

```

> df$Plant<-as.factor(df$Plant)
> df$Product_Line<-as.factor(df$Product_Line)
> mlr<-lm(df$Sales_Transportation~df$Quantity_units+df$N_Parts+df$Assembly_Labo
ur_Minutes+df$Machinery_Minutes+
+ df$Number_of_Deliveries+df$Average_Delivery_B
atch_Size_units+
+ df$Turnover_Range_EURO+df$Customer_Class+df$P
roduct_Line+df$Plant)
> summary(mlr)

```

Call:

```

lm(formula = df$Sales_Transportation ~ df$Quantity_units + df$N_Parts +
  df$Assembly_Labour_Minutes + df$Machinery_Minutes + df$Number_of_Deliveries
+
  df$Average_Delivery_Batch_Size_units + df$Turnover_Range_EURO +
  df$Customer_Class + df$Product_Line + df$Plant)

```

Residuals:

Min	1Q	Median	3Q	Max
-34272	-82	12	83	342056

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-6.692e+02	2.272e+02	-2.945	0.003231	**
df\$Quantity_units	1.041e-02	5.026e-03	2.071	0.038353	*
df\$N_Parts	1.208e+01	1.209e+00	9.994	< 2e-16	***
df\$Assembly_Labour_Minutes	-4.618e-02	1.631e-02	-2.832	0.004627	**
df\$Machinery_Minutes	-3.162e-03	1.084e-02	-0.292	0.770452	
df\$Number_of_Deliveries	4.284e+01	1.110e+00	38.607	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	-1.399e-02	2.139e-02	-0.654	0.513072	
df\$Turnover_Range_EUROb 20-100	-3.997e+01	5.513e+01	-0.725	0.468449	
df\$Turnover_Range_EUROc 100-250	-1.608e+01	5.461e+01	-0.294	0.768443	
df\$Turnover_Range_EUROd 250-500	-3.139e+01	5.482e+01	-0.573	0.566868	
df\$Turnover_Range_EUROe >500	-1.683e+01	4.844e+01	-0.347	0.728262	
df\$Turnover_Range_EUROStrategic	1.692e+02	6.458e+01	2.620	0.008798	**
df\$Customer_ClassOthers	-8.444e+00	2.993e+01	-0.282	0.777830	
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-5.051e+02	2.461e+02	-2.052	0.040143	*
df\$Product_LineCables	-1.026e+02	2.252e+02	-0.455	0.648778	
df\$Product_LineCables China	1.094e+03	2.804e+02	3.900	9.65e-05	***
df\$Product_LineHigh-Tech Cables	5.895e+02	6.922e+02	0.852	0.394413	
df\$Product_LineMIVI	8.516e+01	2.972e+02	0.287	0.774435	
df\$Product_LinePlugs and Caps	5.296e+02	2.129e+02	2.488	0.012856	*
df\$Product_LineProfiles	3.390e+02	2.134e+02	1.588	0.112201	
df\$Product_LineProfiles Trading	6.313e+02	2.911e+02	2.168	0.030136	*
df\$Product_LinePull Cables	1.643e+04	3.485e+02	47.132	< 2e-16	***
df\$Product_LinePull Cables China	4.818e+02	6.208e+02	0.776	0.437741	
df\$Product_LineResidual Springs	6.559e+02	2.293e+02	2.861	0.004228	**
df\$Product_LineSprings	3.294e+02	2.090e+02	1.576	0.114947	
df\$Product_LineSprings China	6.070e+02	2.637e+02	2.302	0.021335	*
df\$Product_LineSprings Trading	8.306e+02	2.485e+02	3.342	0.000833	***
df\$Product_LineTP 821	-6.494e+02	2.689e+02	-2.415	0.015725	*
df\$Product_LineTP 821-822	7.907e+03	1.107e+03	7.145	9.19e-13	***
df\$PlantChina	-7.852e+02	3.701e+02	-2.122	0.033864	*
df\$PlantFRA	4.614e+01	4.481e+02	0.103	0.917979	
df\$PlantIND	1.504e+02	8.134e+02	0.185	0.853348	
df\$PlantNorthern Italy	1.479e+01	8.448e+01	0.175	0.860997	
df\$PlantSouthern Italy	7.099e+01	8.820e+01	0.805	0.420902	
df\$PlantSpain	9.776e+01	8.195e+01	1.193	0.232934	
df\$PlantUK	2.320e+01	9.440e+01	0.246	0.805880	

```
df$PlantUSA -3.326e+01 8.790e+01 -0.378 0.705095
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Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
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```
Residual standard error: 2288 on 32341 degrees of freedom
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Multiple R-squared: 0.1642, Adjusted R-squared: 0.1632
```

```
F-statistic: 176.5 on 36 and 32341 DF, p-value: < 2.2e-16
```

```
> mlr<-lm(df$Packing~df$Quantity_units+df$N_Parts+df$Assembly_Labour_Minutes+df$Machinery_Minutes+
+ df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+ df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)
```

```
Call:
```

```
lm(formula = df$Packing ~ df$Quantity_units + df$N_Parts + df$Assembly_Labour_Minutes +
    df$Machinery_Minutes + df$Number_of_Deliveries + df$Average_Delivery_Batch_Size_units +
    df$Turnover_Range_EURO + df$Customer_Class + df$Product_Line +
    df$Plant)
```

```
Residuals:
```

```
    Min      1Q  Median      3Q      Max
-10167   -53      -2      29 137541
```

```
Coefficients: (1 not defined because of singularities)
```

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	2.892e+02	9.550e+01	3.029	0.002459	**
df\$Quantity_units	7.461e-03	2.112e-03	3.532	0.000413	***
df\$N_Parts	5.529e+00	5.082e-01	10.880	< 2e-16	***
df\$Assembly_Labour_Minutes	-5.631e-03	6.854e-03	-0.822	0.411334	
df\$Machinery_Minutes	2.493e-03	4.554e-03	0.547	0.584087	
df\$Number_of_Deliveries	3.342e+00	4.664e-01	7.167	7.84e-13	***
df\$Average_Delivery_Batch_Size_units	-1.668e-02	8.989e-03	-1.855	0.063540	.
df\$Turnover_Range_EUROb 20-100	-7.395e+00	2.317e+01	-0.319	0.749603	
df\$Turnover_Range_EUROc 100-250	4.480e+00	2.295e+01	0.195	0.845243	
df\$Turnover_Range_EUROd 250-500	1.210e+00	2.304e+01	0.053	0.958124	
df\$Turnover_Range_EUROe >500	2.615e+01	2.036e+01	1.284	0.199059	
df\$Turnover_Range_EUROStrategic	1.255e+02	2.714e+01	4.623	3.81e-06	***
df\$Customer_ClassOthers	-3.340e+01	1.258e+01	-2.655	0.007930	**
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-4.130e+02	1.034e+02	-3.992	6.57e-05	***
df\$Product_LineCables	-4.963e+02	9.465e+01	-5.244	1.58e-07	***
df\$Product_LineCables China	-6.131e+02	1.179e+02	-5.201	1.99e-07	***
df\$Product_LineHigh-Tech Cables	-2.734e+02	2.909e+02	-0.940	0.347319	
df\$Product_LineMIVI	-4.305e+02	1.249e+02	-3.447	0.000568	***
df\$Product_LinePlugs and Caps	-3.173e+02	8.948e+01	-3.546	0.000391	***
df\$Product_LineProfiles	-3.501e+02	8.971e+01	-3.902	9.55e-05	***
df\$Product_LineProfiles Trading	-2.794e+01	1.224e+02	-0.228	0.819359	
df\$Product_LinePull Cables	4.693e+03	1.465e+02	32.040	< 2e-16	***
df\$Product_LinePull Cables China	-6.374e+02	2.609e+02	-2.443	0.014576	*
df\$Product_LineResidual Springs	-2.895e+02	9.636e+01	-3.005	0.002662	**
df\$Product_LineSprings	-3.001e+02	8.783e+01	-3.417	0.000635	***
df\$Product_LineSprings China	-3.955e+02	1.108e+02	-3.569	0.000359	***
df\$Product_LineSprings Trading	-1.530e+02	1.045e+02	-1.465	0.142901	
df\$Product_LineTP 821	-5.171e+02	1.130e+02	-4.576	4.76e-06	***
df\$Product_LineTP 821-822	4.137e+03	4.651e+02	8.895	< 2e-16	***
df\$PlantChina	-1.828e+02	1.555e+02	-1.175	0.240008	
df\$PlantFRA	-4.662e+00	1.883e+02	-0.025	0.980249	

df\$PlantIND	6.785e+01	3.419e+02	0.198	0.842673
df\$PlantNorthern Italy	1.617e+00	3.551e+01	0.046	0.963674
df\$PlantSouthern Italy	8.117e+00	3.707e+01	0.219	0.826675
df\$PlantSpain	2.742e+01	3.445e+01	0.796	0.425987
df\$PlantUK	-6.579e+00	3.968e+01	-0.166	0.868307
df\$PlantUSA	-3.579e+01	3.694e+01	-0.969	0.332685

