

# A STUDY FOR DEVELOPING EFFECTIVE PRODUCT DESIGN BY IDENTIFYING THE TOURIST PREFERENCES

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## ABSTRACT

Conjoint Analysis is based on the simple premise that consumers evaluate the value of a product/service by combining the separate amounts of value provided by each attribute. In this chapter to apply Conjoint Analysis, first a set of real or hypothetical products or services were constructed by combining selected levels of each attribute. These combinations were presented to respondents, who provided only their overall evaluations. Thus, the respondents are asked to perform a very realistic task choosing among a set of services by rating/ranking. Because of construction of the hypothetical product/service in a specific manner, the influence of each attribute and the worth of each level as judged by respondent can be determined by the respondent's overall ratings.

The state of Jharkhand was carved out of the southern part of Bihar on 15<sup>th</sup> November 2000. After the birth of the state of Jharkhand no much significant development in Tourism happened. Jharkhand tourism was chosen and some select districts were identified for the study. The districts are Dhanbad, Ranchi, Hazaribagh, Deoghar and Dumka. The current study focused on the relative importance given to the six identified attributes i.e. Value for money, Information, Security, Choices offered, Complaint redressal and modes of Access. The Conjoint Analysis results reveal that the tourists accord the greatest importance to 'Information' attribute, followed by 'Security' then by 'Value for money'. They however place relatively less value on 'Choice', 'Complaint redressal' and 'Access'. As a key policy implication, this study aims to provide Jharkhand Tourism Department, valuable information about tourist preferences, so that they can design customized tourism packages; consequentially furthering the socio-economic objectives of the state like enhancement of revenue from tourism.

**Keywords:** *Conjoint Analysis, Jharkhand Tourism, Six Factors*

## INTRODUCTION

Market research is frequently concerned with finding out which characteristics of a product or service is most important to consumers. The ideal product or service, of course, would have all the best characteristics, but realistically, tradeoffs have to be made. The product with the most expensive features, for example, cannot have the lowest price. Conjoint Analysis (CJA) is a technique for measuring consumer preferences about the attributes of a product or service. There are two general approaches to collecting data for Conjoint Analysis—the two-factor-at-a-time tradeoff method and the multiple factor full-concept method. With the tradeoff method, respondents are asked to rank the cells of a series of matrices, each matrix crossing the levels of one factor with the levels of another. The two-factor-at-a-time tradeoff method is hardly ever used today. The full-concept method is considered a more realistic,

ecologically valid method because all factors are considered at the same time. The three Conjoint Analysis procedures—Generate Orthogonal Design, Display Design, and Conjoint—are designed for the full-concept method.

The state of Jharkhand lies in the eastern India. This 28<sup>th</sup> state of the Indian Union was born on 15<sup>th</sup> November 2000 through the Bihar Reorganization Act on 15<sup>th</sup> November 2000 – the birth anniversary of the legendary Bhagwan Birsa Munda. The state was carved out of the southern part of Bihar with its geographical location with the state of Bihar in the North, Orissa in the south, Uttar Pradesh and Chhattisgarh to the west and West Bengal to the east. After the birth of the state of Jharkhand no much significant development of Tourism happened. Jharkhand tourism was chosen and some select districts were identified for the study. The districts are Dhanbad, Ranchi, Hazaribagh, Deoghar

and Dumka.

**(A) Conceptual Model for the Research Study**

Conjoint Analysis is based on the simple premise that consumers evaluate the value of a product/service by combining the separate amounts of value provided by each attribute. In this chapter to apply Conjoint Analysis, first a set of real or hypothetical products or services were constructed by combining selected levels of each attribute. These combinations were presented to respondents, who provided only their overall evaluations. Thus, the respondents are asked to perform a very realistic task choosing among a set of services by rating/ranking. Because of construction of the hypothetical product/service in a specific manner, the influence of each attribute and the worth of each level as judged by respondent can be determined by the respondent's overall ratings. The step wise process followed under the conceptual model (Exhibit 1) to arrive at the most desirable tourism package (as per tourist preferences), so that it can be conveyed further to the state tourism department for implementation.

