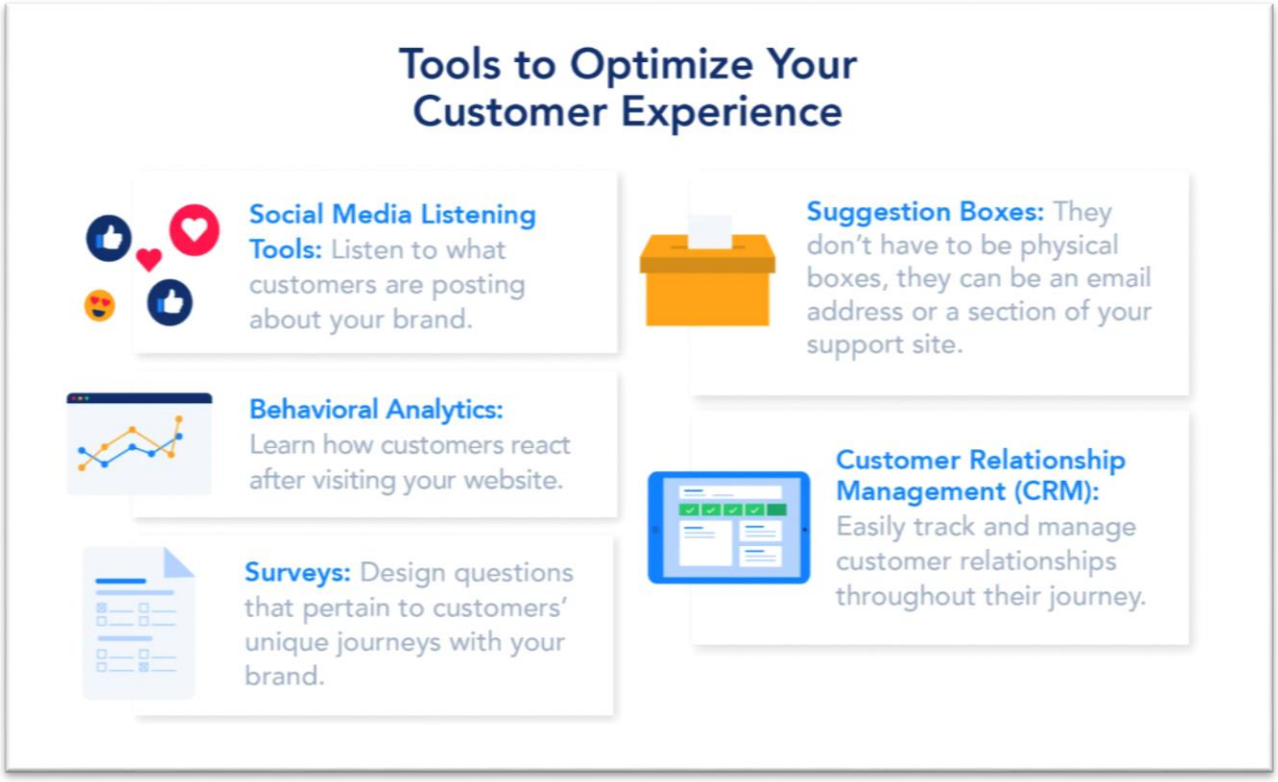
ABC Call Volume Trend Analysis

Final project-4



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About the project:

The attached dataset is of Inbound calls of an ABC company from the insurance category consists of a Customer Experience (CX) Inbound calling team for 23 days. Data includes Agent Name, Agent ID, Queue Time [duration for which customer have to wait before they get connected to an agent], Time [time at which call was made by customer in a day], Time Bucket [for easiness we have also provided you with the time bucket], Duration [duration for which a customer and executives are on call, Call Seconds [for simplicity we have also converted those time into seconds), call status (Abandon, answered, transferred).

A customer experience (CX) team consists of professionals who analyze customer feedback and data, and share insights with the rest of the organization. Typically, these teams fulfil various roles and responsibilities such as: Customer experience programs (CX programs), Digital customer experience, Design and processes, Internal communications, Voice of the customer (VOC), User experiences, Customer experience management, Journey mapping, Nurturing customer, interactions, Customer success, Customer support, Handling customer data, Learning about the customer journey.

Interactive Voice Response (IVR), Robotic Process Automation (RPA), Predictive Analytics, Intelligent Routing are some of the most impactful Al-empowered customer experience tools we can use in this project.