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 961.8 on 32341 degrees of freedom

Multiple R-squared: 0.08528, Adjusted R-squared: 0.08427

F-statistic: 83.76 on 36 and 32341 DF, p-value: < 2.2e-16

```
> mlr<-lm(df$Outbound_Logistics_Local_Branches~df$Quantity_units+df$N_Parts+df$
Assembly_Labour_Minutes+df$Machinery_Minutes+
+ df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+ df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)
```

Call:

```
lm(formula = df$Outbound_Logistics_Local_Branches ~ df$Quantity_units +
df$N_Parts + df$Assembly_Labour_Minutes + df$Machinery_Minutes +
df$Number_of_Deliveries + df$Average_Delivery_Batch_Size_units +
df$Turnover_Range_EURO + df$Customer_Class + df$Product_Line +
df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-56735	-128	69	161	152206

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	1.153e+03	1.672e+02	6.893	5.58e-12	***
df\$Quantity_units	-5.366e-03	3.699e-03	-1.451	0.146885	
df\$N_Parts	3.818e+00	8.898e-01	4.291	1.79e-05	***
df\$Assembly_Labour_Minutes	-3.305e-03	1.200e-02	-0.275	0.782999	
df\$Machinery_Minutes	-6.199e-03	7.974e-03	-0.777	0.436915	
df\$Number_of_Deliveries	1.169e+02	8.166e-01	143.155	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	6.494e-02	1.574e-02	4.126	3.70e-05	***
df\$Turnover_Range_EUROb 20-100	2.863e+01	4.057e+01	0.706	0.480417	
df\$Turnover_Range_EUROc 100-250	5.682e+01	4.019e+01	1.414	0.157473	
df\$Turnover_Range_EUROd 250-500	6.321e+01	4.034e+01	1.567	0.117171	
df\$Turnover_Range_EUROe >500	1.044e+00	3.565e+01	0.029	0.976643	
df\$Turnover_Range_EUROStrategic	-2.318e+01	4.753e+01	-0.488	0.625834	
df\$Customer_ClassOthers	6.298e+01	2.202e+01	2.859	0.004246	**
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-1.109e+03	1.811e+02	-6.120	9.44e-10	***
df\$Product_LineCables	-1.043e+03	1.657e+02	-6.291	3.19e-10	***
df\$Product_LineCables China	-8.724e+02	2.064e+02	-4.227	2.37e-05	***
df\$Product_LineHigh-Tech Cables	-9.046e+02	5.094e+02	-1.776	0.075767	.
df\$Product_LineMIVI	-1.897e+03	2.187e+02	-8.675	< 2e-16	***
df\$Product_LinePlugs and Caps	-9.612e+02	1.567e+02	-6.135	8.59e-10	***
df\$Product_LineProfiles	-1.095e+03	1.571e+02	-6.972	3.20e-12	***
df\$Product_LineProfiles Trading	-9.529e+02	2.143e+02	-4.448	8.71e-06	***
df\$Product_LinePull Cables	1.917e+03	2.565e+02	7.475	7.91e-14	***
df\$Product_LinePull Cables China	1.397e+04	4.569e+02	30.568	< 2e-16	***
df\$Product_LineResidual Springs	-8.452e+02	1.687e+02	-5.009	5.50e-07	***
df\$Product_LineSprings	-1.027e+03	1.538e+02	-6.676	2.50e-11	***
df\$Product_LineSprings China	-8.596e+02	1.940e+02	-4.430	9.45e-06	***
df\$Product_LineSprings Trading	-6.592e+02	1.829e+02	-3.604	0.000314	***

df\$Product_LineTP 821	-1.550e+03	1.979e+02	-7.832	4.94e-15	***
df\$Product_LineTP 821-822	-3.290e+03	8.144e+02	-4.040	5.37e-05	***
df\$PlantChina	2.511e+03	2.723e+02	9.220	< 2e-16	***
df\$PlantFRA	-3.959e+02	3.297e+02	-1.200	0.229955	
df\$PlantIND	-2.522e+02	5.986e+02	-0.421	0.673523	
df\$PlantNorthern Italy	-5.364e+02	6.218e+01	-8.627	< 2e-16	***
df\$PlantSouthern Italy	-5.042e+02	6.491e+01	-7.768	8.21e-15	***
df\$PlantSpain	-5.597e+02	6.031e+01	-9.279	< 2e-16	***
df\$PlantUK	-4.164e+02	6.947e+01	-5.994	2.07e-09	***
df\$PlantUSA	-2.128e+02	6.469e+01	-3.290	0.001002	**

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1684 on 32341 degrees of freedom

Multiple R-squared: 0.4451, Adjusted R-squared: 0.4445

F-statistic: 720.7 on 36 and 32341 DF, p-value: < 2.2e-16

```
> mlr<-lm(df$Distribution_Activities~df$Quantity_units+df$N_Parts+df$Assembly_Labour_Minutes+df$Machinery_Minutes+
+ df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+ df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)
```

Call:

```
lm(formula = df$Distribution_Activities ~ df$Quantity_units +
    df$N_Parts + df$Assembly_Labour_Minutes + df$Machinery_Minutes +
    df$Number_of_Deliveries + df$Average_Delivery_Batch_Size_units +
    df$Turnover_Range_EURO + df$Customer_Class + df$Product_Line +
    df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-4629.9	-36.1	-8.0	13.2	7439.3

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	2.949e+02	1.790e+01	16.471	< 2e-16	***
df\$Quantity_units	9.926e-04	3.960e-04	2.507	0.012192	*
df\$N_Parts	2.181e+00	9.526e-02	22.896	< 2e-16	***
df\$Assembly_Labour_Minutes	2.805e-03	1.285e-03	2.183	0.029022	*
df\$Machinery_Minutes	1.747e-03	8.537e-04	2.046	0.040723	*
df\$Number_of_Deliveries	5.445e+00	8.742e-02	62.282	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	1.028e-03	1.685e-03	0.610	0.541954	
df\$Turnover_Range_EUROb 20-100	2.331e+00	4.343e+00	0.537	0.591548	
df\$Turnover_Range_EUROc 100-250	8.048e+00	4.303e+00	1.871	0.061418	.
df\$Turnover_Range_EUROd 250-500	8.013e+00	4.319e+00	1.855	0.063562	.
df\$Turnover_Range_EUROe >500	2.125e+01	3.816e+00	5.567	2.61e-08	***
df\$Turnover_Range_EUROstrategic	6.388e+01	5.088e+00	12.555	< 2e-16	***
df\$Customer_ClassOthers	-2.032e+01	2.358e+00	-8.618	< 2e-16	***
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-3.637e+02	1.939e+01	-18.757	< 2e-16	***
df\$Product_LineCables	-3.330e+02	1.774e+01	-18.771	< 2e-16	***
df\$Product_LineCables China	-3.370e+02	2.209e+01	-15.254	< 2e-16	***
df\$Product_LineHigh-Tech Cables	-3.069e+02	5.454e+01	-5.628	1.84e-08	***
df\$Product_LineMIVI	-4.039e+02	2.341e+01	-17.252	< 2e-16	***
df\$Product_LinePlugs and Caps	-3.202e+02	1.677e+01	-19.089	< 2e-16	***
df\$Product_LineProfiles	-3.205e+02	1.682e+01	-19.062	< 2e-16	***
df\$Product_LineProfiles Trading	-3.046e+02	2.294e+01	-13.279	< 2e-16	***
df\$Product_LinePull Cables	4.308e-01	2.746e+01	0.016	0.987481	
df\$Product_LinePull Cables China	-5.157e+02	4.891e+01	-10.543	< 2e-16	***

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df$Product_LineResidual Springs      -2.601e+02  1.806e+01 -14.399 < 2e-16 ***
df$Product_LineSprings                -2.804e+02  1.646e+01 -17.033 < 2e-16 ***
df$Product_LineSprings China          -3.237e+02  2.077e+01 -15.584 < 2e-16 ***
df$Product_LineSprings Trading        -2.915e+02  1.958e+01 -14.885 < 2e-16 ***
df$Product_LineTP 821                 -3.971e+02  2.118e+01 -18.748 < 2e-16 ***
df$Product_LineTP 821-822             -5.992e+02  8.719e+01 -6.872 6.44e-12 ***
df$PlantChina                        -3.077e+01  2.916e+01 -1.055 0.291219
df$PlantFRA                          1.379e+01  3.530e+01  0.391 0.696075
df$PlantIND                          4.561e+01  6.408e+01  0.712 0.476611
df$PlantNorthern Italy                3.923e+01  6.656e+00  5.894 3.82e-09 ***
df$PlantSouthern Italy                1.942e+01  6.949e+00  2.795 0.005194 **
df$PlantSpain                        2.348e+01  6.457e+00  3.636 0.000277 ***
df$PlantUK                           -3.195e-01  7.438e+00 -0.043 0.965731
df$PlantUSA                          -2.077e+00  6.925e+00 -0.300 0.764282

```

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 180.3 on 32341 degrees of freedom

Multiple R-squared: 0.2313, Adjusted R-squared: 0.2305

F-statistic: 270.3 on 36 and 32341 DF, p-value: < 2.2e-16