Conjoint Analysis is a multivariate technique which is used to help design new product feature sets. The technique was first developed by Green and Rao (1971). Later Green and Srinivasan (1978) developed it as major set of techniques for buyer's trade-offs among multi-attributed products and services. A survey was conducted as a technique that measures consumer's preferences about attributes of a product or service. The main objective was to identify the most preferable combination of features to be offered or combined in the product or service.

**Specifying Attributes and Levels:** The first step of the Conjoint Analysis is the specification of objectives of the Conjoint Analysis. The objective of the present study was determination of customer preferences for multi attribute hybrid services like tourism, so as to enable the state tourism board and other private players to deliver a desired combination of intrinsic attributes, helping it to create a sustainable competitive advantage, leading to greater customer satisfaction and positive word of mouth. Accordingly, in formulating the Conjoint Analysis problems, six categories of salient attributes were identified (Table 1). These attributes were identified by a detailed identification process consisting of discussion with tourism industry

experts, secondary analysis of reports of the tourism department, content analysis of the pilot survey.

**Table 1: Desired Attributes and their Levels in Conjoint Analysis of Jharkhand tourism**

| Sl. No. | Attribute/Factors  | Levels  |
|---------|--------------------|---|
| 1       | Information        | Web & electronic media<br>Print media<br>Tour operator & tourism department of govt.<br>Visiting friend & relatives |
| 2       | Security           | Luggage safety<br>Medical safety<br>Family safety   |
| 3       | Choice             | Natural sites<br>Adventure<br>Historical/religious monuments  |
| 4       | Access             | Airways<br>Roadways<br>Railways   |
| 5       | Grievance handling | Ombudsman<br>Feedback form<br>Govt. official/tourism dept.  |
| 6       | Value for money    | Greater sightseeing quality<br>Greater lodging comfort<br>Comfort lodging & sightseeing at premium price            |

Source: Author's calculation based on sample survey

After identification of salient attributes, their appropriate levels were selected. The number of attribute levels determines the number of parameters that will be estimated and also influence the number of stimuli (attribute combination) to be evaluated by the respondents. So, following the in- depth interview with tourism industry experts, tour operators and officials of Jharkhand State Tourism Department, the levels estimating the attributes were selected in such a way that they covered the whole spectrum of product and services that are actually offered or are plausible. Three different levels for each of the five attributes have been taken, except 'Information' having four levels (Table 2). These attribute levels satisfied all the requirements for sufficiency, appeal and application, simultaneously it was kept in mind that when operationalizing either features or levels, they should be both communicable and implantable.

**Table 2: Conjoint Analysis: Model Description**

| Model Description   |             |                             |
|---------------------|-------------|-----------------------------|
| Factors             | N of Levels | Relation to Ranks or Scores |
| Information         | 4           | Discrete                    |
| Security            | 3           | Discrete                    |
| Choice              | 3           | Discrete                    |
| Access              | 3           | Discrete                    |
| Complaint Redressal | 3           | Discrete                    |
| Value for money     | 3           | Discrete                    |

Source: Author's calculation based on sample survey; All factors are orthogonal

### (B) Specification of the Conjoint Analysis Objective

Conjoint-analysis data and the modeling of preferences can require complex statistical analysis and modeling methods. There are several objectives when analyzing conjoint-analysis data. The primary objective was to estimate the strength of preferences for the attributes and attribute levels included in the survey.

The basic conjoint analysis model may be represented as (Carroll and Green 1995; Haaijer, Kamakura, and Wedel 2000):

$$u_{mki}(X) = \sum_{i=1}^m \sum_{j=1}^k \alpha_{ij} x_{ij}$$

Where  $u(X)$  = Overall utility of an attribute

$\alpha_{ij}$  = part-worth utility of the jth level of the ith attribute|  
 $i=1, 2, \dots, m \quad j=1, 2, \dots, k$

$x_{ij} = 1$ , if the j-th level of the i-th attribute is present = 0, otherwise.

The basic model was estimated with the Ordinary Least Squares (OLS) regression parametric mathematic algorithm using dummy variable regression. The preference ratings were the predicted (dependent) variable and predictor variables consist of dummy variables for the attribute levels. This algorithm calculates partial values by homogenizing the rate fluctuations based on the normal distribution (Green and Krieger 1993). Partial values were then used to calculate the total mean perceptual values.

