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Using Randomized Block Design to find the effect of different months on Inflation Rates of different sectors.

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AIM: Use Randomized Block Design to study the effect of different months on inflation rates of different sectors.

EXPERIMENT:

From the Annual Report 2019-20, we are given Break-up of overall Inflation rate into Group/Sub-group wise inflation rates, based on CPI for combined sector along with the weightage of each subgroup.

Sub Group	DEC' 18	JAN' 19	FEB' 19	MAR' 19	APR' 19	MAY' 19	JUN' 19	JUL' 19	AUG' 19	SEP' 19	OCT' 19	NOV' 19	WEIGHT
Food and Beverages	-0.61	-0.6	0.22	0.2	0.17	0.15	0.17	0.16	0.14	0.12	0.13	0.12	50.5177
Clothing and Footwear	0.23	0.19	0.19	0.17	0.14	0.12	0.11	0.1	0.08	0.07	0.11	0.09	7.19321
Housing	0.53	0.53	0.54	0.52	0.51	0.5	0.51	0.51	0.51	0.51	0.47	0.48	11.0927
Miscellaneous	1.65	1.58	1.63	1.55	1.41	1.25	1.22	1.3	1.3	1.23	0.94	1.03	31.1963

i) According to the weights given to each subgroup, find the contribution of each subgroup to overall inflation rate and find which month witnessed the highest increase in inflation rate. Also, show it graphically.

Use Randomized Block Design :

ii) To test if there is any significant impact of different months on inflation rates (whether treatments differ significantly or not).

iii) To test if there is any significant difference in inflation rates of different subgroups (whether blocks differ significantly or not).

If any of them differ significantly then apply post-hoc analysis to find the factors which are responsible for it.

THEORY :

From the Annual Report 2019-20 of MoSPI, we have the data on inflation rates in different months of different sectors/subgroups.

We have taken different months as our treatments and different subgroups or sectors as our blocks

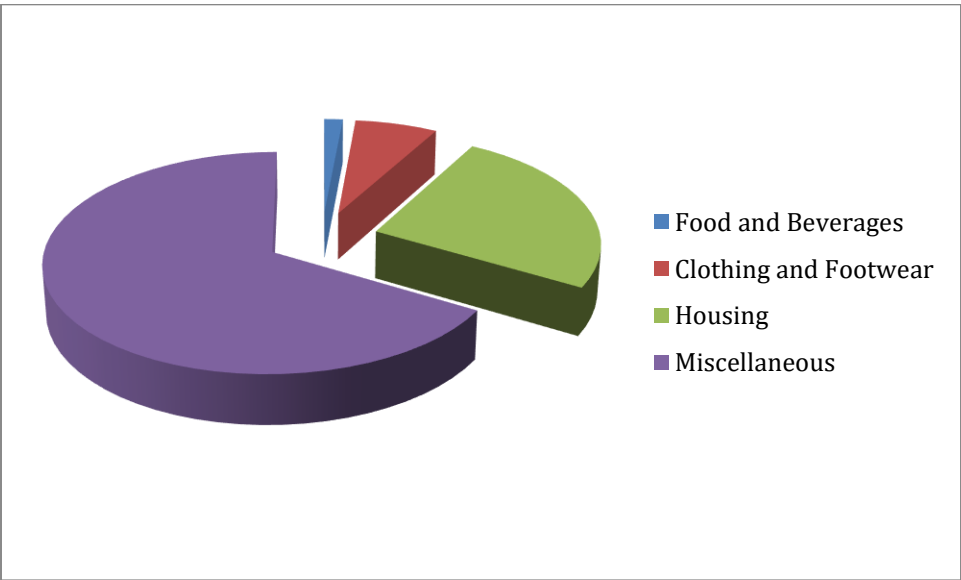
We have 4 blocks (**viz. Food and Beverages, Clothing and Footwear, Housing and Miscellaneous**) and each block has 12 treatments.

CALCULATIONS:

i)