In a Customer Experience team there is a huge employment opportunity for Customer service representatives A.k.a. call Centre agents, customer service agents. Some of the roles for them include: Email support, Inbound support, Outbound support, social media support.

Inbound customer support is defined as the call Centre which is responsible for handling inbound calls of customers. Inbound calls are the incoming voice calls of the existing customers or prospective customers for our business which are attended by customer care representatives. Inbound customer service is the methodology of attracting, engaging, and delighting our customers to turn them into our business' loyal advocates. By solving our customers' problems and helping them achieve success using our product or service, we can delight our customers and turn them into a growth engine for our business.

Approach:

In this analysis, the first step is to go through the data set, clearly understand the variables (i.e. column title and values) contained in the dataset. We will observe how given variable are related with case study and given task. We will analyze and make insights to answer the questions. The analysis can be done using statistical formulas and can also be done using Tech tools like MS-excel and MS-word.

Tech-Stack Used:

- MS-Excel- it is used for data cleaning, visualization and analysis of the provided data.
- MS-Word- It helps in creating and editing document, and also helpful in making document interactive with tools.

Analysis Outcome:

Q1. Calculate the average call time duration for all incoming calls received by agents (in each Time Bucket).

Solution:

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Average of Call_Seconds (s)	Day part												
Agents	10_11	11_12	12_13	13_14	14_15	15_16	16_17	17_18	18_19	19_20	20_21	9_10	Grand Total
Executives 1		181.3888889	185.9666667	193.775641	173.8402778	195.0980392	183.3092105	179.6794872	202.2165605	197.5408163	215.2320442		191.9666453
Executives 10	324.8978102	367.5	441.0235294	321.4375	303.8818182	298.3333333	333.6601942	332.8409091	315.6923077	160		304.984252	333.3353414
Executives 11										0			0
Executives 12	206.7982456	211.4926829	202.2142857	188.0913978	198.8169935	206.0318471	220.3461538	211.1830986	207.725	225		227.645	208.3687902
Executives 13	234.2857143	233.6937799	210.6077348	240.0940594	247.2638889	240.862069	276.0486111	244.3735632	235.4857143	320.5		249.5242718	240.7162242
Executives 14	0												0
Executives 15	274.978836	299.9719101	265.858209	285.8275862	284.122093	278.9389313	280.8701299	280.6322581	258.4900662	349.3555556	341.2222222	293.6363636	282.2441938
Executives 16	208.0805687	196.4722222	167.75	190.38	182.3657143	182.8461538	185.5470085	187.2063492	224.8611111	71		188.9347826	189.7785373
Executives 17	215.0131579	257.8455882	225.4576271	197.3664122	197.4444444	193.8444444	209.6111111	228.2118644	215.2051282	528		191.5068493	214.9763458
Executives 18		137.75	149.9	154.5916667	175.4268293	171.6625	226.5142857	175.2098765	171.0721649	201.8898305	187.76		176.8167939
Executives 19	229.9603175	192.2989691	207.3846154	192.3404255	216.4423077	201.0492958	217.3181818	215.0273973	206.4538462	236.9117647	248	238.1866667	211.1123596
Executives 2					0								0
Executives 20	291.8518519	225.46875	254.72	218.0833333	258.8823529	290.6071429	236.6086957	218.28	309.8125			276.4166667	255.0567686
Executives 21	164.1649832	155.6654275	142.5940171	138.7758007	157.505	141.3640553	139.6855895	145.0990566	142.32	203.5		142.1632653	147.8066964