```

> mlr<-lm(df$Manufacturing_Costs~df$Quantity_units+df$N_Parts+df$Assembly_Labou
r_Minutes+df$Machinery_Minutes+
+         df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+         df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)

```

Call:

```

lm(formula = df$Manufacturing_Costs ~ df$Quantity_units + df$N_Parts +
    df$Assembly_Labour_Minutes + df$Machinery_Minutes + df$Number_of_Deliveries
+
    df$Average_Delivery_Batch_Size_units + df$Turnover_Range_EURO +
    df$Customer_Class + df$Product_Line + df$Plant)

```

Residuals:

Min	1Q	Median	3Q	Max
-141369	-530	86	345	594420

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	2.698e+02	5.209e+02	0.518	0.604466	
df\$Quantity_units	1.806e-02	1.152e-02	1.568	0.116990	
df\$N_Parts	4.155e+01	2.771e+00	14.992	< 2e-16	***
df\$Assembly_Labour_Minutes	2.910e-02	3.738e-02	0.778	0.436352	
df\$Machinery_Minutes	2.847e-02	2.484e-02	1.146	0.251637	
df\$Number_of_Deliveries	1.896e+02	2.543e+00	74.556	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	1.581e-02	4.902e-02	0.322	0.747107	
df\$Turnover_Range_EUROb 20-100	-1.391e+02	1.264e+02	-1.101	0.270996	
df\$Turnover_Range_EUROc 100-250	-8.705e+01	1.252e+02	-0.695	0.486828	
df\$Turnover_Range_EUROd 250-500	-1.452e+02	1.257e+02	-1.155	0.248036	
df\$Turnover_Range_EUROe >500	4.568e+01	1.110e+02	0.411	0.680774	
df\$Turnover_Range_EUROStrategic	8.932e+02	1.480e+02	6.033	1.62e-09	***
df\$Customer_ClassOthers	-1.656e+02	6.860e+01	-2.414	0.015771	*
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-2.910e+03	5.642e+02	-5.159	2.50e-07	***
df\$Product_LineCables	-3.014e+03	5.162e+02	-5.839	5.29e-09	***
df\$Product_LineCables China	-3.367e+02	6.428e+02	-0.524	0.600407	
df\$Product_LineHigh-Tech Cables	-5.005e+02	1.587e+03	-0.315	0.752443	
df\$Product_LineMIVI	-2.782e+03	6.812e+02	-4.084	4.44e-05	***
df\$Product_LinePlugs and Caps	-9.158e+02	4.880e+02	-1.877	0.060560	.

df\$Product_LineProfiles	-1.572e+03	4.892e+02	-3.213	0.001316	**
df\$Product_LineProfiles Trading	-1.311e+03	6.674e+02	-1.965	0.049399	*
df\$Product_LinePull Cables	2.272e+04	7.989e+02	28.436	< 2e-16	***
df\$Product_LinePull Cables China	6.565e+03	1.423e+03	4.613	3.98e-06	***
df\$Product_LineResidual Springs	-8.823e+02	5.255e+02	-1.679	0.093192	.
df\$Product_LineSprings	-6.428e+02	4.790e+02	-1.342	0.179668	
df\$Product_LineSprings China	2.008e+03	6.044e+02	3.322	0.000895	***
df\$Product_LineSprings Trading	-1.484e+03	5.697e+02	-2.604	0.009217	**
df\$Product_LineTP 821	-1.731e+03	6.163e+02	-2.808	0.004984	**
df\$Product_LineTP 821-822	8.562e+04	2.537e+03	33.751	< 2e-16	***
df\$PlantChina	-2.014e+01	8.483e+02	-0.024	0.981061	
df\$PlantFRA	1.352e+02	1.027e+03	0.132	0.895268	
df\$PlantIND	8.116e+02	1.865e+03	0.435	0.663370	
df\$PlantNorthern Italy	1.737e+02	1.937e+02	0.897	0.369721	
df\$PlantSouthern Italy	1.483e+02	2.022e+02	0.733	0.463319	
df\$PlantSpain	2.773e+02	1.879e+02	1.476	0.139957	
df\$PlantUK	7.065e+00	2.164e+02	0.033	0.973956	
df\$PlantUSA	-5.846e+01	2.015e+02	-0.290	0.771696	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 5245 on 32341 degrees of freedom

Multiple R-squared: 0.2935, Adjusted R-squared: 0.2927

F-statistic: 373.2 on 36 and 32341 DF, p-value: < 2.2e-16

```
> mlr<-lm(df$Internal_Logistics_Costs~df$Quantity_units+df$N_Parts+df$Assembly_Labour_Minutes+df$Machinery_Minutes+
+ df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+ df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)
```

Call:

```
lm(formula = df$Internal_Logistics_Costs ~ df$Quantity_units +
    df$N_Parts + df$Assembly_Labour_Minutes + df$Machinery_Minutes +
    df$Number_of_Deliveries + df$Average_Delivery_Batch_Size_units +
    df$Turnover_Range_EURO + df$Customer_Class + df$Product_Line +
    df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-56072	-243	25	151	238467

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	9.781e+02	2.304e+02	4.245	2.19e-05	***
df\$Quantity_units	7.100e-03	5.097e-03	1.393	0.163649	
df\$N_Parts	2.328e+01	1.226e+00	18.990	< 2e-16	***
df\$Assembly_Labour_Minutes	-8.976e-03	1.654e-02	-0.543	0.587293	
df\$Machinery_Minutes	4.550e-03	1.099e-02	0.414	0.678854	
df\$Number_of_Deliveries	7.485e+01	1.125e+00	66.518	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	6.306e-03	2.169e-02	0.291	0.771256	
df\$Turnover_Range_EUROb 20-100	-6.124e+01	5.591e+01	-1.095	0.273358	
df\$Turnover_Range_EUROc 100-250	-4.210e+01	5.538e+01	-0.760	0.447181	
df\$Turnover_Range_EUROd 250-500	-5.920e+01	5.559e+01	-1.065	0.286905	
df\$Turnover_Range_EUROe >500	5.222e+01	4.912e+01	1.063	0.287726	
df\$Turnover_Range_EUROstrategic	4.065e+02	6.550e+01	6.206	5.50e-10	***
df\$Customer_Classothers	-8.968e+01	3.035e+01	-2.955	0.003129	**
df\$Customer_Classstrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-1.020e+03	2.496e+02	-4.087	4.38e-05	***
df\$Product_LineCables	-2.046e+03	2.284e+02	-8.957	< 2e-16	***

df\$Product_LineCables China	-2.594e+03	2.844e+02	-9.120	< 2e-16	***
df\$Product_LineHigh-Tech Cables	-1.012e+03	7.020e+02	-1.441	0.149559	
df\$Product_LineMIVI	-1.909e+03	3.014e+02	-6.335	2.40e-10	***
df\$Product_LinePlugs and Caps	-1.200e+03	2.159e+02	-5.556	2.77e-08	***
df\$Product_LineProfiles	-1.497e+03	2.164e+02	-6.919	4.65e-12	***
df\$Product_LineProfiles Trading	-1.352e+03	2.952e+02	-4.579	4.68e-06	***
df\$Product_LinePull Cables	9.409e+03	3.534e+02	26.621	< 2e-16	***
df\$Product_LinePull Cables China	-3.309e+03	6.296e+02	-5.255	1.49e-07	***
df\$Product_LineResidual Springs	-1.252e+03	2.325e+02	-5.383	7.37e-08	***
df\$Product_LineSprings	-1.113e+03	2.119e+02	-5.251	1.53e-07	***
df\$Product_LineSprings China	-1.848e+03	2.674e+02	-6.912	4.85e-12	***
df\$Product_LineSprings Trading	-1.413e+03	2.520e+02	-5.605	2.10e-08	***
df\$Product_LineTP 821	-2.313e+02	2.727e+02	-0.848	0.396321	
df\$Product_LineTP 821-822	-4.358e+03	1.122e+03	-3.883	0.000103	***
df\$PlantChina	-2.255e+02	3.753e+02	-0.601	0.547846	
df\$PlantFRA	8.462e+00	4.544e+02	0.019	0.985143	
df\$PlantIND	3.111e+02	8.249e+02	0.377	0.706045	
df\$PlantNorthern Italy	4.362e+01	8.568e+01	0.509	0.610701	
df\$PlantSouthern Italy	2.264e+01	8.944e+01	0.253	0.800177	
df\$PlantSpain	6.839e+01	8.311e+01	0.823	0.410567	
df\$PlantUK	1.857e+00	9.574e+01	0.019	0.984521	
df\$PlantUSA	-1.153e+02	8.914e+01	-1.293	0.195896	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2321 on 32341 degrees of freedom

