

ANALYSIS OF VARIABLES PRESENT IN HERITAGE BUILDINGS

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Abstract – A research was conducted to analyse thirty five important variables found in heritage buildings in India. For this a pilot survey has been conducted through questionnaire. The experts of Heritage and renowned academicians have graded these variables on a scale of five. The statistical analysis of thirty five variables was done to identify the significance of these variables.

Keywords: Heritage, Statistical Analysis, correlation, factor analysis.

1. INTRODUCTION

The cultural heritage of our country India is much diversified in nature. The reason is the variation in climate, culture and religion. Due to many factors like climatic factor where temperature variation is from + 48° C to – 30°C and so many other factors like culture, language, religion, regional and natural factors, the built environment of every region is different from other. The kothi of Awadh is different from the residential house of Kerala.

But few variables are commonly found in the heritage buildings in all the regions of our country. Thirty five variables on which the heritage buildings are dependent were identified through literature and site visit. These variable were categorised into four broad parameters ie. Influences, principles, elements and ornamentation for conducting this research.

These variables were then send to forty professionals and academicians in the field of heritage building conservation for grading them on scale of 1to 5 where one is the least significance and 5 is the most significance aspect of each variable. Freedom was given to them for suggesting some more variables and to provide suggestions if any.

The hypothesis tested is as follows: “Are all these variables significant for the heritage buildings in India”.

2. DESCRIPTIVE STATISTICS

The mean of each variable is calculated for the forty questionnaire forms collected from the professionals. Mean may be define as the value which we get by dividing the total of the values of various given items in a series by the total no of items. Kothari and Garg (1985)

For example: If we have the scale I to V and for variable INCL out of 40 samples 4 provides I score, 1 provides II score, 9 provided III score, 6 provides IV score and 20 provides V score.

Mean: $(4X1+1X2+9X3+6X4+20X5)/40=3.925$

Therefore Mean for Variable INCL=3.925 on the scale of 5. For the statistical analysis of the variables minimum size of the sample should be 30 and therefore samples were collected from forty experts and the score of thirty five variables is analysed through SPSS which is a statistical analysis tool. The table generated is as below.

TABLE I

S. No	Variable Code	Variables	Mean Value
1	PRPR	Proportion	4.0256
2	ELBO	Built Open Relationship	4.0000
3	ELAR	Arches	3.9487
4	ORMS	Monolithic Screen (Jali)	3.9487
5	INCL	Climate	3.9487
6	INRA	Regional Architecture	3.9231
7	ORSC	Stone Carving	3.8974
8	ELCO	Column	3.8718
9	ORIW	Inlay Work	3.7692
10	ELLS	Landscaping	3.7692
11	ORPS	Paintings & Sculptures	3.7692
12	ELCC	Chatris and Cupolas	3.7692
13	ELDO	Domes	3.7179
14	PRSY	Symmetry	3.7179
15	ORCA	Calligraphy	3.6923
16	ELBR	Brackets	3.6923
17	ORCC	Cornices & Corbelling	3.6667
18	PRAX	Axis	3.6667
19	PRGS	Grand Scale	3.6154
20	PRVI	Viewshed	3.6154
21	ELMI	Minarets	3.5641
22	ELHP	High Plinth	3.5128
23	PRGP	Geometric Planning	3.4615
24	INTY	Typology	3.4615
25	ORPI	Pilaster	3.4359
26	ELCV	Colonnaded Verandah	3.4359
27	ELEP	Eave projection and louver	3.4103
28	PRCP	Courtyard Planning	3.3590

29	ELFS	Foundation Stone	3.2308
30	ELPW	Parapet Wall	3.1795
31	ELSC	Stone Cladding	3.1538
32	ELBW	Boundary Wall	3.1538
33	ORFA	False Arch	3.0513
34	ELGL	Green Lawns	2.9487
35	ELEB	Exposed Brick	2.7692

2.1 RESULT OF MEAN

3. PEARSON PRODUCT MOVEMENT CORRELATION BETWEEN THE VARIABLES

The above analysis proves that all the thirty five variables taken for analysis are significant in the heritage buildings in our country. Further correlation among variables was done to analyse the significant relationship among them.