Executives 22	209.8333333	154.9724771	159.18	142.3373494	160.0549451	157	154.5952381	182.0175439	196.3953488	158.7532468			162.2982005
Executives 23	157.4918033	175.5410959	180.1827957	181.1477833	174.1853659	189.2254098	186.5315315	166.2300885	172.7132353	177.5090253	150.2857143	131	177.0845921
Executives 24	294	231.4782609	253.9248555	235.6555556	245.0206897	228.5897436	244.7848101	269.9927007	250.2418301	259.3454545	271.9827586		249.6438181
Executives 25	212.5906736	223.5947368	211.4177215	202.5823529	211.481203	223.3121019	217.4604317	207.6448598	195.05	150		199.492891	211.2797893
Executives 26	114.0217391	112.7913907	117.73	123.7578475	112.6	131.2240437	119.0045662	114.2326733	114.952381	124.2042553	113.9487179	31	118.1205083
Executives 27	159.8484848	169.1834862	177.6965174	173.6273585	172.7014925	176.078534	182.0104167	168.9766082	171.8768473	201.9447514	188.5153061	163	178.4051535
Executives 28	221.0046729	207.6306306	188.7624309	203.4186047	194.9407895	243.4012346	213.5578947	199.5344828	214.9939024	161.5555556		240.7058824	210.7617096
Executives 29	217.5154185	190.1041667	201.0120482	230.8333333	196.2857143	193.8068182	191.030303	198.3414634	166.5538462	91		212.7554585	202.2358491
Executives 3	336.7580645	216.2947368	283.1084337	299.6842105	284.0196078	260	392.4444444	295.8474576	263.7118644	121.875		238.5	283.5785582
Executives 30		132	218.2307692	224.2116788	220.7254902	210.0540541	195.5964912	215.3392857	242.2983871	217.1935484	207.738255		216.8432971
Executives 31	120.5	118.0666667	131.875	163.2235294	121.78125	114.125	128.7	131.675	132.3333333	156.7954545	159.7142857		138.8128773
Executives 32	299.1333333	243.36	264.7692308	297.0714286	217.2777778	274.5217391	225.9166667	233.5714286	211.3529412			249.8235294	249.47343
Executives 33	172.5783133	168.6367713	186.706383	180.7934272	158.2180095	159.8457447	160.8937198	173.2264151	169.4887892	171.9321429	163.877551	181	170.3185882
Executives 34	234.4025974	226.5333333	228.2580645	212.6635945	268.3533835	267.5142857	232.9337748	246.8263158	257.9693252	250.7565217	229.3548387	292	241.1611479
Executives 35	145.1208791	156.1322314	144.3791469	150.3350785	142.1848739	142.182266	158.1725888	153.4456522	216.9473684	21.33333333		148.0782313	149.0987835
Executives 36	149.4285714	138.7435897	141.371134	135.7632509	143.4086957	139.2355769	142.502439	136.4926829	142.8	164.296748	165.7225131		145.1315424
Executives 37		285.2666667	282.9817073	265.5581395	244.2058824	272.4814815	299.1466667	299.751773	281.5068493	259.027933	238.25		276.4096821
Executives 38		182.7142857	195.4897959	197.6103896	214.5438596	195.22	250.6610169	219.1269841	193.1375	261	273.1304348		219.8459119
Executives 39	282	264.9038462	229.0194175	245.8846154	269.4157303	238.2571429	213.6218487	227.6803279	262.0984848	274.38	254.65625		247.7046861
Executives 4	194.4708029	188.5826087	175.6153846	175.4296296	179.6640927	194.2850679	196.9929577	193.6769231	209.2888889			191.3419355	188.3528481
Executives 40	173.1775701	163.0674157	131.5	195.1617647	190.6666667	165.0714286	124.2037037	188.3953488	97.5			170.9279279	166.8255452
Executives 41	192.4467005	174.6371681	168.2756757	171.4748603	205.4021164	180.7628205	181.4150943	192.170068	175.65625	40		183.8995434	182.9905325
Executives 42	162.4579439	176.3568627	149.1428571	154.8365385	165.9336735	153.4328358	138.4201183	174.1219512	268.1666667			162.7609428	161.313048
Executives 43	226.5555556	195.212766	182.459854	172.875	171	185.1698113	161.5104895	180.1583333	195.9782609	159.0275862	173.0814815		177.064213
Executives 44					0								0
Executives 45		0											0