Multiple R-squared: 0.2319, Adjusted R-squared: 0.2311

F-statistic: 271.3 on 36 and 32341 DF, p-value: < 2.2e-16

```
> mlr<-lm(df$Transportations~df$Quantity_units+df$N_Parts+df$Assembly_Labour_Minutes+df$Machinery_Minutes+
+         df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+         df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)
```

Call:

```
lm(formula = df$Transportations ~ df$Quantity_units + df$N_Parts +
    df$Assembly_Labour_Minutes + df$Machinery_Minutes + df$Number_of_Deliveries
+
    df$Average_Delivery_Batch_Size_units + df$Turnover_Range_EURO +
    df$Customer_Class + df$Product_Line + df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-25838	-59	13	58	171922

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-3.216e+02	1.177e+02	-2.733	0.00628	**
df\$Quantity_units	7.216e-04	2.603e-03	0.277	0.78160	
df\$N_Parts	1.000e+01	6.262e-01	15.970	< 2e-16	***
df\$Assembly_Labour_Minutes	-3.384e-02	8.445e-03	-4.007	6.15e-05	***
df\$Machinery_Minutes	-1.051e-03	5.612e-03	-0.187	0.85142	
df\$Number_of_Deliveries	4.499e+01	5.747e-01	78.288	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	9.914e-03	1.108e-02	0.895	0.37079	
df\$Turnover_Range_EUROb 20-100	-3.540e+01	2.855e+01	-1.240	0.21506	
df\$Turnover_Range_EUROc 100-250	-2.983e+01	2.829e+01	-1.055	0.29165	
df\$Turnover_Range_EUROd 250-500	-3.503e+01	2.839e+01	-1.234	0.21727	
df\$Turnover_Range_EUROe >500	-3.090e+01	2.509e+01	-1.232	0.21809	
df\$Turnover_Range_EUROstrategic	3.365e+01	3.345e+01	1.006	0.31449	

df\$Customer_ClassOthers	-1.516e+01	1.550e+01	-0.978	0.32796	
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-2.812e+02	1.275e+02	-2.206	0.02741	*
df\$Product_LineCables	-3.367e+02	1.166e+02	-2.887	0.00389	**
df\$Product_LineCables China	-3.584e+02	1.452e+02	-2.467	0.01362	*
df\$Product_LineHigh-Tech Cables	2.973e+02	3.585e+02	0.829	0.40695	
df\$Product_LineMIVI	-9.747e+01	1.539e+02	-0.633	0.52653	
df\$Product_LinePlugs and Caps	2.374e+02	1.103e+02	2.153	0.03131	*
df\$Product_LineProfiles	5.730e+01	1.105e+02	0.518	0.60421	
df\$Product_LineProfiles Trading	1.783e+02	1.508e+02	1.183	0.23697	
df\$Product_LinePull Cables	7.371e+03	1.805e+02	40.837	< 2e-16	***
df\$Product_LinePull Cables China	-2.182e+02	3.215e+02	-0.679	0.49741	
df\$Product_LineResidual Springs	1.463e+02	1.187e+02	1.232	0.21807	
df\$Product_LineSprings	1.398e+02	1.082e+02	1.292	0.19645	
df\$Product_LineSprings China	-7.992e+01	1.366e+02	-0.585	0.55836	
df\$Product_LineSprings Trading	8.241e+01	1.287e+02	0.640	0.52202	
df\$Product_LineTP 821	-1.467e+02	1.392e+02	-1.053	0.29214	
df\$Product_LineTP 821-822	-1.413e+03	5.732e+02	-2.465	0.01371	*
df\$PlantChina	-1.199e+02	1.917e+02	-0.626	0.53158	
df\$PlantFRA	-2.665e+00	2.321e+02	-0.011	0.99084	
df\$PlantIND	9.940e+01	4.213e+02	0.236	0.81347	
df\$PlantNorthern Italy	3.038e+00	4.376e+01	0.069	0.94465	
df\$PlantSouthern Italy	2.307e+01	4.568e+01	0.505	0.61359	
df\$PlantSpain	5.098e+01	4.245e+01	1.201	0.22971	
df\$PlantUK	7.210e+00	4.889e+01	0.147	0.88277	
df\$PlantUSA	-5.182e+01	4.552e+01	-1.138	0.25499	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1185 on 32341 degrees of freedom

Multiple R-squared: 0.2619, Adjusted R-squared: 0.2611

F-statistic: 318.7 on 36 and 32341 DF, p-value: < 2.2e-16

```
> mlr<-lm(df$Inbound_Logistics~df$Quantity_units+df$N_Parts+df$Assembly_Labour_Minutes+df$Machinery_Minutes+
+         df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+         df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)
```

Call:

```
lm(formula = df$Inbound_Logistics ~ df$Quantity_units + df$N_Parts +
    df$Assembly_Labour_Minutes + df$Machinery_Minutes + df$Number_of_Deliveries
+   df$Average_Delivery_Batch_Size_units + df$Turnover_Range_EURO +
    df$Customer_Class + df$Product_Line + df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-12316	-59	-9	30	91637

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-2.325e+02	8.791e+01	-2.644	0.008190	**
df\$Quantity_units	4.658e-03	1.944e-03	2.395	0.016613	*
df\$N_Parts	5.190e+00	4.678e-01	11.094	< 2e-16	***
df\$Assembly_Labour_Minutes	1.042e-02	6.309e-03	1.652	0.098501	.
df\$Machinery_Minutes	2.292e-03	4.192e-03	0.547	0.584557	
df\$Number_of_Deliveries	1.372e+01	4.293e-01	31.950	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	-5.031e-03	8.274e-03	-0.608	0.543137	
df\$Turnover_Range_EUROb 20-100	-5.518e+00	2.133e+01	-0.259	0.795863	

df\$Turnover_Range_EUOC 100-250	3.276e+01	2.113e+01	1.550	0.121059	
df\$Turnover_Range_EUOD 250-500	2.071e+01	2.121e+01	0.977	0.328762	
df\$Turnover_Range_EUOE >500	5.296e+01	1.874e+01	2.826	0.004719	**
df\$Turnover_Range_EUROStrategic	1.149e+02	2.499e+01	4.599	4.27e-06	***
df\$Customer_ClassOthers	-1.671e+01	1.158e+01	-1.443	0.149022	
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-2.844e+02	9.522e+01	-2.986	0.002826	**
df\$Product_LineCables	-2.155e+02	8.712e+01	-2.474	0.013374	*
df\$Product_LineCables China	1.520e+03	1.085e+02	14.013	< 2e-16	***
df\$Product_LineHigh-Tech Cables	1.935e+02	2.678e+02	0.723	0.469928	
df\$Product_LineMIVI	-5.792e+01	1.150e+02	-0.504	0.614412	
df\$Product_LinePlugs and Caps	1.415e+02	8.236e+01	1.718	0.085869	.
df\$Product_LineProfiles	3.147e+01	8.257e+01	0.381	0.703126	
df\$Product_LineProfiles Trading	1.828e+02	1.126e+02	1.623	0.104668	
df\$Product_LinePull Cables	3.992e+03	1.348e+02	29.606	< 2e-16	***
df\$Product_LinePull Cables China	7.937e+03	2.402e+02	33.044	< 2e-16	***
df\$Product_LineResidual Springs	4.387e+02	8.870e+01	4.946	7.61e-07	***
df\$Product_LineSprings	6.688e+01	8.085e+01	0.827	0.408089	
df\$Product_LineSprings China	5.622e+02	1.020e+02	5.512	3.58e-08	***
df\$Product_LineSprings Trading	2.712e+02	9.615e+01	2.820	0.004805	**
df\$Product_LineTP 821	-2.254e+02	1.040e+02	-2.167	0.030255	*
df\$Product_LineTP 821-822	-5.257e+02	4.281e+02	-1.228	0.219465	
df\$PlantChina	4.758e+02	1.432e+02	3.323	0.000891	***
df\$PlantFRA	2.967e+01	1.734e+02	0.171	0.864095	
df\$PlantIND	1.077e+02	3.147e+02	0.342	0.732225	
df\$PlantNorthern Italy	3.874e+01	3.269e+01	1.185	0.235912	
df\$PlantSouthern Italy	6.982e-01	3.412e+01	0.020	0.983676	
df\$PlantSpain	3.473e+01	3.171e+01	1.095	0.273358	
df\$PlantUK	-9.405e+00	3.652e+01	-0.258	0.796783	
df\$PlantUSA	1.522e+01	3.401e+01	0.448	0.654396	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 885.3 on 32341 degrees of freedom

Multiple R-squared: 0.1586, Adjusted R-squared: 0.1577

F-statistic: 169.4 on 36 and 32341 DF, p-value: < 2.2e-16

```
> m1r<-lm(df$Manage_Foreign_Relationships~df$Quantity_units+df$N_Parts+df$Assembly_Labour_Minutes+df$Machinery_Minutes+
+          df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+          df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(m1r)
```

