

BUSINESS SCENARIO ANALYSIS AND MODELLING WITH APPLICATION ON INCREASING PRODUCTIVITY

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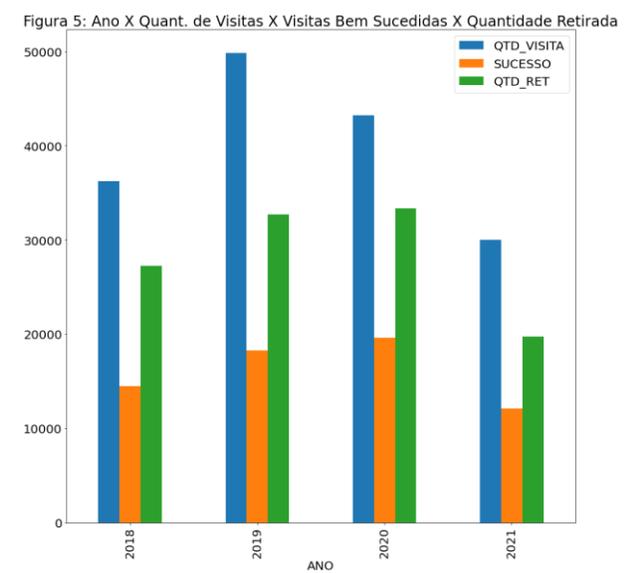
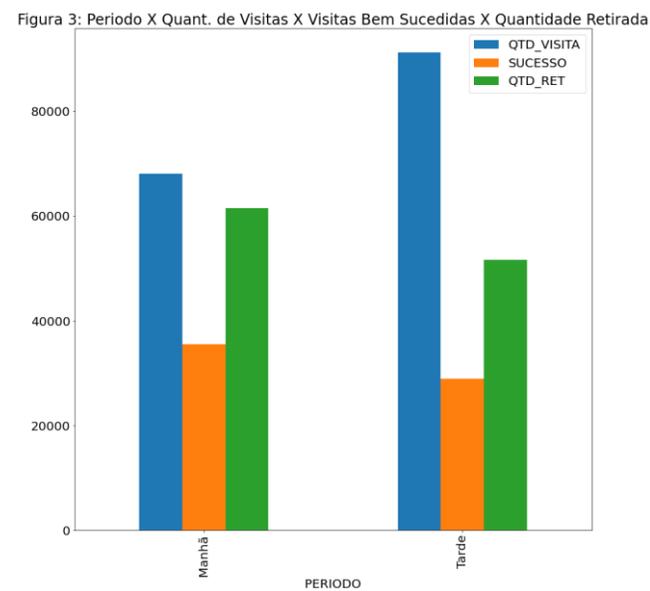
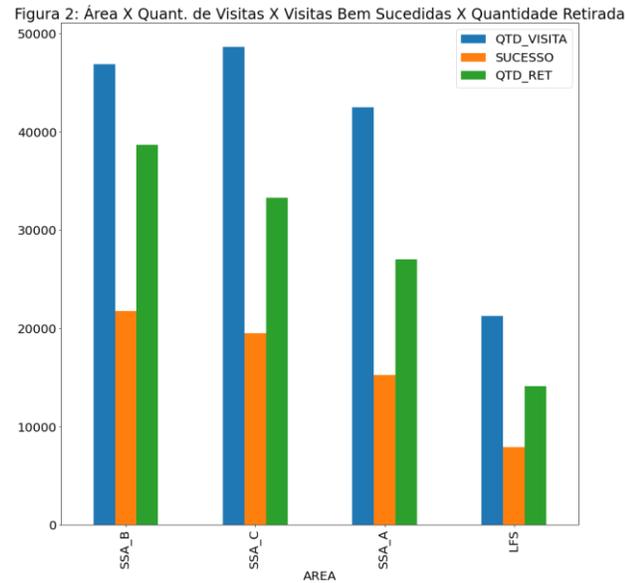
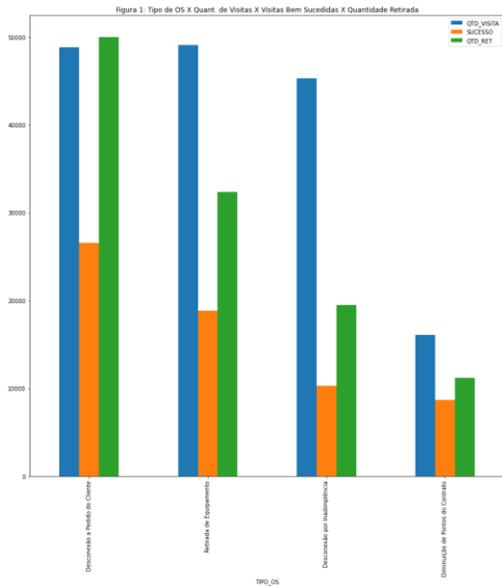
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Abbreviated abstract: This study focuses on improving productivity in an information technology (IT) equipment collection company of inactive customers, from the main telecommunications companies in the municipalities of Salvador and Lauro de Freitas, in the Brazilian state of Bahia. Thus, the aim of this study is to identify which factors influence the success or failure of service orders, measure the production of the technical team and suggest actions that guide the increase in productivity.