### MATERIALS AND METHODOLOGY

Conjoint Analysis methodology (Green and Srinivasan 1990) was used because of the choice revolved around three basic characteristics of the proposed research: number of attributes, level of analysis and the permitted model form. The study dealt with six attributes, with aggregate level of analysis and the model form to be used was additive. Hence, full-profile approaches,

involving construction of complete profiles of the service/product offerings for all the attributes, have been used. Three levels for five attributes and four levels for one attribute have been considered. Hence there would be total  $4 \times 3 \times 3 \times 3 \times 3 \times 3 = 972$  tourism package descriptions (technically called 'stimuli' in Conjoint Analysis). However, numbers of stimuli profiles were greatly reduced from 972 to 29 stimuli by means of fractional factorial design. This appeared to be a manageable number for the respondents and also exceeds the minimum number of stimuli (Total number of levels across all attributes - Number of attributes + 1 = 14) that must be evaluated by the respondent to ensure the reliability of the estimated parameters. A special class of fractional design, called orthogonal arrays was used. It assumes that all interactions present in stimuli are negligible. It allows for efficient estimation of all main effects of interest (Green, Krieger, and Wind 2001; Kuhfeld, Tobias and Garratt 1994). Metric Conjoint Analysis has been used for purpose of survey and two sets of data were obtained. One, estimation set, consisting of 25 stimuli, was used for calculating part-worth functions for the attribute levels. The other, holdout set, consisting of 04 stimuli, was used to assess reliability and validity. The orthogonal arrays were generated by SPSS-22.0 software. So, total 29 design cards resulted and therefore respondents (tourists) were asked to evaluate questionnaires consisting of 29 cards. The ratings were obtained using a ratio scale of 10 (0 = least preferred and 10 = Most preferred). The survey instrument was pre-defined 300 questionnaires. The questionnaire had 29 stimuli profiles for preference rating. 233 questionnaires were found complete in all respects. The information was collected from the tourists at different tourist places and hotels in the state of Jharkhand. The questionnaires were administered personally to ensure the authenticity of information provided by the respondents. The questionnaires were pre-tested to check the orthogonality and other aspects and thereafter suitably modified.

### RESULTS AND DISCUSSION

All the nineteen levels of the six factors were discrete in nature. The most important aspect of the relationship between service providers and customers is that the service providers lack an in-depth insight into customer preferences. There is often a mismatch between what

customers want and what service providers offer. This is particularly true in case of services like tourism because of the intangibility element associated with it. The present study was undertaken to determine hierarchical framework of salient attributes in a desirable tourism-package (as per tourist's preferences) and thereafter to identify the most desirable combination of attributes that can be offered to tourists visiting the state of Jharkhand. These preference scores are based on the data collected from 233 tourists through a structured questionnaire (Table 3).

**Table 3: Overall Statistics**

| Utilities           |   | Utility Estimate | Std. Error |
|---------------------|---|------------------|------------|
| Information         | Web & Tele Media                              | -0.032           | 0.045      |
|                     | Print Media                                   | -0.073           | 0.056      |
|                     | Tour Operator & Tourist Office                | 0.126            | 0.056      |
|                     | Visitor/Friend/Relative                       | -0.021           | 0.056      |
| Security            | Luggage safety                                | -0.267           | 0.041      |
|                     | Medical insurance                             | -0.073           | 0.041      |
|                     | Family safety                                 | 0.34             | 0.049      |
| Choice              | Natural sites                                 | 0.048            | 0.041      |
|                     | Adventure                                     | -0.006           | 0.041      |
|                     | Historical/religious monuments                | -0.042           | 0.049      |
| Access              | Airways                                       | -0.067           | 0.041      |
|                     | Roadways                                      | 0.055            | 0.041      |
|                     | Railway                                       | 0.012            | 0.049      |
| Complaint Redressal | Ombudsman                                     | 0.017            | 0.041      |
|                     | Feedback form                                 | -0.049           | 0.041      |
| Value for money     | Govt. official/tourism dept                   | 0.032            | 0.049      |
|                     | Greater sightseeing quality                   | -0.072           | 0.041      |
|                     | Greater lodging comfort                       | -0.081           | 0.041      |
|                     | Comfort lodging & sight-seeing @ premium cost | 0.153            | 0.049      |
| (Constant)          |   | 6.916            | 0.038      |

