

RANDOM MOTORS PROJECT REPORT

Shrinath Ranjit Rajeshirke

Sept 2020



Rocinante36



Marengo32

In which
model
Should I
Invest??



Objectives

- ▶ To check whether the new models are deviating from the desired specification or not.
- ▶ To decide which error is more expensive.
- ▶ To build a multiple regression model to predict sales.
- ▶ To predict overall profit for both models.
- ▶ To find which model is got most affected by the price increase.

Hypothesis Testing

Model →	Rocinante36		Marengo32	
	Mileage (km/l)	Top speed (km/hr)	Mileage (km/l)	Top speed (km/hr)
Null hypothesis, H_0	$\mu = 22$	$\mu = 140$	$\mu = 15$	$\mu = 210$
Alternative hypothesis, H_a	$\mu \neq 22$	$\mu \neq 140$	$\mu \neq 15$	$\mu \neq 210$
Test statistic	-1.8351	0.8036	1.5645	0.9124
P-value	0.0822	0.4316	0.1342	0.3729

Decision/ Conclusion

Model →	Rocinante36		Marengo32	
	Mileage (km/l)	Top speed (km/hr)	Mileage (km/l)	Top speed (km/hr)
Result	P-value(0.0822) > α	P-value(0.4316) > α	P-value(0.1342) > α	P-value(0.3729) > α
Conclusion	Do not reject Ho	Do not reject Ho	Do not reject Ho	Do not reject Ho

There is sufficient evidence that Rocinante36 and Marengo32 models do not deviate from their desired specification

Expensive Error

- ▶ Type II error is more expensive in this case.
- ▶ Reason:- Generally from the producer's side, type I error is more serious. But in this situation, if the car deviates from specification, we have to refund all customers. So, the loss would be high in type II error as compared with type I error.

Error	Rocinante36	Marengo32
Type I Error	6 lakh	33 lakh
Type II Error	7 lakh	41 lakh

This shows that type II error would be more expensive for us as compared to type I error.

Regression Model

- Equation of regression line for Rocinante36 model:

$$y = 50.7231 - 0.7950(\text{price}) + 8.3063(\text{Mileage}) - 0.0186(\text{Top Speed})$$

- Predicted sales of Rocinante36 model (in 1000 units) = 224.9447

- Equation of regression line for Marengo32 model:

$$y = -13.4476 - 0.1867(\text{price}) + 0.0413(\text{Mileage}) + 0.2208(\text{Top Speed})$$

- Predicted sales of Marengo36 model (in 1000 units) = 25.8852

Predicted profits

Model	Rocinante36	Marengo32
Predicted Sales	2,24,945	25,848
Manufacturing cost	13,49,668	8,52,993
Income	15,74,613	10,59,780
Profit	2,24,945	2,06,786

Profitable Model

Model	Predicted profit (Rs.)
Rocinante36	224945
Marengo32	206786

Rocinante36 give more profit than Marengo32. So, company should invest in Rocinante36.

Effect of price increase

Model	Rocinante36	Marengo32
Price	7+1 lakh	41+1 lakh
Mileage	22 km/l	15 km/l
Top speed	140 km/hr	210 km/hr
Predicted sale	2,24,138	25,661
Predicted profit (Rs)	4,48,275	2,30,946
Previously predicted profit (Rs)	2,24,945	2,06,786

Rocinante36 is mostly affected by price increase than Marengo32

Findings

- ▶ In all hypothesis testing of Rocinante36 and Marengo32, we do not reject H_0 at $\alpha\%$ level of significance.
- ▶ Type II error is more expensive than type I error.
- ▶ Regression model summary:

Equation of regression line for Rocinante36 model:

$$y = 50.7231 - 0.7950(\text{price}) + 8.3063(\text{Mileage}) - 0.0186(\text{Top Speed})$$

Equation of regression line for Marengo32 model:

$$y = -13.4476 - 0.1867(\text{price}) + 0.0413(\text{Mileage}) + 0.2208(\text{Top Speed})$$

- ▶ Predicted Profit:

For Rocinante36 model = 224945 Rs.

For Marengo32 model = 206786 Rs.

Conclusion

- ▶ Rocinante36 and Marengo32 models both do not deviate from their respective design specification.
- ▶ Company will face more problem in case of type II error.
- ▶ Company should invest in the Rocinante36 model.
- ▶ Rocinante36 gets more affected by a price increase.