	TIPO_OS_NUM	AREA_NUM	ANO_MES	ANO	MES	PERIODO_NUM	QTD_VISITA	SUCESO	QTD_RET	INSUCESO
count	159277.000000	159277.000000	159277.000000	159277.000000	159277.000000	159277.000000	159277.0	159277.000000	159277.000000	159277.000000
mean	1.410631	1.771850	201948.239426	2019.420695	6.169949	0.572908	1.0	0.404635	0.709889	0.595365
std	1.212983	1.026686	103.102528	1.036803	3.330074	0.494657	0.0	0.490823	1.106971	0.490823
min	0.000000	0.000000	201801.000000	2018.000000	1.000000	0.000000	1.0	0.000000	0.000000	0.000000
25%	0.000000	1.000000	201901.000000	2019.000000	3.000000	0.000000	1.0	0.000000	0.000000	0.000000
50%	1.000000	2.000000	201911.000000	2019.000000	6.000000	1.000000	1.0	0.000000	0.000000	1.000000
75%	3.000000	3.000000	202010.000000	2020.000000	9.000000	1.000000	1.0	1.000000	1.000000	1.000000
max	3.000000	3.000000	202108.000000	2021.000000	12.000000	1.000000	1.0	1.000000	114.000000	1.000000

PREVIOUS WORK AND CHALLENGE

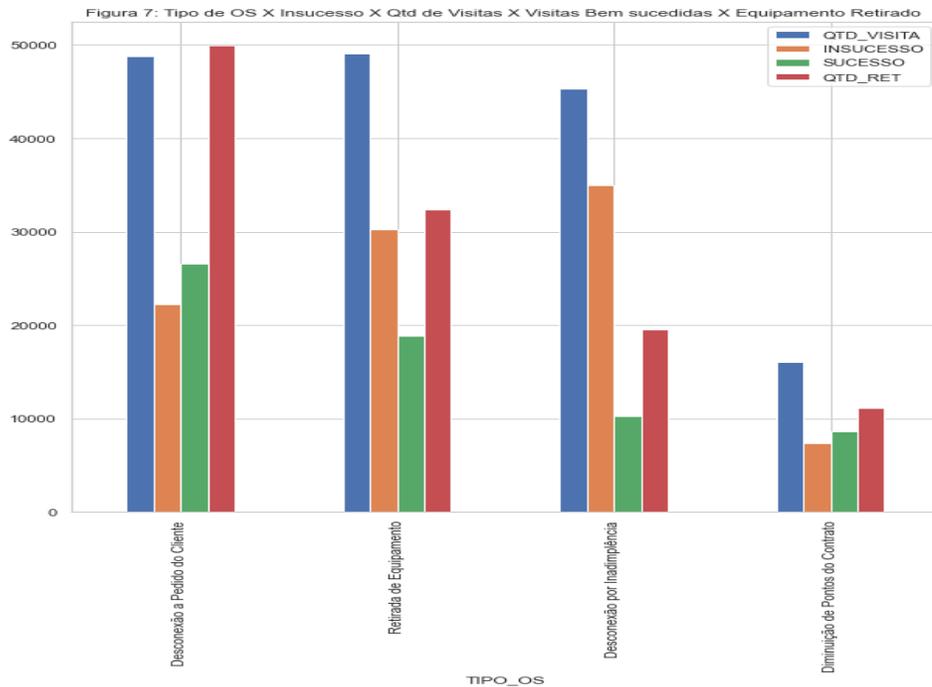
Every day the company receives from the contractors a list of service orders to be executed. We have consolidated the data of the last three years in order to identify patterns of occurrences and also predict future scenarios, which enhance the success of the conclusions of the Service Orders.