Source: Author's calculation based on sample survey

Here six salient attributes and their levels were identified for consumer choice process in the tourism package by exploratory identification process (Table 4). Full Profile Conjoint Analysis was used for construction of preference structure. Analyzing the preference structure or the relative importance accorded (by tourists) to the six salient attributes, the tourists accorded the maximum utility/importance to the attribute 'information' (with importance as 20.665 percent). Hence the State Tourism Board needs to comprehend value in customer terms and deliver the same. Taking into account the part worth functions, the tourists have primarily defined 'Value' in terms of comfortable lodging and extensive sightseeing (even at a price premium). Sightseeing and comfortable lodging as attributes rank very high as per tourist preferences.

**Table 4: Importance Values Survey**

| Importance Values   |        |
|---------------------|--------|
| Information         | 20.665 |
| Security            | 20.152 |
| Choice              | 13.364 |
| Access              | 15.797 |
| Complaint Redressal | 13.219 |
| Value for money     | 16.803 |

Source: Author's calculation based on sample of Averaged Importance Score

The second most important attribute in the desirable tourism package is 'security' expected during the visit (importance 20.152 percent). Ensuring safety and security of all tourists is function of paramount importance for the state tourism board. Within the purview of this attribute the tourists accorded the highest priority to family safety. In recent times, with a sudden spurt in terrorist related activities and attacks on tourists in particular, there is a sense of insecurity among tourists. Appropriate security should be steadfastly ensured by the state law enforcement authorities. In absence of requisite security measures, any substantial progress in development of tourism of a destination may not be possible.

Thereafter at the third place in the worth hierarchy is the attribute of 'value for money' with an importance of 16.803 percent. The most preferred form of accessing the relevant and required information is the print-media and the web-media. For informed decision making, prospective tourists seek host of information (related to accessibility, tourist packages on offer, lodging, sightseeing, etc.). And print media provides detailed and permanent (in the consumer's perception) information about the alternative tourism packages on offer. The web media is probably preferred because of its convenience and easy accessibility. This information can be made available via brochures, newspapers, travel magazines and informative websites.

Then at the fourth place of the hierarchical framework, is the attribute 'access' with an importance of 15.797 percent. Here the tourists accorded the highest priority to the roadways as a mode to access different tourism sites. Hence there should be coordinated efforts by the state tourism board and state government towards proper roadways as a means of travel and communication.

Next in the hierarchical preference structure is the attribute representing 'choice' for tourism with 13.364

percent. Here tourists stressed upon choice of natural sites as tourist attraction. It is the choice of tourist which clearly speaks on the natural site of attraction rather than created or artificial tourism spots. This reflects that nature has its own beauty which cannot be created.

The last attribute was the 'complaint handling' with an importance of 13.219 percent. The tourist preferred government officials/tourism department to handle complaints and grievances. This reflects that the tourist still banks upon government/tourism officials for a proper response of complaints. This must be taken into importance by the State Tourism Board as a very positive implication towards Jharkhand Government and Tourism.

Conjoint Analysis results should be assessed for accuracy, reliability and validity. The objective is to ascertain how consistently the model predicts the set of preference evaluations under different situations. While evaluating the goodness of fit of the estimated conjoint model, it was found out that value of Kendall's tau is 0.713 and value of Pearson's R is 0.936. Both these values are reasonably high and these results are significant at 1 percent level of significance (Table 5).

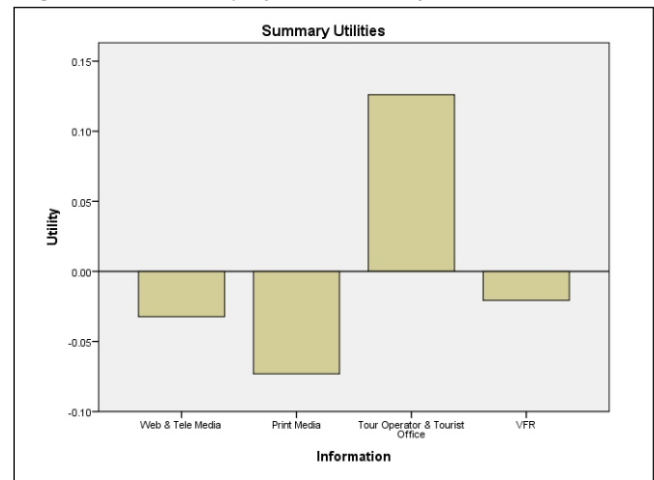
**Table 5: Correlations between observed and estimated preferences**

