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Preference Based Analysis on Online Course Structure of Research Methodology Using Conjoint Method

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Abstract **- Global pandemic Covid-19 has played a major role in increasing demand of online courses. Blackboards and white screens are gradually shifted to mobile and laptop screens. The e-learning becomes indispensable part in the academic arena. Courses on research methodology are most popular on online platform as research scholars and faculties from different institutions may got involved to their desirable option without facing much trouble of transportation. This paper tries to find out the preference of research fraternity of social science streams while they choose any research methodology course through online. Responses have been gathered using Google form from 1447 researchers of social science streams. Conjoint analysis has been performed to investigate what combination among different levels of attributes a researcher prefers while choosing any research methodology course. Order of attributes has been assigned based on their importance. Logistic regression has been performed to find out the demographic and socio-economic factors that influence the attributes.**
Keywords: **Research Methodology, Online, Questionnaire, Conjoint Analysis, Logistic Regression**

I. INTRODUCTION

According to the American sociologist Babbie (1983), research involves inductive and deductive methods to perform a systemic enquiry to describe, explain, predict, and control the observed phenomenon. Research work generally starts with some research questions and suitable methodologies to address the research problem. Research methods in various fields may be considered as a tool to achieve certain objectives. In any field study the outcomes largely depend on the research methodology structure. By thoroughly collecting data from the field through different sampling techniques and questionnaire researchers in the field of social sciences obtain valuable insights of different brands or products or market demands. Thereby, the researcher can effectively make conclusions about different business strategies. Thus, research methodology is an important part of education for researchers. The effect of social science studies largely relies on how appropriately the research methods chosen.

Sackett and Larson (1990) pointed out that conclusion of an experiment depends on some steps like designing, data analysis, construct validation etc. Scandura and Williams (2000) illustrated the impact of research methodology in management. DŹWIGOŁ (2018) also discussed the scientific research methodology in management studies. The students and faculties of social science streams are often face issues with data dealings which need proper knowledge about effective data use and analysis. For this purpose, it is always better to have some workshops or trainings or development programmes to know the direction of research properly. But there are very few institutes that provide that types of course in offline mode. Indian students have to complete a course work for Ph. D. where a small part of research methodology is included. But these are not sufficient for full understanding. Besides students conduct different field analysis to complete their project work at colleges and universities without having a good knowledge regarding how to collect data, arrange data and analyze those data. Many faculties of social sciences stream are involved in research for their own purpose or guide students for their fulfillment of educational degree. This is why it is required a proper course of research methodology for both students and teachers.

The pandemic Covid-19 has shifted the platform of teaching. Chalk-blackboard usual classes are confined into mobile and computer screens. Students, teachers and almost entire educational fraternity are becoming habituated with e-learning. Ministry of higher education (MHRD) has also introduced different online portals, educational channels. MHRD has also notified that all the career advancement courses for teachers will be conducted online. So, there is no option to continue educational activities without choosing the web-based platform. Thus, the pandemic acted like a catalyst to grow the web platform for educational purpose. Rosenberg and Foshay (2002) characterized e-learning as the utilization of internet advancements for conveying various arrangements that improve information and execution.

Yu *et al.*, (2010) represented web-based learning as sustainable delivery systems. Gupta and Sengupta (2021) discussed about the impact of virtual medium in our education system based on students' perception. Many academic institutions which were earlier reluctant to change their traditional pedagogical approach had no option but to shift entirely to online teaching–learning. In response to significant demand, many institutes are offering online learning platforms/courses and students, teachers and scholars are also participating in those courses.

Levin *et al.,* (2009) explored difference in perception for online versus traditional classes for a global business course. Mann and Henneberry (2014) investigated students' preference while choosing online class and offline class. Horvat *et al.,* (2014) discussed the students' perception on Moodle classroom. Pasha and Gorya (2019) analyzed students' preference and perception towards online education in Hydrabad. They have also compared online education with traditional one. Kuzmanović (2019) examined students' preference towards e-learning environment through conjoint analysis. Lambert and Yanson (2017) investigated employee preference in learning modality for professional development. Conrad (2008), Roberts (2010) suggested that the online environment should be such that it will be able to understand the students' requirement. Zhang *et al.,* (2014) discussed how to minimize the disadvantages of e-learning.