Executives 46	190.5636364	194.9215686	188.4545455	194.8173913	175.0584795	187.2103175	205.5720721	190.4055556	209.2244898	226.0471204	213.4642857	108.5	196.84821
Executives 47	343	355.6811594	365.7982456	338.3357143	343.9918033	298.46	313.7461538	313.8793103	408.3829787	477.6712329	56.66666667		350.0667957
Executives 48		152.7209302	160.5294118	162.1047619	173.6496815	151.7307692	159.9344262	167.56875	179.202765	183.7438017	165.7290076		166.811048
Executives 49	190.2138728	213.2699387	213.1923077	180.8272727	196.6923077	185.9245283	199.93	195.7118644	174.3984962	190.5		164	193.4682731
Executives 5	194.8873239	238.984127	241.2293578	272.2407407	215.1066667	210.4227642	237.4416667	239.0884956	248.9259259	172.3333333		182.1176471	229.2816365
Executives 50	202.9883721	194.2717391	171.5208333	216.5454545	198.6885246	186.1607143	191.5714286	280.3888889	281.125	219		224.5121951	205.5493482
Executives 51	209.3992095	209.7692308	223.9468599	203.8902439	216.9693252	216.5065502	207.0459184	210.7894737	208.6986301	146		208.6548673	211.3406863
Executives 52	215.0133929	215.12	186.2887701	207.3712121	195.9324324	211.1202532	205.9946809	190.6071429	213.3364486	183.8333333		199.1698113	204.3195417
Executives 53	110.9375	133.2898089	137.3905724	126.0251046	138.6331658	122.9611111	125.6166667	128.3893805	141.2396313	123.9614243	101.0555556	150.5	129.6516129
Executives 54	202.8913043	203.7692308	235.6	207.1625	191.7777778	215.9076923	209.6533333	199.6065574	222.4153846	157.9		219.4090909	210.0611354
Executives 55	167.1310044	172.6370968	164.5860215	157.2980132	164.0208333	167.1257862	147.2071006	161.2713568	165.6585366	128.4285714		159.4237288	163.1527232
Executives 56	270.0769231	290.3666667	295.8823529	324.1851852	332.1578947	375.6956522	276.68	291.3076923	201.6190476			500.25	302.1966527
Executives 57			0										0
Executives 58	169	176	179.9673913	181.4117647	162.8717949	196.1764706	184.3737374	210.0194175	183.2	180.4867257	191.9954751	149	183.4551084
Executives 59	185.9352751	184.2826748	167.0790378	185.1519608	175.3134921	183.1843137	168.8482143	171.9241071	176.3764045			184.540146	178.2667499
Executives 6	232.1019108	231.9927536	203.9705882	233.8728814	207.5217391	246.736	279.3913043	238.4242424	236.5238095	266		215.3772455	228.2793594
Executives 60	227.1733333	188.0916667	187.8860104	211.038835	203.6686391	193.919598	211.960452	195.2879581	219.7741935	428.5		218.4814815	204.8031368
Executives 61	180.8571429	197.8661417	214.6632124	222.3021978	229.5267176	213.6458333	234.9461078	245.51875	221.68125	256.25	291.257485		232.9681873
Executives 62	206.3717949	227.0447761	225.0235294	201.9364162	186.0146341	211.5584416	205.691358	208.25625	206.2151899	210.7777778		212.9736842	209.1369014
Executives 63	180.6956522	139.1011236	157.5379747	164.6764706	142.64	132.1968504	142.5	154.3134328	139.9638554	131.5111111	160.2222222	164	148.4312377
Executives 64			0										0
Executives 65	196.7366548	183.2989324	193.7945946	201.9811321	185.0967742	198.2896552	186.3401015	198.1116751	192.7926829	193		192.4586466	192.4970958
Executives 7		154.1538462	173.3360324	157.3758389	156.25	173.2080925	171.1538462	156.8046512	176.5243446	185.7425373	184.9492188		170.5542115
Executives 8									23				23
Executives 9		256.5172414	171.2455357	194.8381743	185.7378049	192.0236686	210.1658031	195.591623	184.1469388	247.865285	222.5466667		200.9679829
#N/A	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	**97.42402163**	**116.7837413**	**144.7250237**	**149.5409567**	**146.9693211**	**169.8968228**	**181.4393491**	**179.7245137**	**174.3246753**	**144.5825468**	**105.9491371**	**92.01032541**	**139.5321473**