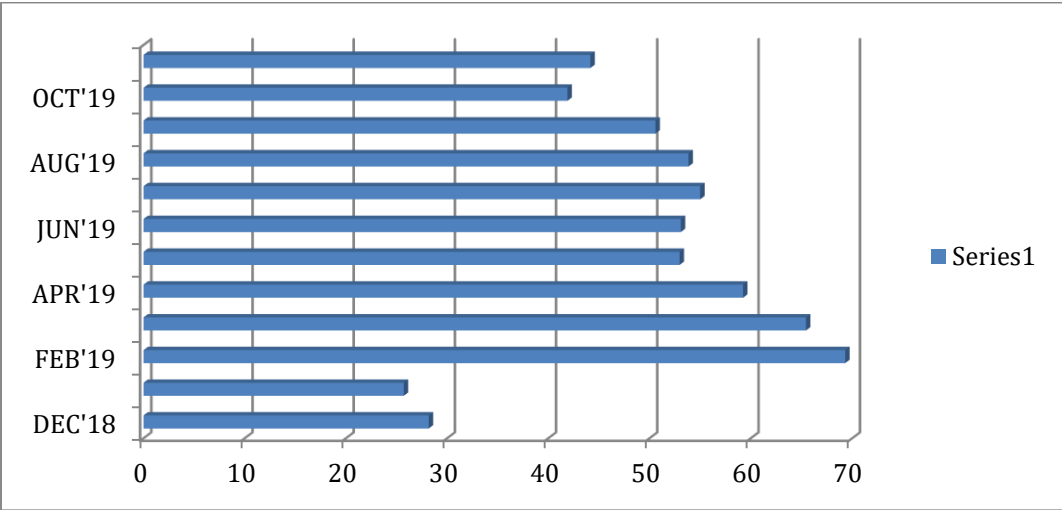
a)

Food and Beverages	0.36
Clothing and Footwear	1.6
Housing	6.12
Miscellaneous	16.09



b)

DEC'18	JAN'19	FEB'19	MAR'19	APR'19	MAY'19	JUN'19	JUL'19	AUG'19	SEP'19	OCT'19	NOV'19
28.192	25.720	69.321	65.448	59.239	52.983	53.096	55.015	53.860	50.594	41.896	44.166



ii) & iii)

Between-Subjects Factors

		Value Label	N
BLOCKS	1	FOOD AND BEVERAGES	12
	2	CLOTHING AND FOOTWEAR	12
	3	HOUSING	12
	4	MISCELLANEOUS	12
TREATMENTS	1	DECEMBER 18	4
	2	JANUARY 19	4
	3	FEBRUARY 19	4
	4	MARCH 19	4
	5	APRIL 19	4
	6	MAY 19	4
	7	JUNE 19	4
	8	JULY 19	4
	9	AUGUST 19	4
	10	SEPTEMBER 19	4
	11	OCTOBER 19	4
	12	NOVEMNER 19	4

Tests of Between-Subjects Effects

Dependent Variable: RESPONSES

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12.981 ^a	14	.927	22.266	.000
Intercept	12.171	1	12.171	292.268	.000
block	12.749	3	4.250	102.050	.000
treatment	.232	11	.021	.507	.885
Error	1.374	33	.042		
Total	26.526	48			
Corrected Total	14.355	47			

a. R Squared = .904 (Adjusted R Squared = .864)

Post Hoc Tests

BLOCKS

Multiple Comparisons

RESPONSES

LSD

(I) BLOCKS	(J) BLOCKS	Mean Difference (I- J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
FOOD AND BEVERAGES	CLOTHING AND FOOTWEAR	-.1033	.08331	.224	-.2728	.0662
	HOUSING	-.4800*	.08331	.000	-.6495	-.3105
	MISCELLANE OUS	-1.3108*	.08331	.000	-1.4803	-1.1413
CLOTHING AND FOOTWEAR	FOOD AND BEVERAGES	.1033	.08331	.224	-.0662	.2728
	HOUSING	-.3767*	.08331	.000	-.5462	-.2072
	MISCELLANE OUS	-1.2075*	.08331	.000	-1.3770	-1.0380
HOUSING	FOOD AND BEVERAGES	.4800*	.08331	.000	.3105	.6495
	CLOTHING AND FOOTWEAR	.3767*	.08331	.000	.2072	.5462
	MISCELLANE OUS	-.8308*	.08331	.000	-1.0003	-.6613
MISCELLANEOUS	FOOD AND BEVERAGES	1.3108*	.08331	.000	1.1413	1.4803
	CLOTHING AND FOOTWEAR	1.2075*	.08331	.000	1.0380	1.3770
	HOUSING	.8308*	.08331	.000	.6613	1.0003

Based on observed means.

The error term is Mean Square(Error) = .042.

*. The mean difference is significant at the 0.05 level.

RESULTS:

i)

Maximum weightage is of Food and Beverages but we can see from the chart that **Miscellaneous** constitutes the major portion in increasing the overall inflation rate.

And **Feb'19** witnessed the highest increase in inflation rate.

ii) & iii)

After performing the univariate analysis of the given data, we found out that the treatments (months) are insignificant i.e. do not differ significantly while the blocks (the subgroups) differ significantly. Thus we performed the post hoc analysis for blocks to find out which subgroup is significantly different from others.

In post hoc analysis, we found that only **Food and Beverages** and **Clothing and Footwear** do not differ significantly but all other subgroups are significantly different from others.

CONCLUSION:

Thus we conclude that different months do not have any significant impact on the inflation rates of a subgroup but different subgroups are significantly different from each other.