The coefficient of correlation “r” is not affected by change in scale or by change in location. It can be used to compare the relationships between two pairs of variables. It is a unit free measure of linear relationship between two variables and takes values in [-1, +1], where r is close to +1(-1), there is strong positive (negative) relationship. Kothari and Garg (1985)

For a significant correlation between two variables the value of significance for two tail test should be checked at .01 and .05 ie 99% significance level and 95% significance level.

The correlation among the thirty five variables were also done using SPSS 20. The Table generated provides the significant correlation of a variable with all the other variables.

The result of SPSS Analysis shows that each variable has a significant correlation with n number of variables selected for analysis.

The data is transformed into Table - III (Number of Strongly Correlated Variables) below which provides the significant correlation of the variable with the number of other variable at 99 % level of significance and at 95% level of significance.

The hypothesis tested is as follows:

H₀ : All these Variables are independent and do not have significant correlation with other variables”.

H₁ : All these Variables are dependent and have significant correlation with other variables”.

The result of shows that the mean of all the forty responses for these thirty five variable was between 2.80 to 4.05 on a scale of 5. Which implies that the variables were having significance level lies between 56% to 81%. Since the mean of all the individual variable taken from the heritage buildings for the analysis was more than 50%.

This justify that “All these thirty five variables contributes significantly in the Heritage Buildings of India”.

**TABLE II
NUMBER OF STRONGLY CORRELATED VARIABLES**

S. No.	Variable Name	Variable Code	Sig (2 Tail)* At .01 & .05 Lvl. No of Variable
1.	Climate	INCL	08
2.	Regional Architecture	INRA	15
3.	Typology	INTY	09
4.	Axis	PRAX	20
5.	Symmetry	PRSY	16
6.	Proportion	PRPR	18
7.	Grand Scale	PRGS	17
8.	Courtyard Planning	PRCP	25
9.	Viewshed	PRVI	17
10.	Geometric Planning	PRGP	13
11.	Boundary Wall	ELBW	18
12.	High Plinth	ELHP	19
13.	Foundation Stone	ELFS	15
14.	Landscaping	ELLS	17
15.	Built open Relationship	ELBO	10
16.	Green Lawns	ELGL	03
17.	Stone Cladding	ELSC	17
18.	Exposed Brick	ELEB	09
19.	Arches	ELAR	27
20.	Columns	ELCO	20
21.	Eave Projection Louvers	ELEP	09
22.	Brackets	ELBR	25
23.	Colonnaded Veranda	ELCV	14
24.	Parapet Wall	ELPW	20
25.	Domes	ELDO	25
26.	Chatris & Cupolas	ELCC	27

27.	Minarets	ELMI	25
28.	Cornices & Corbelling	ORCC	24
29.	Monolithic Screen	ORMS	18
30.	False Arch	ORFA	20
31.	Stone Carving	ORSC	23
32.	Pilaster	ORPI	16
33.	Inlay Work	ORIW	20
34.	Calligraphy	ORCA	22
35.	Paintings & Sculptures	ORPS	20

4. FACTOR ANALYSIS OF THE VARIABLES

After doing the correlation analysis we find out that though all of them are significant in heritage buildings but few variable out of these thirty five are showing strong correlation with the other variables. These variables (INRA, PRAX, ELBR, ELDO, ELMI, ORSC) are neglected since they are influencing the other variables and rest of the variables are taken for factor analysis.

Hypothesis is as under:

H₀: All the variables are equally important in the heritage buildings.

H₁: All the variables are not equally important in the heritage building.