Call:

```
lm(formula = df$Manage_Foreign_Relationships ~ df$Quantity_units +
    df$N_Parts + df$Assembly_Labour_Minutes + df$Machinery_Minutes +
    df$Number_of_Deliveries + df$Average_Delivery_Batch_Size_units +
    df$Turnover_Range_EURO + df$Customer_Class + df$Product_Line +
    df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-18953	-33	-2	32	105827

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-2.981e+02	1.044e+02	-2.854	0.00432	**
df\$Quantity_units	6.532e-04	2.310e-03	0.283	0.77736	
df\$N_Parts	2.545e+00	5.557e-01	4.579	4.70e-06	***
df\$Assembly_Labour_Minutes	1.065e-03	7.495e-03	0.142	0.88702	

df\$Machinery_Minutes	6.009e-03	4.981e-03	1.207	0.22761	
df\$Number_of_Deliveries	2.459e+00	5.100e-01	4.821	1.43e-06	***
df\$Average_Delivery_Batch_Size_units	2.135e-03	9.830e-03	0.217	0.82803	
df\$Turnover_Range_EUROb 20-100	-3.393e+00	2.534e+01	-0.134	0.89350	
df\$Turnover_Range_EUROC 100-250	3.254e+01	2.510e+01	1.296	0.19490	
df\$Turnover_Range_EUROd 250-500	3.013e+01	2.520e+01	1.196	0.23184	
df\$Turnover_Range_EUROe >500	6.351e+01	2.226e+01	2.852	0.00434	**
df\$Turnover_Range_EUROStrategic	8.775e+01	2.969e+01	2.956	0.00312	**
df\$Customer_ClassOthers	-1.361e+01	1.376e+01	-0.989	0.32253	
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-5.490e+01	1.131e+02	-0.485	0.62749	
df\$Product_LineCables	-4.030e-01	1.035e+02	-0.004	0.99689	
df\$Product_LineCables China	2.939e+03	1.289e+02	22.799	< 2e-16	***
df\$Product_LineHigh-Tech Cables	2.315e+02	3.182e+02	0.728	0.46687	
df\$Product_LineMIVI	1.342e+02	1.366e+02	0.982	0.32597	
df\$Product_LinePlugs and Caps	2.062e+02	9.785e+01	2.108	0.03508	*
df\$Product_LineProfiles	1.562e+02	9.810e+01	1.593	0.11126	
df\$Product_LineProfiles Trading	1.960e+02	1.338e+02	1.465	0.14296	
df\$Product_LinePull Cables	-1.297e+02	1.602e+02	-0.810	0.41813	
df\$Product_LinePull Cables China	1.809e+04	2.854e+02	63.397	< 2e-16	***
df\$Product_LineResidual Springs	4.662e+02	1.054e+02	4.424	9.72e-06	***
df\$Product_LineSprings	1.318e+02	9.605e+01	1.373	0.16992	
df\$Product_LineSprings China	8.512e+02	1.212e+02	7.023	2.21e-12	***
df\$Product_LineSprings Trading	2.048e+02	1.142e+02	1.792	0.07308	.
df\$Product_LineTP 821	-9.099e+01	1.236e+02	-0.736	0.46158	
df\$Product_LineTP 821-822	-1.444e+01	5.087e+02	-0.028	0.97736	
df\$PlantChina	1.027e+03	1.701e+02	6.037	1.59e-09	***
df\$PlantFRA	6.710e+01	2.060e+02	0.326	0.74458	
df\$PlantIND	1.055e+02	3.739e+02	0.282	0.77791	
df\$PlantNorthern Italy	3.854e+01	3.883e+01	0.992	0.32103	
df\$PlantSouthern Italy	2.684e+01	4.054e+01	0.662	0.50799	
df\$PlantSpain	3.592e+01	3.767e+01	0.954	0.34027	
df\$PlantUK	2.095e+01	4.339e+01	0.483	0.62925	
df\$PlantUSA	5.409e+01	4.040e+01	1.339	0.18060	

signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1052 on 32341 degrees of freedom

Multiple R-squared: 0.2003, Adjusted R-squared: 0.1994

F-statistic: 225 on 36 and 32341 DF, p-value: < 2.2e-16

```
> m1r<-lm(df$Manage_Orders_to_Suppliers~df$Quantity_units+df$N_Parts+df$Assembly_Labour_Minutes+df$Machinery_Minutes+
+ df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+ df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(m1r)
```

Call:

```
lm(formula = df$Manage_Orders_to_Suppliers ~ df$Quantity_units +
    df$N_Parts + df$Assembly_Labour_Minutes + df$Machinery_Minutes +
    df$Number_of_Deliveries + df$Average_Delivery_Batch_Size_units +
    df$Turnover_Range_EURO + df$Customer_Class + df$Product_Line +
    df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-5620.4	-38.6	-3.3	20.0	25174.7

Coefficients: (1 not defined because of singularities)

Estimate	Std. Error	t value	Pr(> t)
----------	------------	---------	----------

(Intercept)	7.729e+02	3.511e+01	22.014	< 2e-16	***
df\$Quantity_units	3.385e-03	7.765e-04	4.360	1.31e-05	***
df\$N_Parts	4.178e+00	1.868e-01	22.368	< 2e-16	***
df\$Assembly_Labour_Minutes	3.055e-03	2.520e-03	1.213	0.225295	
df\$Machinery_Minutes	-3.091e-03	1.674e-03	-1.846	0.064886	.
df\$Number_of_Deliveries	4.680e+00	1.714e-01	27.296	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	-6.019e-03	3.304e-03	-1.822	0.068530	.
df\$Turnover_Range_EUROb 20-100	-6.138e+00	8.518e+00	-0.721	0.471174	
df\$Turnover_Range_EUROC 100-250	1.409e+00	8.438e+00	0.167	0.867376	
df\$Turnover_Range_EUROD 250-500	1.212e+00	8.470e+00	0.143	0.886204	
df\$Turnover_Range_EUROe >500	2.038e+01	7.484e+00	2.723	0.006478	**
df\$Turnover_Range_EUROStrategic	7.337e+01	9.979e+00	7.353	1.99e-13	***
df\$Customer_ClassOthers	-1.670e+01	4.624e+00	-3.612	0.000305	***
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-7.504e+02	3.803e+01	-19.734	< 2e-16	***
df\$Product_LineCables	-9.657e+02	3.479e+01	-27.754	< 2e-16	***
df\$Product_LineCables China	-1.041e+03	4.333e+01	-24.019	< 2e-16	***
df\$Product_LineHigh-Tech Cables	-7.767e+02	1.070e+02	-7.262	3.90e-13	***
df\$Product_LineMIVI	-9.236e+02	4.591e+01	-20.117	< 2e-16	***
df\$Product_LinePlugs and Caps	-8.087e+02	3.289e+01	-24.587	< 2e-16	***
df\$Product_LineProfiles	-8.350e+02	3.298e+01	-25.321	< 2e-16	***
df\$Product_LineProfiles Trading	-5.528e+02	4.498e+01	-12.289	< 2e-16	***
df\$Product_LinePull Cables	-9.727e+01	5.385e+01	-1.806	0.070855	.
df\$Product_LinePull Cables China	-1.140e+03	9.592e+01	-11.881	< 2e-16	***
df\$Product_LineResidual Springs	-8.017e+02	3.542e+01	-22.632	< 2e-16	***
df\$Product_LineSprings	-8.245e+02	3.229e+01	-25.537	< 2e-16	***
df\$Product_LineSprings China	-8.892e+02	4.074e+01	-21.827	< 2e-16	***
df\$Product_LineSprings Trading	-6.556e+02	3.840e+01	-17.074	< 2e-16	***
df\$Product_LineTP 821	-9.455e+02	4.154e+01	-22.762	< 2e-16	***
df\$Product_LineTP 821-822	-1.106e+03	1.710e+02	-6.466	1.02e-10	***
df\$PlantChina	-3.277e+01	5.718e+01	-0.573	0.566549	
df\$PlantFRA	6.531e+00	6.923e+01	0.094	0.924842	
df\$PlantIND	5.255e+01	1.257e+02	0.418	0.675835	
df\$PlantNorthern Italy	1.629e+01	1.305e+01	1.248	0.212081	
df\$PlantSouthern Italy	1.795e+01	1.363e+01	1.317	0.187777	
df\$PlantSpain	1.674e+01	1.266e+01	1.322	0.186080	
df\$PlantUK	7.967e+00	1.459e+01	0.546	0.584925	
df\$PlantUSA	2.376e+01	1.358e+01	1.750	0.080201	.