Among different courses the demand of research methodology courses is very high. Since most of the educational institutes are closed or irregular at the time of Covid-era; many teachers, researchers and student utilized this time to acquire knowledge of research methodology so that they can use it efficiently afterwards. Online research methodology course has several merits.

1. It is easily accessible.
2. Most of the researchers including faculty and students of higher education have smart mobile phone and legitimate internet connection and hence they can join any online courses.
3. It is flexible. One can choose course according to his/her convenient time.
4. One can get knowledge from different field and experts around the word.
5. Participants can join from their own desk.
6. Online classes can be recorded and hence one can see it several times to understand any topic.
7. Hands on trainings for research methodology are also possible.
8. A large number of online research methodology tools are available. Trainer can use a combination of text, audio, and video to present different research tools/techniques in a better way.

Researchers' preferences in choosing online courses vary based on different influencing factors. There are limited studies on students' preferences of such choices. To fill this gap this paper has two basic objectives

1. To find out the combination of different level of attributes under study that researchers prefer while joining an online research methodology course. For this purpose, a conjoin analysis have been applied.
2. To find out the demographic and socio-economic factors that affect the utilities assigned to different levels of the attributes related to the preference for research methodology. For this purpose, logistic regression is performed.

II. CONJOINT ATTRIBUTES AND ATTRIBUTE LEVELS

The conjoint analysis plays an important role to design and thereby launch a new product in the market (Green and Krieger, 1997). Conjoint analysis is a multivariate technique that applied in survey-based study. It determines the attributes of a service or product. The main purpose of a conjoint analysis is to identify the salient combinations of features that are demanding while launching a service or product. It also orders the attributes according to importance. Conjoint analysis has been effectively applied in the market of education for a long time to understand students' perception and preference for different attributes of education (Souter and Turner, 2002; Gökhan and Buke, 2012; Won and Bravo, 2009; Carey *et al.,* 2018; Sun and Wang, 2014; Kuzmanović *et al.,* 2019 etc.)

The basic model for conjoint analysis can be expressed as (Carroll and Green 1995)

$$U(x) = \sum_{i=1}^{k} \sum_{j=1}^{l_i} \beta_{ij} x_{ij} \qquad (1)$$

Where,

U(x) = Overall utility of an attribute

β_{ij}= utility of the j^{th} level of the i^{th} attribute, i=1,2,…,k; j=1,2,…,l

$$x_{ij} = \begin{cases} 1, \text{if the jth level of ith attribute is present} \\ 0, \text{if the jth level of ith attribute is absent} \end{cases}$$

The ordinary least square method is applied to estimate the regression parameter β_{ij} (Fox, 1997). Here the preference ratings and dummy variables representing the levels of the attributes are dependent and independent variables respectively. The following Table I illustrate the details of the attributes and the attribute levels used in this paper.

TABLE I ATTRIBUTES AND CORRESPONDING LEVELS UNDER STUDY

Attributes	Factors
Research methodology topic (RMT)	(i) Particular research/ subject based (ii) General Topic
Device (D)	(i) Computer (ii) Mobile Phone
Online Platform (OP)	(i) YouTube Live (ii) Zoom, GoogleMeet, TeamLink etc
Communication (C)	(i) WhatsApp (ii) Telegram
Time Slot (TS)	(i) Morning (ii) Afternoon (iii) Evening
Duration (Days) (DU)	(i) 1-15 (ii) 15--30 (iii) >30
Course fees (Rs.) (CF)	(i) Less than2000 (ii) 2000-5000 (iii) More than 5000