**TABLE III
ROTATED COMPONENT MATRIX**

S. No	Var. Code	Variable	PRINCIPLE COMPONENTS		
			PC-I	PC-II	PC-III
1	INCL	Climate	.310	-.711	.205
2	INTY	Typology	.406	-.305	.208
3	PRSY	Symmetry	.502	-.116	.545
4	PRPR	Proportion	.539	-.355	.300
5	PRGS	Grand Scale	.545		.279
6	PRCP	Courtyard Planning	.664	-.173	-.376
7	PRVI	Viewshed or Vista	.553	.172	.434
8	PRGP	Geometric Planning	.475	-.267	.270
9	ELB W	Boundary Wall	.549	.353	.264
10	ELHP	High Plinth	.589		.381
11	ELFS	Foundation Stone	.571		.195
12	ELLS	Landscaping	.581		.317
13	ELBO	Built Open Relationship	.425	-.225	.399
14	ELGL	Green Lawns	.150	.694	
15	ELSC	Stone Cladding	.587	.441	.144
16	ELEB	Exposed Bricks	.475	.548	-.270

3.1 RESULT OF CORRELATION BETWEEN THE VARIABLES

Taking the variable 'Axis', table shows that the variable 'Axis' has a significant correlation with 20 (twenty) other variables out of 35 variables taken for the analysis.

This implies that "All these Variables are not independent and some variables have significant correlation with other variables and they can influence the other variables taken for analysis".

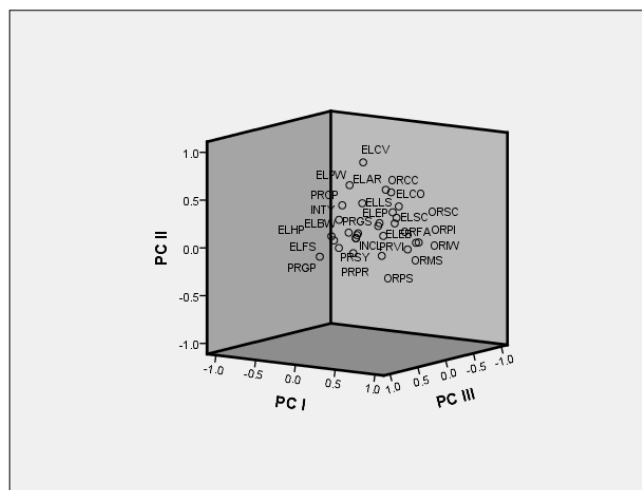
Null Hypothesis H₀ is rejected on the basis of statistical analysis carried out.

17	ELAR	Arches	.760	-.238	-.368
18	ELCO	Columns	.671	-.390	-.331
19	ELEP	Eave Projections and Louvers	.484	-.145	-.141
20	ELCV	Colonnaded Veranda	.548		
21	ELPW	Parapet Wall	.628		-.340
22	ORCC	Cornices and Corbelling	.753		-.227
23	ORMS	Monolithic Screen	.616	.414	-.189
24	ORFA	False Arch	.640	.386	-.438
25	ORPI	Pilaster	.606	.146	-.320
26	ORIW	Inlay Work	.740	.131	
27	ORPS	Paintings and Sculptures	.622	-.378	.283
Percentage of Variance			33.32	9.921	8.648
Cumulative Percentage			33.32	43.24	51.88

Extraction Method: Principal Component Analysis.

GRAPH I

COMPONENT PLOT IN ROTATED SPACE



4.1 RESULT OF FACTOR ANALYSIS OF VARIABLES

The values selected from these PC's should not be less than .5. PC I contributes 33.3% of the variance in the data set, it comprises of Arches and Cornices & Corbelling, PC II contributes 9.9 % of the variance in the data set and it comprises of Climate & Green Lawns, while PC III contributes 8.6 % of the variance in the data set and it comprises of Symmetry. These five variables of PC I, PC II and PC III together contributes 51.886% of variance in the data set.

This implies that "Although the thirty five variables which were selected from heritage buildings are significant but these five variables from among them are the most important and significant variables. These five variables are contributing 51.8% in the selected thirty five variables".

Null Hypothesis H_0 is rejected on the basis of statistical analysis carried out.

5. CONCLUSION

The above analysis proves that though the thirty five variable taken for analysis are significant in heritage buildings in Indian context but Arches and Cornices & Corbelling, Climate, Green Lawns and Symmetry are the most significant variables among these variables since they are together contributes 51.886% in all.

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