TIPO_OS	INSUCESSO	QTD_RET	QTD_VISITA	SUCESSO
Desconexão a Pedido do Cliente	22229	49979	48828	26599
Desconexão por Inadimplência	34968	19514	45289	10321
Diminuição de Pontos do Contrato	7409	11188	16088	8679
Retirada de Equipamento	30222	32388	49072	18850
All	94828	113069	159277	64449

TECHNIQUE

For this, we quantitatively reduced the data using calculations of the mean, standard deviation, sum and percentage and used the logistic regression in order to produce a model that allows estimating the probability of success associated with the explanatory variables existing in the data set.



TIPO_OS	sum	mean	std
Desconexão a Pedido do Cliente	26599	0.544749	0.497999
Desconexão por Inadimplência	10321	0.227892	0.419477
Diminuição de Pontos do Contrato	8679	0.539470	0.498455
Retirada de Equipamento	18850	0.384129	0.486394

Tabela 3. Generalized Linear Model Regression Results

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Dep. Variable:          SUCESSO      No. Observations:      159277
Model:                GLM           Df Residuals:          159266
Model Family:         Binomial      Df Model:                10
Link Function:        logit         Scale:                  1.0000
Method:               IRLS         Log-Likelihood:        -99030.
Date:                 Sun, 03 Oct 2021  Deviance:              1.9806e+05
Time:                 16:05:04      Pearson chi2:          1.59e+05
No. Iterations:       5
Covariance Type:     nonrobust
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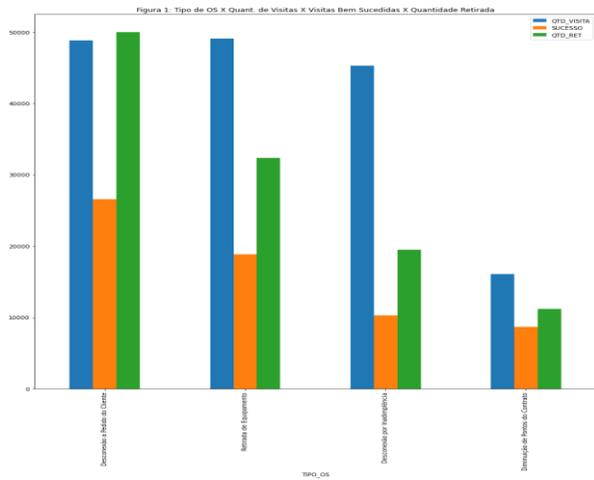
	coef	std err	z	P> z	[0.025	0.975]
Intercept	0.3074	0.020	15.341	0.000	0.268	0.347
TIPO_OS[T.Desconexão por Inadimplência]	-1.2170	0.015	-82.193	0.000	-1.246	-1.188
TIPO_OS[T.Diminuição de Pontos do Contrato]	0.0210	0.019	1.119	0.263	-0.016	0.058
TIPO_OS[T.Retirada de Equipamento]	-0.6566	0.013	-49.318	0.000	-0.683	-0.631
AREA[T.SSA_A]	-0.0382	0.018	-2.083	0.037	-0.074	-0.002
AREA[T.SSA_B]	0.2987	0.018	16.750	0.000	0.264	0.334
AREA[T.SSA_C]	0.1202	0.018	6.741	0.000	0.085	0.155
PERIODO[T.Tarde]	-0.6933	0.011	-63.157	0.000	-0.715	-0.672
ANO[T.2019]	-0.0327	0.015	-2.171	0.030	-0.062	-0.003
ANO[T.2020]	0.3044	0.015	19.723	0.000	0.274	0.335
ANO[T.2021]	0.0827	0.017	4.872	0.000	0.049	0.116

