Review Article

PREFERENCES OF INFORMATION SOURCES IN VETERINARY SCIENCE IN INDIA: BEST-WORST SCALING ANALYSIS

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ABSTRACT

This study examines the preferences of information sources among veterinary science professionals in India, employing a Best-Worst Scaling analysis to identify the most and least favoured sources, as well as the constraints faced in accessing these resources. Conducted through an online survey in 2024, the research gathered responses from 142 veterinary professionals, predominantly male (88.73%). Key findings reveal that the internet and training courses are the most preferred information sources, while traditional resources like CD databases are least favoured. Constraints such as information overload and inadequate infrastructure significantly hinder effective information access. The study highlights gender disparities in information source preferences and emphasizes the need for improved access to information and resources in the veterinary field.

Keywords: Information sources, veterinary science, India, best-worst scaling, internet, gender disparity

Received :02.12.2024 Revised : 23.04.2025 Accepted : 25.04.2025

INTRODUCTION

Veterinary professionals play a crucial role in extending research findings and technologies from academic settings to practical applications in rural areas, where most livestock populations reside in India. However, after completing their formal education, these professionals often face challenges in staying updated with the latest knowledge and practices due to various constraints. This study aims to identify the preferred sources of information among veterinary professionals in India, analyze the constraints they encounter, and explore gender differences in these preferences. By understanding these dynamics, the research seeks to inform strategies that can enhance information access and utilization in the veterinary field, ultimately benefiting both professionals and the communities they serve.

REVIEW OF LITERATURE

Garner *et al.,* (2019) assessed information-seeking strategies among

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veterinary trainees at the University of Georgia. A survey of 184 participants revealed that students initially relied on class notes and online resources, while interns and residents preferred textbooks. First-year students preferred printed textbooks more than upperclassmen, with cost being a key factor for purchasing. Huntley *et al*., (2016) made an international survey of 2,137 veterinarians across 78 countries and revealed insights into their information sources. Most respondents accessed journals and electronic resources, with notable preferences differing between developed and developing countries. Key journals included the Journal of the American Veterinary Medical Association and the Veterinary Information Network study findings indicated that veterinarians and students adapted to digital learning technologies, particularly in veterinary pathology, due to COVID-19. Giacomazzo *et al*., (2024) evaluated the effectiveness and satisfaction of digital cytology as a teaching method among European veterinary students. Results indicated a preference for digital methods but emphasized the need to retain traditional light microscopy in training. Anagaw and Guadie, (2023) analyzed global information-seeking behaviour related to COVID-19 using databases like PubMed and Scopus. It included 20 articles, highlighting the influence of digital health literacy and socio-demographic factors. Key information sources were digital media and public health websites, emphasizing the importance of online resources in health information access.White *et al*., (2023) aims to equip equine professionals with skills to efficiently navigate scientific literature for clinical decision-making. It covers essential questions to consider, optimal search locations, accessing legal copies of research, conducting effective searches, and utilizing databases of research syntheses, drawing on expertise from various professionals in the field.

A study by Muca *et al*., (2022), analyzed data from 2012-2022, revealing high use of portable devices, continued reliance on textbooks, moderate online tool usage, and low engagement with research papers, indicating varied student attitudes towards digital resources.

Objectives

The interpretations of the online survey were made using the Best-Worst Scaling method with the following objectives and limitations:

- To analyze the most and least-sought source of information from veterinary science professionals in India.
- To identify the various constraints in the source of information from veterinary science professionals in India.

Limitations

The study was confined to the veterinary science field in India and exclusively utilized the Best-Worst Scaling method for data analysis. As such, findings may not be generalizable to other fields or countries.

METHODOLOGY

This study employed a quantitative research design utilizing an online survey to assess the preferences of information sources among veterinary science professionals in India. The survey aimed to identify the most and least preferred sources of information, as well as the constraints faced by these professionals in accessing information.

Survey Design and Distribution

The survey was conducted in 2024 and targeted veterinary professionals across various services throughout India. A total of 150 questionnaires were received, with 142 valid responses collected, yielding a response rate of 94.67%. The sample consisted predominantly of males (88.73%) compared to females (11.27%) mentioned in Table 1.