III. METHODS AND DATA COLLECTION

The conceptual framework of the conjoint analysis is given below

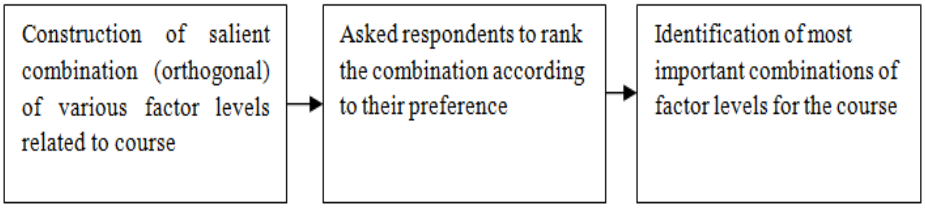

Fig. 1 Conceptual framework for conjoint analysis

At first, different combinations of the levels of the attributes have been prepared. From the table I it can be said that if the all possible combinations of the levels are considered then there will be 432 possible combinations. The number of combinations is quite large. Instead of 432 possible combinations 32 orthogonal combinations have been generated including of 5 hold out cases using SPSS. Thus, two sets of data were obtained. They were

1. *Estimation Set:* This set consists of 27 combinations. These combinations were used for evaluating part-worth functions for the attribute levels.

2. *Holdout Set:* This set consists of 5 combinations. These combinations were to assess reliability and validity.

The orthogonal arrays were generated using SPSS software. On the basis of these 32 cards or combinations the first part of the questionnaire has been prepared. Metric conjoint analysis is used for survey data in this part. Students, teachers and research scholars of social science studies were asked to rank the cards. Google form was used to collect the response. A total of 1447 researchers of social science background including students and teachers responded on it.

The second part of the questionnaire consists of demographic and socio-economic and demographic profiles of the respondents. Table II represents the distribution of respondents corresponding to the selected profiles. Logistic regressions have been performed to test the impact of these profiles on the attributes' preference level.

TABLE II SOCIO, ECONOMIC AND DEMOGRAPHIC PROFILE OF RESPONDENTS

Demographic Profile		**Dummy**	**Percentage**
Age (year)	18-25	1	30
	25-40	2	37
	40-65	3	33
Gender	Male	1	58
	Female	0	42
Area/Locality	Rural	0	32
	Urban	1	68
Marital Status	Married	1	43
	Unmarried	0	57
Income per month (Rs)	0-35000	1	39
	35000-75000	2	24
	>75000	3	37
Profession	Student and Research Scholar	0	57
	Teacher	1	43

IV. RESULTS AND DISCUSSION

Average utilities of each attribute levels are determined using SPSS software. The result is depicted in Table III. Table III shows that particular research/ subject based methodology yields a greater utility than general research methodologies. This implies that scholars of different Social studies prefer the research methodology courses more that related to their own research/subject. Zoom, Google Meet etc online platforms are more in demand than YouTube because of easy interaction options. Even one can interact face to face through a mobile/computer screen in these video platforms. Telegram has higher utility than WhatsApp as an information sending medium which may attribute to the easy and smooth transfer of large files.

TABLE III AVERAGE UTILITY SCORE FOR EACH LEVEL OF THE ATTRIBUTES

Attribute	Level	Utility Estimate	Std. Error
RMT	Particular research/subject based	1.770	0.660
	General	-1.770	0.660
OP	Zoom, Google meet etc	0.670	0.820
	YouTube	-0.670	0.820
C	WhatsApp	-0.176	0.640
	Telegram	0.176	0.640
D	Computer	-0.144	0.640
	Mobile	0.144	0.640
TS	Morning	-0.104	0.932
	Afternoon	-0.175	0.855
	Evening	0.279	0.672
DU	<15	0.514	0.659
	15-30	0.922	0.583
	>30	-1.436	2.284
CF	<2000	0.742	0.660
	2000-5000	-0.329	0.742
	>5000	-0.413	0.836
(Constant)		10.622	2.284

The present study has found that mobile phone holds a relatively higher importance than computer as communicating device. Mobile phones are easy to access and carry anywhere. Researchers prefer the evening slot most than morning and afternoon as for example teachers of colleges and universities have their classes during morning and afternoon. A research methodology course with 15-30 days has more utility than less than 15 days and long duration courses. Less than 2000 course fee has been given more importance than higher fees. This implies that researchers don't want to invest much course fee for the courses. The most preferable combination of choices for a research methodology course is

Particular/ subject based course + Zoom, Google Meet etc video platform + Telegram as communication medium + Mobile phone as device + Evening time slot + 15-30 days course + Course fee less than 2000

For this combination the utility value is 15.325. Table IV highlights a measure of the average relative importance of the attribute.