Total de Equipamentos Retirados por Tipo de OS

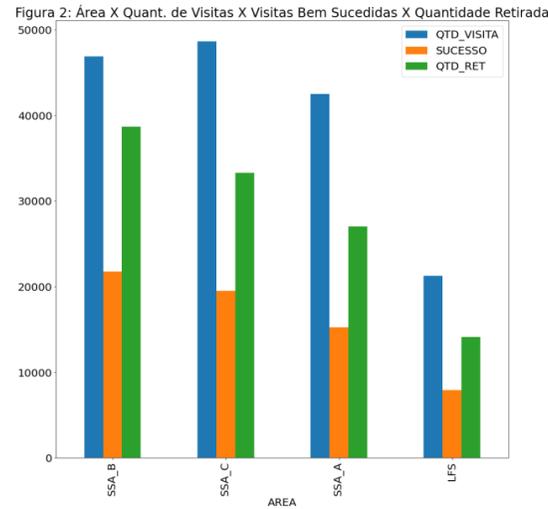
EMPRESA	MOTIVO_BAIXA	QTD_VISITA
Alcazar Coletas	Cliente Ausente	30998
	Cliente Solicitou Novo Agendamento	13783
	Cliente não pediu o Serviço	1561
	Cliente não quer devolver o Equipamento	5026
	Desco. Efetuada Com Retirada De Equipamento	21312
	Desco. Efetuada Sem Retirada de Equipamento	3978
	Equipamento Retirado	43494
	Não Localizou o endereço	7654
	Não Reside No Local	18610
	Não compriu agenda	7476
	OS Incorreta	999
	Outras	1948
	Solicitação de Vistoria	2438

FINDINGS:

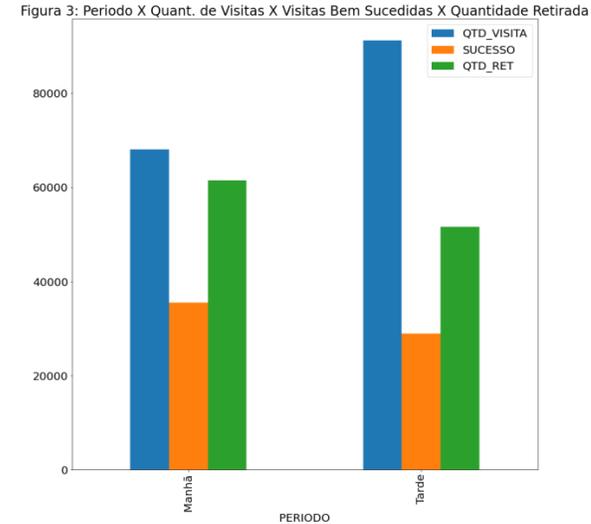
Finally, we identified the main influencing attributes for the success of the collections, that is, which directly contribute to the increase in the number of equipment collected in the first visit, resulting in increased productivity.



OS, Disconnection on Customer Request, has the best visit versus removal of equipment ratio. The number of equipment removed being higher than the number of visits.

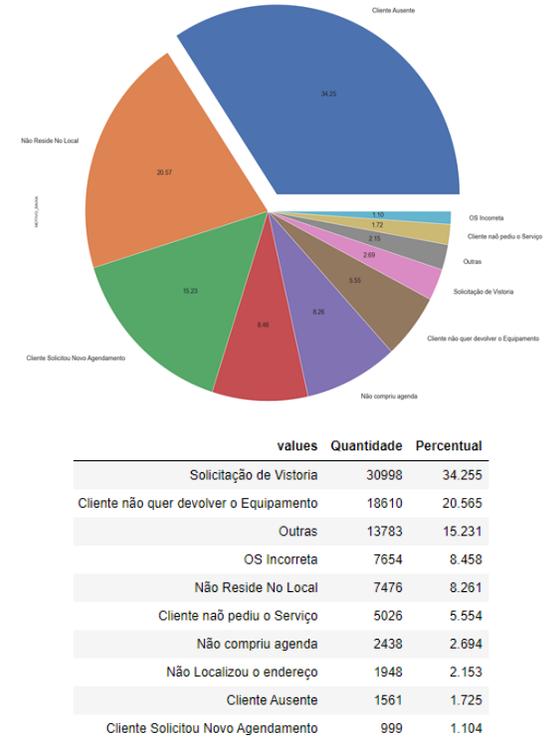


The SSA_B area has the best visit versus equipment removal ratio; note that the best technician is targeting that area. In this way, we could think of rotation aiming to improve the performance of the other operating regions;



The morning is the best time for picking up equipment; concentrate clients with the most difficult withdrawal history at this time of day;

Figura 8: Insucesso por Motivo



Considering the data presented, we verified that 9 low codes are responsible for 98.90% of all unproductive visits that these events are present in all OS, including the most productive ones.