Data Collection

The online survey (https://forms.gle/L93ZC3Awoqqzm1ho8) included questions regarding the preference for various information sources, such as the internet, training courses, personal notes and seminars. Additionally, it assessed constraints like information overload, inadequate infrastructure, and power failures. The data collection process was facilitated through an online platform, ensuring broad accessibility for respondents from diverse geographical locations.

Data Analysis

The collected data were analyzed using demographic and gender-wise distribution metrics to identify differences in preferences and constraints. A standardized scoring method was employed to rank the importance of various information sources and constraints, allowing for a comparative analysis across respondents. Best-worst scaling (BWS) is an effective survey method for determining individual priorities by identifying the most and least important factors. By asking respondents to identify their best and worst choices, this method yields clear insights into user preferences. The results facilitate informed decision-making by highlighting the most appealing aspects relevant to the research question (Louviere *et al*., 2015). The BWS method was specifically utilized to quantify preferences, where respondents ranked attributes based on their importance. The methodology employed in the studies reviewed includes a combination of literature analysis, survey techniques, and stakeholder engagement.

Anagaw and Guadie (2023) utilized databases such as PubMed and Scopus to analyze global information-seeking behaviour related to COVID-19, focusing on 20 articles that examined the impact of digital health literacy and socio-demographic factors on health information access.

Wittenberg *et al*., (2016) implemented Best-Worst Scaling (BWS) in a primary care setting to evaluate the priorities of homeless

women regarding Pap testing services, revealing that support for non-health issues significantly influenced screening uptake. Schuster *et al*., (2024) conducted a literature review of BWS applications, identifying 526 studies primarily in health and agriculture, noting a doubling of BWS use every four years and a predominance of online surveys. Beres *et al*., (2024) reviewed 35 studies applying BWS as a prioritization technique, emphasizing its relevance and quality across sectors affecting health determinants. Overall, these methodologies highlight the effectiveness of BWS and the importance of stakeholder engagement in health-related research and policy decision-making.

Statistical Methods:

The analysis involved calculating the standard scores for each information source and constraint based on the frequency of their appearance in the responses. The formula used was:

$$\text{Standard Score} = \frac{(\text{Count Most} - \text{Count Least})}{5n}$$

Where

Count Most = total number of times an attribute was most important.

Count Least = total number of times an attribute was least important.

n is the number of questionnaires

and

5 is the frequency of the appearance of each attribute in the design.

This methodology provided a structured approach to understanding the preferences and challenges faced by veterinary professionals in accessing information, highlighting the need for improved information systems and strategies to address identified constraints.

Table 1: Sample Size

S.No	Gender	Distributed	Received
1	Male	130 (86.67)	126 (88.73)
2	Female	20 (13.33)	16 (11.27)
Total		150 (100)	142 (100)

(Figures in parentheses indicate Percentages) Sample Size (142) 94.67%

RESULTS AND DISCUSSION

The analysis of state-wise gender representation table 2 highlights significant gender disparities among the 142 individuals, where males dominate with 126 (88.73%), and females account for only 16 (11.27%). Andhra Pradesh reports the highest total representation (39 individuals, 27.46%), with males overwhelmingly contributing 36 individuals (25.35%) compared to only 3 females (2.11%). Similarly, Madhya Pradesh ranks second, with 20 individuals (14.08%), but maintains the male dominance

trend with 17 males (11.97%) and 3 females (2.11%). States like Jammu and Kashmir, Karnataka, Orissa, and Uttar Pradesh exhibit a complete absence of female representation, reflecting possible regional barriers to female participation. Conversely, states like Kerala, Rajasthan, Tamil Nadu, and Telangana show slightly better gender inclusion, yet males still predominate. These findings highlight systemic challenges in achieving gender equity across regions. Such disparities necessitate targeted policy interventions to empower female representation and participation, particularly in underrepresented states. Further research is essential to investigate socio-economic and cultural factors contributing to this gender imbalance.