| Correlations               |       |              |
|----------------------------|-------|--------------|
|                            | Value | Significance |
| Pearson's R                | 0.936 | 0            |
| Kendall's tau              | 0.713 | 0            |
| Kendall's tau for Holdouts | 0     | 0.5          |

Source: Author's calculation based on sample survey

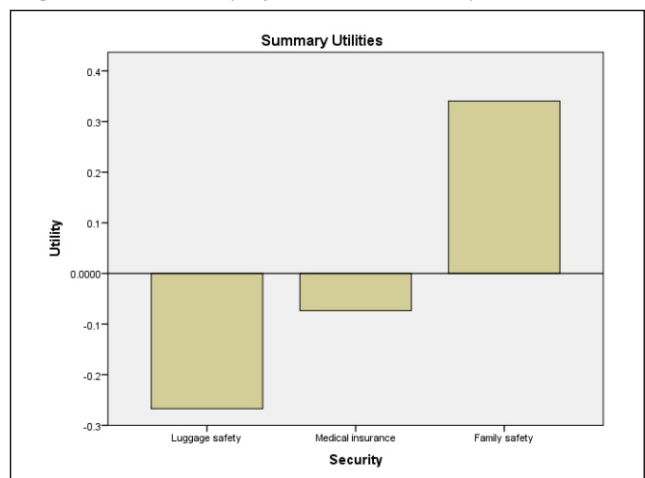
The utility score for the attribute 'Information' has been shown in Figure 1. It is clearly seen that for the attribute 'Information' a large number of respondents preferred information from tour operators and tourist offices rather than from web and tele-media, print media and VFR (visitors, friends and relatives). A larger segment of respondents did not want print media as a information source while a smaller segment of respondents too did not want information's through web and tele-media and VFR (visitors, friends and relatives).

**Figure 1: Summary of Utilities- Information**



The utility scores of the attribute 'Security' has been shown in Figure 2. It is seen from the figure that a large segment of respondents preferred or gave priority to family safety during tours. A considerable number of respondents did not give importance to luggage safety during tour in terms of security while a still smaller segment did not want medical insurance as a priority when security in tour is to be considered.

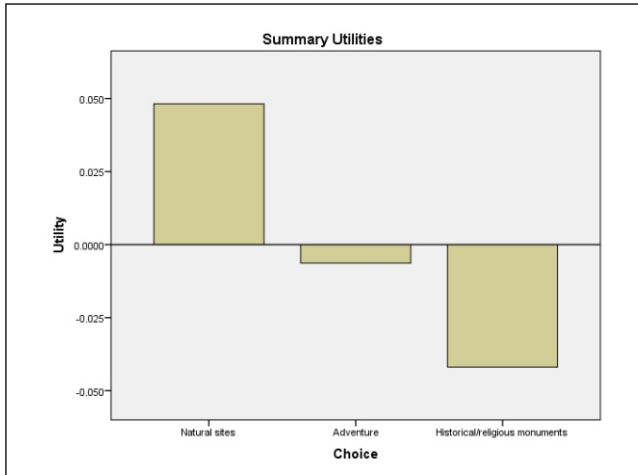
**Figure 2: Summary of Utilities-Security**



The utility scores for the attribute 'Choice' has been shown in Figure 3. It is seen from the figure that a large segment of respondents preferred natural sites when given a choice of type of tourist destination. An equally large number of respondents did not prefer historical and religious monuments as a site while a smaller segment of respondents also did not prefer adventure

