.41461
16/2/2012	Thursday	1.45-2.45 pm	37	30	45.75	14.25	0.616667	0.655738
17/2/2012	Friday	2.00-3.00 pm	25	21	40.2167	19.7833	0.416667	0.522171
20/2/2012	Monday	1.00-2.00pm	40	35	50	10	0.666667	0.7
21/2/2012	Tuesday	1.00-2.00 pm	26	26	41.7	18.3	0.433333	0.623501
22/2/2012	Wednesday	1.00-2.00 pm	29	24	49.3	10.7	0.483333	0.486815
23/2/2012	Thursday	8.45-9.45 am	33	28	54.3833	5.6167	0.55	0.514864
24/2/2012	Friday	8.30-9.30 am	46	41	51.35	8.65	0.766667	0.798442
25/2/2012	Saturday	9.00-10.00 am	43	37	50.25	9.75	0.716667	0.736318
27/2/2012	Tuesday	11.00-12.00 pm	43	39	49.1667	10.8333	0.733333	0.79322
28/2/2012	Wednesday	12.00-1.00 pm	41	37	52.2	7.8	0.5	0.602085
			533	459	706.45	193.55	8.716667	9.589357
			35.5333333	30.6	47.096667	12.903333	0.581111	0.63929

Table B.3   Summary of collected data in counter C3

Date	Day	Time	# of wating customers	# of served customers	Time spent to service in mins	Time not served	Arrival rate	Service rate
6/2/2012	Monday	8.30-9.30am	39	33	47.3333	12.6667	0.65	0.697184
9/2/2012	Thursday	10.00-11.00am	27	23	33.05	26.95	0.45	0.695915
10/2/2012	Friday	9.00-10.00 am	24	19	50.6	9.4	0.4	0.375494
14/2/2012	Tuesday	3.00-4.00 pm						
15/2/2012	Wednesday	2.30-3.30 pm	27	20	20:24	13.15	0.45	0.426894
16/2/2012	Thursday	1.45-2.45 pm	34	28	54.6333	5.3667	0.566667	0.512508
17/2/2012	Friday	2.00-3.00 pm	26	22	38.5666	21.4334	0.433333	0.570442
20/2/2012	Monday	1.00-2.00pm	32	26	47.2	12.8	0.533333	0.550847
21/2/2012	Tuesday	1.00-2.00 pm	26	24	29.1333	30.8667	0.433333	0.8238
22/2/2012	Wednesday	1.00-2.00 pm	31	27	52.7333	7.2667	0.516667	0.51201
23/2/2012	Thursday	8.45-9.45 am	30	27	51.45	8.55	0.5	0.524781
24/2/2012	Friday	8.30-9.30 am	35	28	44.15	15.85	0.583333	0.634202
25/2/2012	Saturday	9.00-10.00 am	46	41	51.3	8.7	0.766667	0.79922
27/2/2012	Tuesday	11.00-12.00 pm	50	43	46.6	13.4	0.833333	0.922747
28/2/2012	Wednesday	12.00-1.00 pm	33	28	46.8333	13.1667	0.55	0.597865
			460	389	640.4331	199.5669	7.666667	8.64391
			32.8571429	27.785714	45.745221	14.254779	0.547619	0.617422

Table B.4 Summary of the collected data in counter C4

Date	Day	Time	# of wating customers	# of served customers	Time spent to service in mins	Time not served	Arrival rate	Service rate
6/2/2012	Monday	8.30-9.30am	29	25	47.7667	12.2333	0.483333	0.523377
9/2/2012	Thursday	10.00-11.00am	23	19	41.3833	18.6167	0.383333	0.459122
10/2/2012	Friday	9.00-10.00 am	23	22	33.05	26.95	0.383333	0.665658
14/2/2012	Tuesday	3.00-4.00 pm	26	26	40.55	19.45	0.433333	0.641184
15/2/2012	Wednesday	2.30-3.30 pm	16	16	18:47	30.2167	0.266667	0.537214
16/2/2012	Thursday	1.45-2.45 pm	18	15	28.15	31.85	0.3	0.53286
17/2/2012	Friday	2.00-3.00 pm	20	18	37.15	22.85	0.333333	0.484522
20/2/2012	Monday	1.00-2.00pm	32	25	43.25	16.75	0.533333	0.578035
21/2/2012	Tuesday	1.00-2.00 pm	29	26	40.3667	19.6333	0.483333	0.644095
22/2/2012	Wednesday	1.00-2.00 pm	20	20	32.95	27.05	0.333333	0.60698
23/2/2012	Thursday	8.45-9.45 am	20	14	41.2333	18.7667	0.333333	0.339531
24/2/2012	Friday	8.30-9.30 am	32	25	48.0333	11.9667	0.533333	0.520472
25/2/2012	Saturday	9.00-10.00 am	30	27	49.5	10.5	0.5	0.545455
27/2/2012	Tuesday	11.00-12.00 pm	35	31	47.2333	12.7667	0.583333	0.656317
28/2/2012	Wednesday	12.00-1.00 pm	32	27	43.3833	16.6167	0.533333	0.622359
			385	336	574.782539	296.2168	6.416667	8.357181
			25.66666667	22.4	38.3188359	19.74779	0.427778	0.557145

Table B.5   Total arrivals to the all sections of the bank

Date	Day	C1	C2	C3	C4	S1	S2	Other Arrivals	Total Arrivals to the bank
6/2	Monday	4	1	2	28	50	56	11	152
9/2	Thursday	2	5	2	20	40	33	19	121
10/2	Friday	3	2	3	23	43	48	21	143
14/2	Tuesday	2	1	0	25	19	16	7	70
15/2	Wednesday	0	3	1	16	32	38	13	103
16/2	Thursday	4	2	5	16	35	47	20	129
17/2	Friday	2	1	3	19	39	30	10	104
20/2	Monday	3	2	1	30	55	42	8	141
21/2	Tuesday	5	3	4	29	30	37	22	130
22/2	Wednesday	3	5	1	17	40	37	18	121
23/2	Thursday	3	5	6	20	40	35	20	129
24/2	Friday	3	4	6	30	58	45	23	169
25/2	Saturday	1	4	3	30	38	43	10	129
27/2	Tuesday	8	3	1	33	53	67	35	200
28/2	Wednesday	0	3	4	32	44	56	15	154
Total sum	Total sum	43	44	42	368	616	630	252	1995
Average	Average	2.867	2.93	2.8	24.53	41.07	42	16.8	133

Table B.6   The total number of served customers to the each counter for rush hour

Days	Served customers from C1	Served customers from C2	Served customers from C3	Served customers from C4
Monday	26	35	33	25
Monday	23	35	26	25
Friday	27	41	28	25
Monday	32	39	43	31
Wednesday	28	37	28	27
Sum	136	187	158	133
Average	27.2	37.4	31.6	26.6

Table B.7   The total number of served customers to the each counter for normal hour

Days	Served customers from C1	Served customers from C2	Served customers from C3	Served customers from C4
Thursday	19	22	23	19
Friday	16	43	19	22
Tuesday	16	20	*	26
Wednesday	17	21	20	16
Thursday	19	30	28	15
Friday	18	21	22	18
Tuesday	23	26	24	26
Wednesday	20	24	27	20
Thursday	21	28	27	14
Saturday	*	37	41	27
Sum	169	235	190	176
Average	18.78	23.5	19.0	17.6

Appendix C   Computer Outputs Using Arena 12.0 Statistical Software