The dataset presented in table 3 of the gender distribution across four designations in the veterinary profession, highlighting significant gender disparities. Out of 142 individuals, males overwhelmingly dominate with 126 (88.73%), while females constitute only 16 (11.27%). The highest representation is observed among veterinary assistant surgeons, comprising 84 individuals (59.15%). Males account for the vast majority at 75 (52.82%), with females contributing just 9 (6.34%). Government Field Veterinarians form the second-largest group with 30 individuals (21.13%), heavily skewed toward males at 28 (19.72%), compared to 2 females (1.41%). The teaching category exhibits a slightly improved gender balance, with 17 individuals (11.97%)- 13 males (9.15%) and 4 females (2.82%). However, the Private Field Veterinarian category, despite having the lowest total representation (11 individuals, 7.75%), shows significant male predominance (10 males, 7.04%, and 1 female, 0.70%). This data underscores a persistent gender gap in veterinary professions, particularly in field roles. The underrepresentation of females in leadership and field positions points to systemic barriers, including societal expectations and workplace dynamics. Addressing these gaps requires targeted strategies such as mentorship programs, flexible work policies, and initiatives to encourage female participation in veterinary fields.

The dataset table 4 reveals the distribution of individuals across different age groups by gender, emphasizing a significant gender imbalance. Out of the total 142 individuals, males constitute a dominant 88.73% (126 individuals), while females make up only 11.27% (16 individuals).The largest representation is observed in the 31- 40 age group, comprising 69 individuals (48.59%). Males significantly outnumber females, with 60 individuals (42.25%) compared to 9 females (6.34%). The second-largest group is those below 30, accounting for 62 individuals (43.66%), where males again dominate with 55 individuals (38.73%) versus 7 females (4.93%). In older age groups, the gender disparity becomes even more pronounced. The 41–50 age group consists of 8 individuals (5.63%), all male. Similarly, in the 51 and above category, there are only 3 individuals (2.11%), all male, with no female representation in either group. The data underscores that females are predominantly represented in younger age groups and are virtually absent in older

demographics, reflecting potential career drop-offs or barriers as age progresses. These trends highlight the need for gender-inclusive policies and retention strategies, particularly to support women in sustaining long-term careers.

The dataset table 5 illustrates the distribution of individuals across different academic qualifications in the veterinary field, highlighting notable gender disparities. Out of a total of 142 individuals, males represent 88.73% (126 individuals), while females account for only 11.27% (16 individuals). The majority of individuals hold an M.V.Sc. qualification, constituting 67 (47.18%) of the total. This group includes 61 males (42.96%) and 6 females (4.23%). The B.V.Sc. qualification accounts for 61 individuals (42.96%), with males dominating at 56 (39.44%) compared to only 5 females (3.52%). The smallest group is those with a Ph.D., comprising 14 individuals (9.86%). While males remain the majority with 9 (6.34%), females represent a slightly higher proportion relative to other categories, contributing 5 (3.52%). These statistics reveal a consistent gender gap across all academic levels, with male dominance more pronounced at undergraduate and postgraduate levels. However, female representation in Ph.D. qualifications, while still limited, suggests potential interest in advanced academic pursuits among women. Addressing these disparities requires initiatives to promote gender equity in veterinary education and career progression, particularly at foundational academic levels.

The data in table 6 demonstrates disparities in internet access across genders, categorized into office, personal, and smartphone connections. Among 142 total respondents, males (88.73%) overwhelmingly dominate internet usage compared to females (11.27%). Personal connections account for the highest usage, with 94 respondents (66.20%) - 9 females (6.34%) and 85 males (59.86%). Office connections are less prevalent, utilized by only 14 individuals (9.86%), with males (6.34%) outnumbering females (3.52%). Smartphone access is moderate, with 34 respondents (23.94%), including 32 males (22.54%) and 2 females (1.41%).

These results highlight a pronounced gender gap in internet access, with males significantly more connected, particularly through personal connections and smartphones. This disparity could stem from socio-economic, cultural, or infrastructural barriers that limit women's access to technology. Prior research has similarly found that gender inequalities in digital access perpetuate broader socio-economic divides, impeding opportunities for education, work, and information exchange for women (Hendricks and Olawale, 2022). Efforts to bridge the digital gender gap, such as affordable devices, digital literacy programs and targeted policies, are essential to promote equitable access. Addressing these issues can foster inclusivity in the digital economy, particularly for under represented groups.