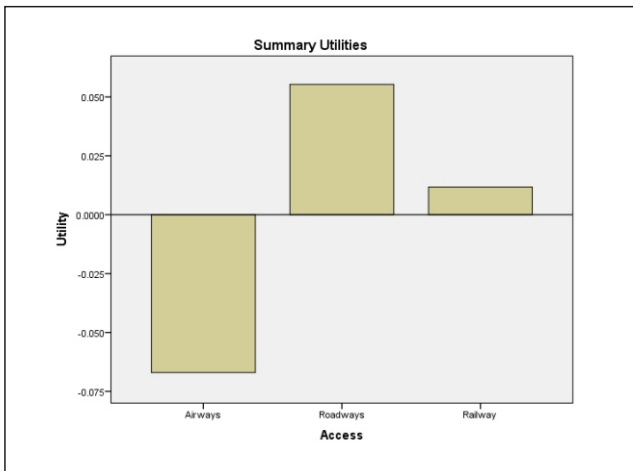
site for tourism. This may reflect the change in taste and preference of tourist so that they are no more interested in artificial sites but on natural site with natural beauty.

**Figure 3: Summary of Utilities – Choice**



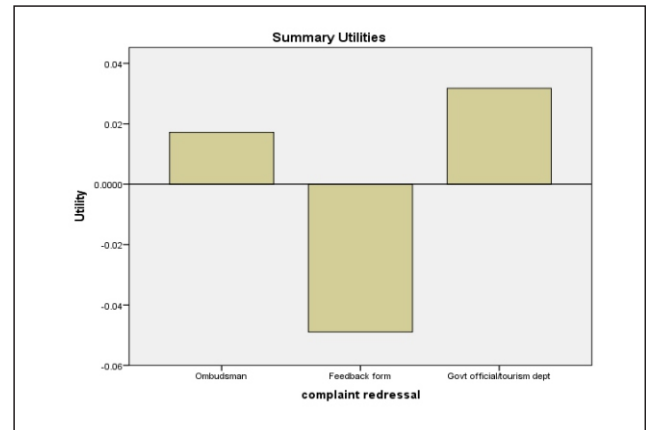
The utility scores for the attribute 'Access' has been shown in Figure 4. It is observed from the figure that a major portion of the respondents mostly preferred roadways for travelling to destinations. A smaller number of the respondents also preferred railways as a mode of transportation. While again a major number of respondents did not prefer airways as a mode of travel to destination in Jharkhand. This indicates that the government should focus on development of roadways and railways as a part of infrastructural development in the state for tourism. This also means that the government should work on airport development to facilitate travel the absence of which is not allowing the tourist to choose as a mode of transport.

**Figure 4: Summary of Utilities – Access**



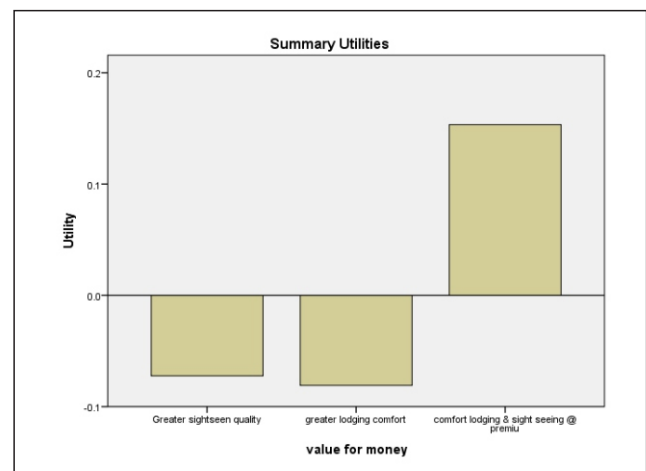
The utility scores for the attribute 'Complaint Redressal' has been shown in Figure 5. It is seen from the figure that a major number of respondents did not prefer to redress their complaint through feedback form. While a considerable segment of respondents preferred to redress their complaint through government officials and officials from tourism department. A still less number of respondents expressed their preference to redress their complaints through Ombudsman.