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 353.6 on 32341 degrees of freedom
Multiple R-squared: 0.1301, Adjusted R-squared: 0.1291
F-statistic: 134.3 on 36 and 32341 DF, p-value: < 2.2e-16

```
> m1r<-lm(df$Inspect_goods~df$Quantity_units+df$N_Parts+df$Assembly_Labour_Minu
tes+df$Machinery_Minutes+
+          df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+          df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(m1r)
```

```
Call:
lm(formula = df$Inspect_goods ~ df$Quantity_units + df$N_Parts +
    df$Assembly_Labour_Minutes + df$Machinery_Minutes + df$Number_of_Deliveries
+
    df$Average_Delivery_Batch_Size_units + df$Turnover_Range_EURO +
    df$Customer_Class + df$Product_Line + df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-----	----	--------	----	-----

-6200 -49 3 29 91916

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	1.291e+02	6.798e+01	1.899	0.057583	.
df\$Quantity_units	2.914e-03	1.504e-03	1.938	0.052652	.
df\$N_Parts	6.756e+00	3.617e-01	18.679	< 2e-16	***
df\$Assembly_Labour_Minutes	-2.869e-03	4.878e-03	-0.588	0.556430	
df\$Machinery_Minutes	-6.300e-03	3.242e-03	-1.943	0.051975	.
df\$Number_of_Deliveries	6.173e+00	3.319e-01	18.596	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	-3.680e-03	6.398e-03	-0.575	0.565126	
df\$Turnover_Range_EUROb 20-100	-1.940e+00	1.649e+01	-0.118	0.906346	
df\$Turnover_Range_EUROc 100-250	8.518e+00	1.634e+01	0.521	0.602139	
df\$Turnover_Range_EUROd 250-500	8.342e+00	1.640e+01	0.509	0.610962	
df\$Turnover_Range_EUROe >500	3.060e+01	1.449e+01	2.111	0.034737	*
df\$Turnover_Range_EUROStrategic	1.246e+02	1.932e+01	6.449	1.14e-10	***
df\$Customer_ClassOthers	-7.648e+00	8.953e+00	-0.854	0.392950	
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-7.838e+01	7.363e+01	-1.065	0.287091	
df\$Product_LineCables	-3.273e+02	6.737e+01	-4.858	1.19e-06	***
df\$Product_LineCables China	-5.320e+02	8.389e+01	-6.342	2.30e-10	***
df\$Product_LineHigh-Tech Cables	-1.484e+02	2.071e+02	-0.717	0.473676	
df\$Product_LineMIVI	-3.043e+02	8.890e+01	-3.423	0.000620	***
df\$Product_LinePlugs and Caps	-1.872e+02	6.369e+01	-2.939	0.003290	**
df\$Product_LineProfiles	-2.732e+02	6.385e+01	-4.278	1.89e-05	***
df\$Product_LineProfiles Trading	-2.031e+02	8.709e+01	-2.332	0.019703	*
df\$Product_LinePull Cables	-1.450e+02	1.043e+02	-1.390	0.164392	
df\$Product_LinePull Cables China	-6.255e+02	1.857e+02	-3.368	0.000758	***
df\$Product_LineResidual Springs	-1.735e+02	6.859e+01	-2.530	0.011402	*
df\$Product_LineSprings	-2.117e+02	6.252e+01	-3.386	0.000709	***
df\$Product_LineSprings China	-2.909e+02	7.887e+01	-3.688	0.000226	***
df\$Product_LineSprings Trading	4.783e+01	7.435e+01	0.643	0.520045	
df\$Product_LineTP 821	-3.746e-01	8.043e+01	-0.005	0.996284	
df\$Product_LineTP 821-822	-5.843e+02	3.311e+02	-1.765	0.077562	.
df\$PlantChina	-1.259e+02	1.107e+02	-1.138	0.255315	
df\$PlantFRA	1.179e+01	1.340e+02	0.088	0.929926	
df\$PlantIND	6.578e+01	2.433e+02	0.270	0.786924	
df\$PlantNorthern Italy	2.244e+01	2.527e+01	0.888	0.374581	
df\$PlantSouthern Italy	1.789e+01	2.638e+01	0.678	0.497660	
df\$PlantSpain	1.142e+01	2.452e+01	0.466	0.641501	
df\$PlantUK	1.902e+01	2.824e+01	0.674	0.500584	
df\$PlantUSA	7.573e+00	2.629e+01	0.288	0.773357	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 684.6 on 32341 degrees of freedom

Multiple R-squared: 0.05857, Adjusted R-squared: 0.05752

F-statistic: 55.89 on 36 and 32341 DF, p-value: < 2.2e-16

```
> mlr<-lm(df$Customer_Order_Management_Local_Branches~df$Quantity_units+df$N_Parts+df$Assembly_Labour_Minutes+df$Machinery_Minutes+
+ df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+ df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)
```

Call:

```
lm(formula = df$Customer_Order_Management_Local_Branches ~ df$Quantity_units +
    df$N_Parts + df$Assembly_Labour_Minutes + df$Machinery_Minutes +
    df$Number_of_Deliveries + df$Average_Delivery_Batch_Size_units +
    df$Turnover_Range_EURO + df$Customer_Class + df$Product_Line +
```

df\$Plant)

Residuals:

Min	1Q	Median	3Q	Max
-73368	-151	91	211	210042

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	9.281e+02	1.996e+02	4.650	3.33e-06	***
df\$Quantity_units	-7.399e-03	4.414e-03	-1.676	0.093735	.
df\$N_Parts	3.968e+00	1.062e+00	3.737	0.000186	***
df\$Assembly_Labour_Minutes	4.619e-03	1.432e-02	0.322	0.747078	
df\$Machinery_Minutes	-1.361e-03	9.517e-03	-0.143	0.886250	
df\$Number_of_Deliveries	1.578e+02	9.745e-01	161.959	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	8.978e-02	1.878e-02	4.780	1.76e-06	***
df\$Turnover_Range_EUROb 20-100	-3.683e+01	4.842e+01	-0.761	0.446913	
df\$Turnover_Range_EUROc 100-250	-2.745e+01	4.797e+01	-0.572	0.567191	
df\$Turnover_Range_EUROd 250-500	7.059e+00	4.815e+01	0.147	0.883430	
df\$Turnover_Range_EUROe >500	-1.347e+02	4.254e+01	-3.167	0.001542	**
df\$Turnover_Range_EUROStrategic	-8.985e+01	5.672e+01	-1.584	0.113191	
df\$Customer_Classothers	1.076e+02	2.628e+01	4.092	4.28e-05	***
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-1.145e+03	2.162e+02	-5.298	1.18e-07	***
df\$Product_LineCables	-1.296e+03	1.978e+02	-6.553	5.72e-11	***
df\$Product_LineCables China	-8.394e+02	2.463e+02	-3.408	0.000655	***
df\$Product_LineHigh-Tech Cables	-1.022e+03	6.080e+02	-1.682	0.092614	.
df\$Product_LineMIVI	-2.503e+03	2.610e+02	-9.592	< 2e-16	***
df\$Product_LinePlugs and Caps	-1.215e+03	1.870e+02	-6.496	8.39e-11	***
df\$Product_LineProfiles	-1.396e+03	1.875e+02	-7.447	9.78e-14	***
df\$Product_LineProfiles Trading	-1.131e+03	2.557e+02	-4.422	9.81e-06	***
df\$Product_LinePull Cables	2.233e+03	3.061e+02	7.296	3.03e-13	***
df\$Product_LinePull Cables China	-2.677e+02	5.453e+02	-0.491	0.623532	
df\$Product_LineResidual Springs	-1.183e+03	2.014e+02	-5.875	4.28e-09	***
df\$Product_LineSprings	-1.318e+03	1.835e+02	-7.180	7.11e-13	***
df\$Product_LineSprings China	-1.221e+03	2.316e+02	-5.273	1.35e-07	***
df\$Product_LineSprings Trading	-8.604e+02	2.183e+02	-3.942	8.11e-05	***
df\$Product_LineTP 821	-1.925e+03	2.361e+02	-8.152	3.69e-16	***
df\$Product_LineTP 821-822	-6.313e+03	9.720e+02	-6.496	8.39e-11	***
df\$PlantChina	-2.057e+02	3.250e+02	-0.633	0.526733	
df\$PlantFRA	2.645e+01	3.935e+02	0.067	0.946413	
df\$PlantIND	1.789e+02	7.144e+02	0.250	0.802258	
df\$PlantNorthern Italy	-8.067e+01	7.420e+01	-1.087	0.276984	
df\$PlantSouthern Italy	-5.416e+01	7.746e+01	-0.699	0.484462	
df\$PlantSpain	-9.707e+01	7.198e+01	-1.349	0.177502	
df\$PlantUK	-9.394e+01	8.291e+01	-1.133	0.257208	
df\$PlantUSA	3.672e+02	7.720e+01	4.756	1.98e-06	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2010 on 32341 degrees of freedom

Multiple R-squared: 0.4771, Adjusted R-squared: 0.4765

F-statistic: 819.8 on 36 and 32341 DF, p-value: < 2.2e-16