Table 2: Gender Vs State wise

State wise	Gender		
	Female	**Male**	**Total**
Andhra Pradesh	3 (2.11)	36 (25.35)	39 (27.46)
Assam	1 (0.70)	4 (2.82)	5 (3.52)
Delhi	1 (0.70)	5 (3.52)	6 (4.23)
Haryana	1 (0.70)	2 (1.41)	3 (2.11)
Jammu and Kashmir	0 (0.00)	4 (2.82)	4 (2.82)
Karnataka	0 (0.00)	6 (4.23)	6 (4.23)
Kerala	1 (0.70)	8 (5.63)	9 (6.34)
Madhya Pradesh	3 (2.11)	17 (11.97)	20 (14.08)
Maharashtra	1 (0.70)	2 (1.41)	3 (2.11)
Orissa	0 (0.00)	4 (2.82)	4 (2.82)
Pondicherry	1 (0.70)	4 (2.82)	5 (3.52)
Rajasthan	2 (1.41)	10 (7.04)	12 (8.45)
Tamil Nadu	1 (0.70)	9 (6.34)	10 (7.04)
Telangana	1 (0.70)	8 (5.63)	9 (6.34)
Uttar Pradesh	0 (0.00)	7 (4.93)	7 (4.93)
Total	**16 (11.27)**	**126 (88.73)**	**142 (100.00)**

(Figures in parentheses indicate percentages.)

Table 3: Gender Vs Designation

Designation	Gender		
	Female	**Male**	**Total**
Government Field Veterinarian	2 (1.41)	28 (19.72)	30 (21.13)
Private Field Veterinarian	1 (0.70)	10 (7.04)	11 (7.75)
Teaching	4 (2.82)	13 (9.15)	17 (11.97)
Veterinary Assistant Surgeon	9 (6.34)	75 (52.82)	84 (59.15)
Total	**16 (11.27)**	**126 (88.73)**	**142 (100.00)**

(Figures in parentheses indicate percentages)

Table 4: Gender Vs Age

Age	Gender		
	Female	**Male**	**Total**
31- 40	9 (6.34)	60 (42.25)	69 (48.59)
41 - 50	0 (0.00)	8 (5.63)	8 (5.63)
51 and above	0 (0.00)	3 (2.11)	3 (2.11)
Below 30	7 (4.93)	55 (38.73)	62 (43.66)
Total	**16 (11.27)**	**126 (88.73)**	**142 (100.00)**

(Figures in parentheses indicate percentages)

Table 5: Gender Vs Academic Status

Academic Status	Gender		
	Female	**Male**	**Total**
B.V.Sc	5 (3.52)	56 (39.44)	61 (42.96)
M.V.Sc	6 (4.23)	61 (42.96)	67 (47.18)
Ph.D	5 (3.52)	9 (6.34)	14 (9.86)
Total	**16 (11.27)**	**126 (88.73)**	**142 (100.00)**

(Figures in parentheses indicate percentages)

Table 6: Gender Vs Access to internet

Access Internet	Gender		
	Female	Male	Total
Office Connection	5 (3.52)	9 (6.34)	14 (9.86)
Personal Connection	9 (6.34)	85 (59.86)	94 (66.20)
Smart Phones	2 (1.41)	32 (22.54)	34 (23.95)
Total	**16 (11.27)**	**126 (88.73)**	**142 (100.00)**

(Figures in parentheses indicate percentages)

Table 7 examines internet usage levels (less, moderate and more) by gender among 142 respondents, highlighting significant gender disparities. The total sample consists of 126 males (88.73%) and 16 females (11.27%).

The less usage category comprises 15 respondents (10.56%) all male, indicating that females exhibit no minimal internet usage. Moderate usage, the most common category, accounts for 73 respondents (51.41%)—11 females (7.75%) and 62 males (43.66%). In the more usage category, 54 respondents (38.03%) exhibit high internet usage with 5 females (3.52%) and 49 males (34.51%). These findings suggest a consistent gender disparity, with males dominating across all usage levels, particularly at higher levels.