TABLE IV AVERAGE IMPORTANCE VALUE OF THE ATTRIBUTES

Attributes	Importance Value
Research Methodology Topic (RMT)	13.921
Online Platform (OP)	8.458
Communication (C)	8.803
Device (D)	11.173
Time Slot (TS)	14.236
Duration (DU)	19.322
Course Fee (CF)	21.350

The table IV shows that course fee is the most influential attribute. Course duration and time slot are the second and third preferable attributes. The result also shows that communication medium and online platform are the least considered by the researchers.

In Table V three statistics are computed based on the correlation between observed and estimated preferences. The p-values corresponding to test statistics show that the correlations are high for all conjoint models which validate a good and efficient model fit.

TABLE V CORRELATION BETWEEN OBSERVED AND ESTIMATED PREFERENCES

Preferences	Value	Significance
Pearson's R	0.894	0.01
Kendal's tau	0.785	0.02
Kendal's tau for holdouts	0.683	0.04

Logistic regression analyses have been performed to study the relationship between the preferences under study with some demographic and socio-economic profiles of the respondents. Here the preferences are the dependent variable and demographic and socio- economic profiles are the independent variable.

Since seven attributes have been studied here, seven regression models are considered. For each attributes 1 is assigned for the level which has maximum utility and 0 for the other levels. The results of the logistic regressions are given in Table VI.

TABLE VI LOGISTIC REGRESSION MODEL RESULTS FOR ATTRIBUTE LEVELS

Dependent Variable	Constant	Age	Gender	Locality	Marital Status	Monthly Income	Profession
Methodology Type	0.97 (0.18)	10.54 (0.04*)	7.82 (0.07)	8.25 (0.31)	9.31 (0.42)	10.92 (0.47)	4.39 (0.22)
Online Platform	0.90 (0.22)	7.04 (0.11)	9.06 (0.11)	-14.79 (0.04*)	-6.26 (0.65)	-4.25 (0.68)	-6.22 (0.37)
Communication	2.06 (0.11)	-19.26 (0.05*)	6.09 (0.21)	-11.24 (0.09)	8.31 (0.35)	-9.93 (0.10)	-11.53 (0.05*)
Device	3.28 (0.09)	15.77 (0.03*)	-12.47 (0.04*)	7.62 (0.09)	-4.13 (0.42)	6.33 (0.47)	12.32 (0.05*)
Time Slot	2.22 (0.15)	-11.35 (0.04*)	17.99 (0.01*)	-11.22 (0.05*)	-5.82 (0.63)	5.30 (0.42)	9.71 (0.04*)
Duration	1.07 (0.20)	-10.21 (0.05*)	-11.92 (0.05*)	12.44 (0.71)	-5.92 (0.55)	7.14 (0.29)	11.21 (0.04*)
Course Fees	1.76 (0.23)	-12.09 (0.04*)	7.61 (0.47)	4.98 (0.52)	-6.03 (0.54)	-12.33 (0.05*)	-15.05 (0.04*)

From table VI we have the following results.

1. Research Methodology Type depends on age only.
2. Online platform depends on locality only.
3. Communication depends on age and profession.
4. Device depends on age, gender and profession.
5. Time slot depends on age, gender, locality and profession.
6. Duration of course depends on age, gender and profession.
7. Course fee depends on age, monthly income and profession.

V. CONCLUSION

The study of the present paper mainly focuses on the relative importance of the attributes while researchers select research methodological courses. For this purpose, a conjoint analysis has been performed. Different mutually exclusive levels of the attributes are considered. The best preferable combinations of the levels that researchers value most have been identified from this paper. Among the all possible combinations of the levels 32 orthogonal combinations have been selected. The idle combination is based on subject specific research methodology course with low fee structure, 15-30 day duration, evening time slot, mobile device, telegram message app, and zoom, Google meet etc online platform. The course fee has been assigned as the most important attribute and online platform assigned as the least important from the survey responses. Validity of the conjoint model has been checked. Logistic regression identified the socio economic and demographic factors that influence the preference attributes. This result indicates that there is a possibility that the utilities may sensitive to the profile of these variables. This study would help the institutions to develop a research methodology course based on preferences of research scholars. The analysis is also giving insight for changing a course structure to make it more learners friendly.

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