```
> mlr<-lm(df$Sales_Development~df$Quantity_units+df$N_Parts+df$Assembly_Labour_Minutes+df$Machinery_Minutes+
+         df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+         df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)
```

Call:


```
lm(formula = df$Sales_Development ~ df$Quantity_units + df$N_Parts +
  df$Assembly_Labour_Minutes + df$Machinery_Minutes + df$Number_of_Deliveries
+
  df$Average_Delivery_Batch_Size_units + df$Turnover_Range_EURO +
  df$Customer_Class + df$Product_Line + df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-10595.6	-73.7	-18.8	24.3	23397.8

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	1.113e+02	4.432e+01	2.512	0.01201	*
df\$Quantity_units	3.581e-03	9.803e-04	3.653	0.00026	***
df\$N_Parts	5.714e+00	2.358e-01	24.229	< 2e-16	***
df\$Assembly_Labour_Minutes	4.832e-03	3.181e-03	1.519	0.12867	
df\$Machinery_Minutes	-2.728e-04	2.113e-03	-0.129	0.89728	
df\$Number_of_Deliveries	1.110e+01	2.164e-01	51.296	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	-2.316e-03	4.171e-03	-0.555	0.57872	
df\$Turnover_Range_EUROb 20-100	-1.274e+01	1.075e+01	-1.185	0.23609	
df\$Turnover_Range_EUROc 100-250	-3.157e+00	1.065e+01	-0.296	0.76694	
df\$Turnover_Range_EUROd 250-500	-1.127e+00	1.069e+01	-0.105	0.91604	
df\$Turnover_Range_EUROe >500	3.953e+01	9.448e+00	4.184	2.87e-05	***
df\$Turnover_Range_EUROStrategic	8.521e+01	1.260e+01	6.765	1.36e-11	***
df\$Customer_ClassOthers	-2.464e+01	5.837e+00	-4.221	2.44e-05	***
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-2.141e+02	4.801e+01	-4.460	8.22e-06	***
df\$Product_LineCables	-3.964e+02	4.392e+01	-9.024	< 2e-16	***
df\$Product_LineCables China	6.975e+01	5.470e+01	1.275	0.20223	
df\$Product_LineHigh-Tech Cables	-1.534e+02	1.350e+02	-1.136	0.25592	
df\$Product_LineMIVI	-2.866e+02	5.796e+01	-4.945	7.67e-07	***
df\$Product_LinePlugs and Caps	-2.106e+02	4.152e+01	-5.072	3.96e-07	***
df\$Product_LineProfiles	-2.276e+02	4.163e+01	-5.466	4.63e-08	***
df\$Product_LineProfiles Trading	-2.309e+01	5.678e+01	-0.407	0.68423	
df\$Product_LinePull Cables	6.993e+02	6.798e+01	10.288	< 2e-16	***
df\$Product_LinePull Cables China	4.727e+02	1.211e+02	3.904	9.48e-05	***
df\$Product_LineResidual Springs	-6.540e+01	4.472e+01	-1.463	0.14360	
df\$Product_LineSprings	-1.045e+02	4.076e+01	-2.564	0.01036	*
df\$Product_LineSprings China	-1.636e+02	5.143e+01	-3.181	0.00147	**
df\$Product_LineSprings Trading	-3.257e+01	4.848e+01	-0.672	0.50168	
df\$Product_LineTP 821	-2.910e+02	5.244e+01	-5.550	2.88e-08	***
df\$Product_LineTP 821-822	3.589e+02	2.158e+02	1.663	0.09637	.
df\$PlantChina	-2.174e+02	7.218e+01	-3.012	0.00259	**
df\$PlantFRA	4.888e+01	8.739e+01	0.559	0.57599	
df\$PlantIND	1.248e+02	1.587e+02	0.786	0.43161	
df\$PlantNorthern Italy	9.723e+01	1.648e+01	5.900	3.67e-09	***
df\$PlantSouthern Italy	7.217e+01	1.720e+01	4.195	2.73e-05	***
df\$PlantSpain	1.017e+02	1.599e+01	6.363	2.00e-10	***
df\$PlantUK	5.867e+00	1.841e+01	0.319	0.75001	
df\$PlantUSA	-2.251e+01	1.714e+01	-1.313	0.18921	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 446.3 on 32341 degrees of freedom

Multiple R-squared: 0.1969, Adjusted R-squared: 0.1961

F-statistic: 220.3 on 36 and 32341 DF, p-value: < 2.2e-16

```
> m1r<-lm(df$Offer_Development~df$Quantity_units+df$N_Parts+df$Assembly_Labour_
Minutes+df$Machinery_Minutes+
+
  df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
```

```
+ df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)
```

Call:

```
lm(formula = df$Offer_Development ~ df$Quantity_units + df$N_Parts +
    df$Assembly_Labour_Minutes + df$Machinery_Minutes + df$Number_of_Deliveries
+
    df$Average_Delivery_Batch_Size_units + df$Turnover_Range_EURO +
    df$Customer_Class + df$Product_Line + df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-18328	-41	9	35	38748

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	1.441e+02	4.961e+01	2.904	0.003687	**
df\$Quantity_units	4.017e-04	1.097e-03	0.366	0.714330	
df\$N_Parts	4.534e+00	2.640e-01	17.176	< 2e-16	***
df\$Assembly_Labour_Minutes	-9.037e-04	3.560e-03	-0.254	0.799647	
df\$Machinery_Minutes	-4.715e-03	2.366e-03	-1.993	0.046270	*
df\$Number_of_Deliveries	3.215e+01	2.423e-01	132.685	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	1.207e-02	4.670e-03	2.585	0.009734	**
df\$Turnover_Range_EUROb 20-100	-1.213e+01	1.204e+01	-1.008	0.313448	
df\$Turnover_Range_EUROc 100-250	3.807e+00	1.192e+01	0.319	0.749511	
df\$Turnover_Range_EUROd 250-500	-2.329e+00	1.197e+01	-0.195	0.845695	
df\$Turnover_Range_EUROe >500	-1.664e+00	1.058e+01	-0.157	0.874980	
df\$Turnover_Range_EUROStrategic	2.146e+01	1.410e+01	1.522	0.127985	
df\$Customer_ClassOthers	-1.006e+01	6.534e+00	-1.540	0.123559	
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-2.097e+02	5.374e+01	-3.903	9.52e-05	***
df\$Product_LineCables	-3.780e+02	4.917e+01	-7.687	1.55e-14	***
df\$Product_LineCables China	-1.958e+02	6.123e+01	-3.198	0.001385	**
df\$Product_LineHigh-Tech Cables	-1.849e+02	1.511e+02	-1.223	0.221198	
df\$Product_LineMIVI	-4.957e+02	6.488e+01	-7.640	2.22e-14	***
df\$Product_LinePlugs and Caps	-2.328e+02	4.648e+01	-5.008	5.53e-07	***
df\$Product_LineProfiles	-3.041e+02	4.660e+01	-6.525	6.92e-11	***
df\$Product_LineProfiles Trading	-1.729e+02	6.357e+01	-2.720	0.006525	**
df\$Product_LinePull Cables	2.315e+03	7.609e+01	30.428	< 2e-16	***
df\$Product_LinePull Cables China	4.099e+02	1.356e+02	3.024	0.002496	**
df\$Product_LineResidual Springs	-1.982e+02	5.006e+01	-3.958	7.56e-05	***
df\$Product_LineSprings	-2.430e+02	4.563e+01	-5.325	1.02e-07	***
df\$Product_LineSprings China	-2.575e+02	5.757e+01	-4.472	7.76e-06	***
df\$Product_LineSprings Trading	-6.637e+01	5.427e+01	-1.223	0.221297	
df\$Product_LineTP 821	-8.894e+01	5.870e+01	-1.515	0.129745	
df\$Product_LineTP 821-822	8.125e+02	2.416e+02	3.363	0.000773	***
df\$PlantChina	1.495e+02	8.080e+01	1.850	0.064325	.
df\$PlantFRA	2.903e+01	9.783e+01	0.297	0.766638	
df\$PlantIND	1.029e+02	1.776e+02	0.580	0.562147	
df\$PlantNorthern Italy	1.755e+01	1.845e+01	0.951	0.341541	
df\$PlantSouthern Italy	2.522e+01	1.926e+01	1.310	0.190244	
df\$PlantSpain	4.032e+01	1.789e+01	2.253	0.024251	*
df\$PlantUK	1.161e+01	2.061e+01	0.563	0.573291	
df\$PlantUSA	2.223e+01	1.919e+01	1.159	0.246648	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 499.6 on 32341 degrees of freedom
Multiple R-squared: 0.4383, Adjusted R-squared: 0.4377
F-statistic: 701.1 on 36 and 32341 DF, p-value: < 2.2e-16

```
> mlr<-lm(df$Customer_Service~df$Quantity_units+df$N_Parts+df$Assembly_Labour_Minutes+df$Machinery_Minutes+
+         df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+         df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)
```

Call:

```
lm(formula = df$Customer_Service ~ df$Quantity_units + df$N_Parts +
    df$Assembly_Labour_Minutes + df$Machinery_Minutes + df$Number_of_Deliveries
+
    df$Average_Delivery_Batch_Size_units + df$Turnover_Range_EURO +
    df$Customer_Class + df$Product_Line + df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-8976	-49	-8	34	153688

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	3.074e+01	9.969e+01	0.308	0.757795	
df\$Quantity_units	7.241e-03	2.205e-03	3.284	0.001025	**
df\$N_Parts	5.355e+00	5.305e-01	10.095	< 2e-16	***
df\$Assembly_Labour_Minutes	-1.529e-02	7.154e-03	-2.137	0.032599	*
df\$Machinery_Minutes	-5.876e-04	4.754e-03	-0.124	0.901638	
df\$Number_of_Deliveries	4.674e+00	4.868e-01	9.601	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	-1.578e-02	9.383e-03	-1.682	0.092528	.
df\$Turnover_Range_EUROb 20-100	-1.991e+01	2.419e+01	-0.823	0.410524	
df\$Turnover_Range_EUROc 100-250	-1.566e+01	2.396e+01	-0.654	0.513390	
df\$Turnover_Range_EUROd 250-500	-2.677e+01	2.405e+01	-1.113	0.265688	
df\$Turnover_Range_EUROe >500	2.959e+01	2.125e+01	1.392	0.163883	
df\$Turnover_Range_EUROStrategic	1.445e+02	2.834e+01	5.098	3.44e-07	***
df\$Customer_ClassOthers	-2.564e+01	1.313e+01	-1.953	0.050828	.
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-2.375e+02	1.080e+02	-2.200	0.027828	*
df\$Product_LineCables	-3.267e+02	9.880e+01	-3.306	0.000946	***
df\$Product_LineCables China	8.928e+01	1.230e+02	0.726	0.468070	
df\$Product_LineHigh-Tech Cables	-2.885e+01	3.037e+02	-0.095	0.924305	
df\$Product_LineMIVI	-1.411e+02	1.304e+02	-1.082	0.279225	
df\$Product_LinePlugs and Caps	-5.480e+01	9.340e+01	-0.587	0.557417	
df\$Product_LineProfiles	-1.259e+02	9.364e+01	-1.345	0.178645	
df\$Product_LineProfiles Trading	1.092e+01	1.277e+02	0.085	0.931884	
df\$Product_LinePull Cables	1.967e+03	1.529e+02	12.867	< 2e-16	***
df\$Product_LinePull Cables China	-3.410e+02	2.724e+02	-1.252	0.210674	
df\$Product_LineResidual Springs	-3.175e+01	1.006e+02	-0.316	0.752283	
df\$Product_LineSprings	-7.406e+01	9.168e+01	-0.808	0.419221	
df\$Product_LineSprings China	-6.267e+01	1.157e+02	-0.542	0.587945	
df\$Product_LineSprings Trading	6.414e+01	1.090e+02	0.588	0.556394	
df\$Product_LineTP 821	1.933e+02	1.180e+02	1.639	0.101326	
df\$Product_LineTP 821-822	-3.638e+02	4.855e+02	-0.749	0.453627	
df\$PlantChina	-2.070e+02	1.624e+02	-1.275	0.202264	
df\$PlantFRA	7.533e+00	1.966e+02	0.038	0.969433	
df\$PlantIND	4.970e+01	3.569e+02	0.139	0.889239	
df\$PlantNorthern Italy	1.695e+01	3.707e+01	0.457	0.647545	
df\$PlantSouthern Italy	1.513e+01	3.870e+01	0.391	0.695783	
df\$PlantSpain	2.561e+01	3.596e+01	0.712	0.476394	
df\$PlantUK	1.155e+00	4.142e+01	0.028	0.977745	
df\$PlantUSA	-8.686e+01	3.856e+01	-2.253	0.024295	*

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1004 on 32341 degrees of freedom
Multiple R-squared: 0.03075, Adjusted R-squared: 0.02967
F-statistic: 28.5 on 36 and 32341 DF, p-value: < 2.2e-16

```
> mlr<-lm(df$Cost_of_Poor_Quality~df$Quantity_units+df$N_Parts+df$Assembly_Labo
ur_Minutes+df$Machinery_Minutes+
+          df$Number_of_Deliveries+df$Average_Delivery_Batch_Size_units+
+          df$Turnover_Range_EURO+df$Customer_Class+df$Product_Line+df$Plant)
> summary(mlr)
```

```
Call:
lm(formula = df$Cost_of_Poor_Quality ~ df$Quantity_units + df$N_Parts +
    df$Assembly_Labour_Minutes + df$Machinery_Minutes + df$Number_of_Deliveries
+
    df$Average_Delivery_Batch_Size_units + df$Turnover_Range_EURO +
    df$Customer_Class + df$Product_Line + df$Plant)
```

Residuals:

Min	1Q	Median	3Q	Max
-11069	-27	14	39	87405

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	4.797e+01	1.164e+02	0.412	0.68027	
df\$Quantity_units	7.311e-03	2.575e-03	2.839	0.00452	**
df\$N_Parts	1.530e+00	6.194e-01	2.470	0.01350	*
df\$Assembly_Labour_Minutes	8.362e-03	8.354e-03	1.001	0.31686	
df\$Machinery_Minutes	-8.964e-04	5.551e-03	-0.161	0.87172	
df\$Number_of_Deliveries	8.024e+00	5.685e-01	14.116	< 2e-16	***
df\$Average_Delivery_Batch_Size_units	-1.348e-02	1.096e-02	-1.231	0.21848	
df\$Turnover_Range_EUROb 20-100	-4.702e+00	2.824e+01	-0.166	0.86777	
df\$Turnover_Range_EUROc 100-250	8.892e+00	2.798e+01	0.318	0.75063	
df\$Turnover_Range_EUROd 250-500	9.933e+00	2.808e+01	0.354	0.72359	
df\$Turnover_Range_EUROe >500	2.415e+01	2.482e+01	0.973	0.33053	
df\$Turnover_Range_EUROStrategic	2.920e+02	3.309e+01	8.826	< 2e-16	***
df\$Customer_ClassOthers	-1.138e+00	1.533e+01	-0.074	0.94085	
df\$Customer_ClassStrategic	NA	NA	NA	NA	
df\$Product_LineBuilding Materials	-1.158e+02	1.261e+02	-0.919	0.35824	
df\$Product_LineCables	-1.810e+02	1.154e+02	-1.569	0.11677	
df\$Product_LineCables China	6.824e+02	1.437e+02	4.750	2.04e-06	***
df\$Product_LineHigh-Tech Cables	-1.693e+02	3.546e+02	-0.477	0.63315	
df\$Product_LineMIVI	-4.342e+02	1.522e+02	-2.852	0.00434	**
df\$Product_LinePlugs and Caps	-1.799e+02	1.091e+02	-1.649	0.09909	.
df\$Product_LineProfiles	-2.068e+02	1.093e+02	-1.891	0.05862	.
df\$Product_LineProfiles Trading	-1.300e+02	1.492e+02	-0.872	0.38342	
df\$Product_LinePull Cables	-7.810e+02	1.785e+02	-4.374	1.22e-05	***
df\$Product_LinePull Cables China	-2.319e+02	3.181e+02	-0.729	0.46593	
df\$Product_LineResidual Springs	-1.253e+02	1.175e+02	-1.067	0.28606	
df\$Product_LineSprings	-1.445e+02	1.071e+02	-1.350	0.17702	
df\$Product_LineSprings China	3.088e+02	1.351e+02	2.286	0.02226	*
df\$Product_LineSprings Trading	1.336e+03	1.273e+02	10.495	< 2e-16	***
df\$Product_LineTP 821	2.749e+02	1.377e+02	1.996	0.04593	*
df\$Product_LineTP 821-822	-5.244e+02	5.669e+02	-0.925	0.35501	
df\$PlantChina	-1.414e+02	1.896e+02	-0.746	0.45563	
df\$PlantFRA	1.030e+02	2.296e+02	0.449	0.65350	
df\$PlantIND	1.330e+02	4.167e+02	0.319	0.74956	
df\$PlantNorthern Italy	8.455e+01	4.328e+01	1.953	0.05077	.
df\$PlantSouthern Italy	8.362e+01	4.518e+01	1.851	0.06424	.
df\$PlantSpain	6.033e+01	4.199e+01	1.437	0.15074	

df\$PlantUK	6.090e+01	4.836e+01	1.259	0.20795
df\$PlantUSA	8.458e+01	4.503e+01	1.878	0.06034 .

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1172 on 32341 degrees of freedom

Multiple R-squared: 0.03561, Adjusted R-squared: 0.03453

F-statistic: 33.17 on 36 and 32341 DF, p-value: < 2.2e-16