Table: 1

- Agents are measured in the Rows and average of Call Seconds is measured in the Values section for each day part time in columns. And call status in filter section.
- The total average of call time duration which are answered by the agents is 198.6 seconds and overall average call time duration is 139.53 seconds.
- The average call time duration for all incoming calls received by agents is the highest in between 10 am to 11 am and from 7 pm to 8 pm.
- The average call time duration for all incoming calls received by agents is the least in between 12 noon to 1 pm.
- Executive 47 has highest average call duration and Executive 8 has lowest average call duration.

Q2. Show the total volume/ number of calls coming in via charts/ graphs [Number of calls v/s Time]. You can select time in a bucket form (i.e. 1-2, 2-3, ….).

Solution:

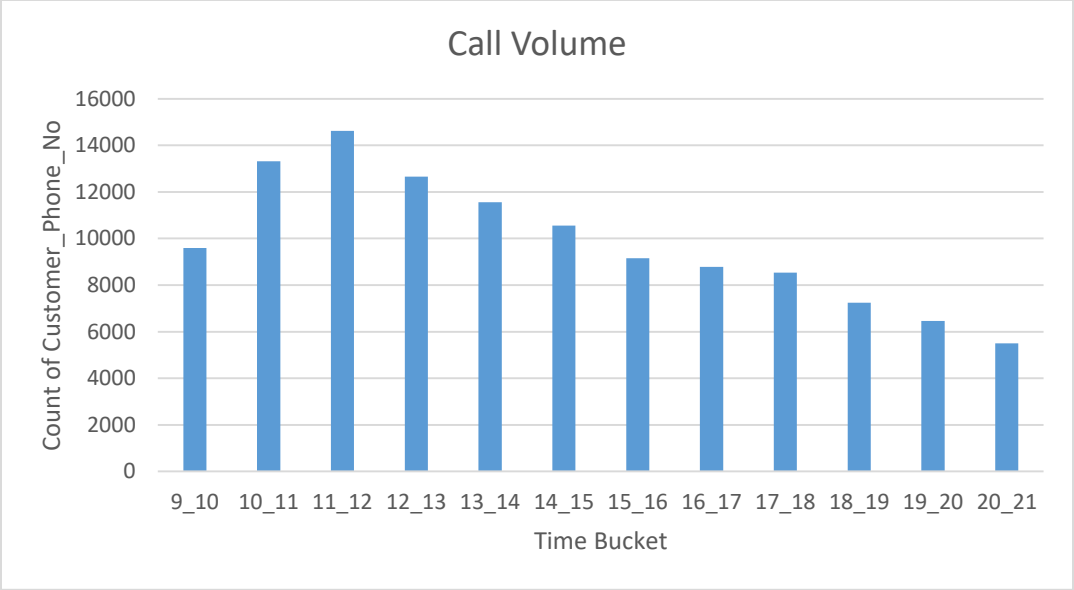

Figure-1

- We plotted Time Bucket in the rows and took Count of phone number as their values.
- We measured Count of phone number as the Total call received in that duration.
- The customers call the most in between 11 am to 1 noon.
- The customers call the least in between 8 pm to 9 pm.

Assumption: An agent work for 6 days a week; On an average total unplanned leaves per agent is 4 days a month; An agent total working Hrs. is 9 Hrs. out of which 1.5 Hrs. goes into lunch and snacks in the office. On average an agent occupied for 60% of his total actual working Hrs. (i.e. 60% of 7.5 Hrs.) on call with customers/ users. Total days in a month is 30 days.

Q3. As you can see current abandon rate is approximately 30%. Propose a manpower plan required during each time bucket [between 9am to 9pm] to reduce the abandon rate to 10%. (i.e. You have to calculate minimum number of agents required in each time bucket so that at least 90 calls should be answered out of 100).

Solution: From the table-2 shown below, we know that 29% are Abandon call, 70% are answered and 1 % are transferred call. In order to reduce abandon rate to 10%, we have answer more number of all and for that we require more agents to attend more calls.

From this, we first have to find how many call received in each day and average number of call received having on the basis of call status.

A	B	C	D	E	F
Count of Customer_Phone_No	Call _status				
Date	abandon	answered	transfer	(blank)	Grand Total
<1/1/2022					
1-Jan	684	3883	77		4644
2-Jan	356	2935	60		3351
3-Jan	599	4079	111		4789
4-Jan	595	4404	114		5113
5-Jan	536	4140	114		4790
6-Jan	991	3875	85		4951
7-Jan	1319	3587	42		4948
8-Jan	1103	3519	50		4672
9-Jan	962	2628	62		3652
10-Jan	1212	3699	72		4983
11-Jan	856	3695	86		4637
12-Jan	1299	3297	47		4643
13-Jan	738	3326	59		4123
14-Jan	291	2832	32		3155
15-Jan	304	2730	24		3058
16-Jan	1191	3910	41		5142
17-Jan	16636	5706	5		22347
18-Jan	1738	4024	12		5774
19-Jan	974	3717	12		4703
20-Jan	833	3485	4		4322
21-Jan	566	3104	5		3675
22-Jan	239	3045	7		3291
23-Jan	381	2832	12		3225
Grand Total	**34403**	**82452**	**1133**		**117988**
Average values	**1496**	**3585**	**49**		**5130**
Call stauts percentage	29	70	1		