**Figure 5: Summary of Utilities – Complaint Redressal**



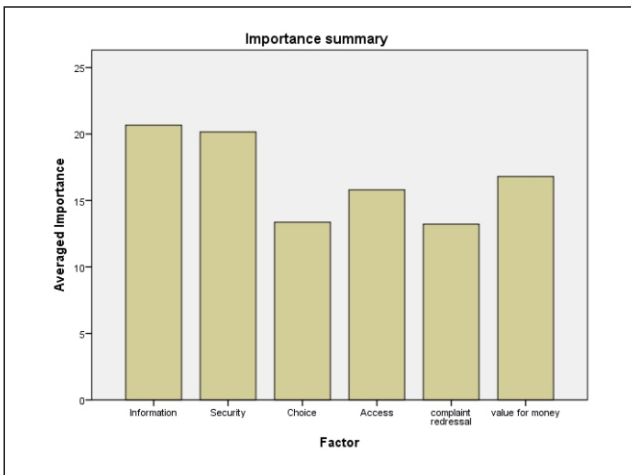
The utility scores of the attribute 'Value for Money' has been shown in Figure 6. It is seen from the figure that a substantial number of respondents expressed their preference on comfortable lodging and sight-seeing at a premium price as the value for money. A significant number of respondents as well did not prefer greater sight-seeing and greater lodging comfort as the value for money in tourism.

**Figure 6: Summary of Utilities – Value for Money**

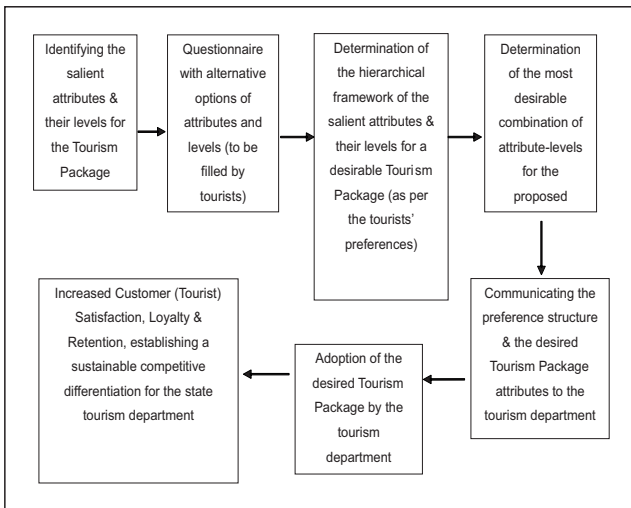


The Figure 7 shows the importance factors of the attributes as preferred by the respondents. It is seen from the figure that the respondents mostly gave the first importance to 'information' and 'security' attribute in case of tourism. Then the respondents gave second importance to the attribute 'value for money' followed by the attribute 'access' as the third importance. An equal number of respondents gave the fourth importance to the attributes 'choice' and 'complaint redressal'.

**Figure 7: Summary of Importance – Factors**



**Exhibit: Step wise process flow of Conjoint Analysis**



**CONCLUSION**

The current study focused on the relative importance given to the six identified attributes i.e. Value for

money, Information, Security, Choices offered, Complaint redressal and modes of Access. The Conjoint Analysis results reveal that the tourists accord the greatest importance to 'Information' attribute, followed by 'Security' then by 'Value for money'. They however place relatively less value on 'Choice', 'Complaint redressal' and 'Access'. This study can be looked at two perspectives; one would be a management perspective and the other would be a marketing perspective. From the management perspective, the state departments of Jharkhand Tourism can be empowered with information (about tourist preferences) from this study, from which they can value add to the relation building with the tourists by incorporating the preferred combination of attributes in the tourism packages or as tourism elements. The decision-making authorities in the tourism department with the help of the information attribute as provided by the study can judiciously bridge the gaps between their perception of value (of services provided) and the tourists' perception of value (desired services), though corrective action plans. As a result, with the corrective action plans a greater customer satisfaction can be ensured and also a differentiable competitive advantage can be gained over other tourist destinations.

Even though the study focuses on tourism department of Jharkhand, the premise of this paper can even be successfully implemented by the tourism authorities of other national environments. Across the world the most important factor connecting between the service providers and customers is the service provider's lack of insight into the customer's preference. This leads to a gap between what customers want (expected) and what service provider's offer (delivered), particularly in case of services like tourism. So, to bridge this gap tourism authority can determine the tourist's preference structure and offer customized tourism packages. The attributes and their levels used for Conjoint Analysis could be adapted in accordance with the socio-cultural environment of a country. As a key policy implication, this study aims to provide Jharkhand Tourism Department, valuable information about tourist preferences, so that they can design customized tourism packages; consequentially furthering the socio-economic objectives of the state like enhancement of revenue from tourism.

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