Table-2

From given assumption and above obtained table, we have calculated

Time taken on an average to answer a call	198.6
time required to make 90% of call(in hrs)	254.7
Total working person required per day	57

Table-3

Time for 90% of call (in Hrs.) = (Average time to answer 70% call* total average call* 0.9)/3600

Agent required = [Time for 90% of call (in Hrs.)]/ working time for agent

Initially answering 70%, the agent required for that is: average call duration/ working time of agent

i.e. [(198.6* 5130*0.7)/3600]/4.5 = 44

for answer 90% of call: 198.6* 5130*0.9)/3600]/4.5 = 57

Row Labels	Count of Customer_Phone_No	Required Agents
10_11	11.28%	6
11_12	12.40%	7
12_13	10.72%	6
13_14	9.80%	6
14_15	8.95%	5
15_16	7.76%	4
16_17	7.45%	4
17_18	7.23%	4
18_19	6.13%	3
19_20	5.48%	3
20_21	4.67%	3
9_10	8.13%	5
Grand Total	**100.00%**	57

Table- 4

So, the additional agents required are: 57-44 = 13.

Q4. Let's say customers also call this ABC insurance company in night but didn't get answer as there are no agents to answer, this creates a bad customer experience for this Insurance company. Suppose every 100 calls that customer made during 9 Am to 9 Pm, customer also made 30 calls in night between interval [9 Pm to 9 Am] and distribution of those 30 calls are as follows:

Distribution of 30 calls coming in night for every 100 calls coming in between 9am - 9pm (i.e. 12 hrs slot)											
9pm- 10pm	10pm - 11pm	11pm- 12am	12am- 1am	1am - 2am	2am - 3am	3am - 4am	4am - 5am	5am - 6am	6am - 7am	7am - 8am	8am - 9am
3	3	2	2	1	1	1	1	3	4	4	5

Now propose a manpower plan required during each time bucket in a day. Maximum Abandon rate assumption would be same 10%.

Solution: The given data shows the call distribution in each hours between 9pm-9am.

Time taken on an average to answer a call	198.6
time required to make 90% of call	254.700183
Total working person required per day	57

Table- 5

From the previous data, we know the average time to answer calls in day time and from that we can calculate the time required for answering 90% calls, as there is 0.3 times calls in night so the time required to answer them should also be 0.3 times.

And to calculate agent required, we have to divide time required by work time of agents.

call volume(9am-9pm)	5130
call volume(9pm-9am)	1539
hours required	76.41135
Agents required	17

Table-6

So according to percent of call received in particular hour we calculated the agent required in each hour between 9pm to 9am.

Nights Call (9 pm – 9 am)	Calls Distribution	% distributio	Agents required
21_22	3	10%	2
22_23	3	10%	2
23_24	2	7%	1
00_01	2	7%	1
01_02	1	3%	1
2_3	1	3%	1
3_4	1	3%	1
4_5	1	3%	1
5_6	3	10%	2
6_7	4	13%	2
7_8	4	13%	2
8_9	5	17%	3
Grand Total	30	100	17

Table-7

The total number of agents required between 9pm to 9am is 17.

Insights:

- The company can reduce the number of agents at evening time because of least calling at that duration.
- The company must divide working time of agents in 3 part, for efficient use of manpower.
- The employees who are working 9 am to 9 pm. The manager can change some of the workers shift from 5 am to 2 pm and some workers from 2 pm to 11 pm to get the most calls answered.
- The company can shift some of the day workers for the night shift.

Results:

- I learned about the behavioral analytics.
- I have also learned to use pivot table and pivot charts more effectively.
- I got to know about the IVR Duration, which is an Al tool, who answer the calls to get to know the customer exact question and then transfer it to the right agent to get the customer's queries get answered.
- This project was easy to get the answers as the data provided by the team have already calculated the time bucket and converted the calls duration into seconds, so we do not have to spend time on it to calculate.
- I have learned how to analyze the call Centre data and report to the management.

Drive link:

https://drive.google.com/drive/folders/1Qxd9DrKMDOPSmxqB8dVwMp_yB00T0Xfl?usp=share_link