This pattern may reflect structural and societal barriers that disproportionately limit women's internet access and engagement, such as affordability, lower digital literacy, or cultural restrictions. Studies indicate that such gaps can perpetuate inequality in education, employment, and civic participation promoting digital equity through affordable internet, gender-focused digital literacy programs, and inclusive policies is vital. Bridging the digital divide can ensure women benefit equally from internet usage opportunities, fostering greater socio-economic development (Antonio and Tuffley, 2014).

The table 8 reflects preferences for information sources using best-worst scaling. Dynamic sources like the internet dominate, while static resources like CD databases are least preferred, signalling digital transformation in information access. The ranking of information sources reveals figure 1 a clear preference for dynamic, easily accessible platforms like the internet, which scored the highest (standard score: 0.35). This aligns with global trends where professionals prioritize online resources for their convenience, breadth of content and real-time updates (Van Deursen and Van Dijk, 2019). Similarly, training courses (0.29) are valued for offering structured, practical insights, reflecting the importance of continuing education for skill enhancement.

Moderate preference is observed for personal notes, files, and seminars, conferences, and workshops (0.05 each), likely due to their relevance and interactive nature. However, reliance on colleagues (0.00) and veterinary representatives (-0.01) is minimal, possibly reflecting concerns about subjectivity or limited expertise.

Traditional sources such as drug information leaflets (-0.02), social networking platforms (-0.03), and office records (-0.13) are increasingly deemed unreliable or less relevant for professional decision-making. The least preferred sources, medical representatives (-0.15) and CD databases (-0.18), indicate a shift away from static, outdated mediums, underscoring the growing importance of up-to-date and versatile tools. This shift highlights the need for organizations to invest in accessible digital information systems and high-quality training programs to meet evolving professional needs. Digital literacy initiatives can also bridge gaps for those less comfortable with technology, fostering equitable resource use.

Table 9 evaluates constraints faced in information access using a best-worst scaling approach. "Too much information" (standard score: 0.27) ranks as the top constraint, reflecting challenges in managing and filtering excessive data, consistent with findings on information overload in digital environments. "Inadequate infrastructure" (0.14) and "navigation/searching difficulties" (0.11) highlight systemic and user-interface challenges.

Moderate constraints like "management of downloaded information" (0.09) and "specific information not available" (0.06) suggest the need for better organizational tools and comprehensive resource access. Conversely, traditional barriers such as "software incompatibilities" (-0.14), "very short time" (-0.15), "lack of internet awareness" (-0.20), and "power failure" (-0.23) are less significant, likely due to advancements in technology and better resource allocation. Addressing these constraints requires investing in user-friendly digital systems, enhanced infrastructure, and robust information management training. While traditional issues like internet awareness and power reliability are declining, ongoing efforts are needed to support equitable access and usability.

Table 7: Gender Vs Access to Usage of internet

Usage of Internet	Gender		
	Female	Male	Total
Less	0 (0.00)	15 (10.56)	15 (10.56)
Moderate	11 (7.75)	62 (43.66)	73 (51.41)
More	5 (3.52)	49 (34.51)	54 (38.03)
Total	**16 (11.27)**	**126 (88.73)**	**142 (100.00)**

(Figures in parentheses indicate percentages)

Table 8: Preference for source of information

Rank	# Attribute	Source of Information	Level of Preference of Source (Most-Least)	Standard Standard Score
1	4	Internet	247	0.35
2	11	Training Courses	206	0.29
3	6	Personal notes / files	37	0.05
4	9	Seminars/Conference/ workshops	35	0.05
5	2	Colleague	-1	0.00
6	5	Veterinary Representatives	-8	-0.01
7	7	Drug information leaflets	-11	-0.02
8	10	Social networking (Face book/ Twitter etc)	-19	-0.03
9	8	Records in office	-93	-0.13
10	3	Medical Representatives	-110	-0.15
11	1	CD Databases	-130	-0.18

Table 9: Constraints of Source of Information

Rank	# Attribute	Constraints	Level of Preference of Source (Most-Least)	Standard Standard Score
1	1	Too much information	154	0.27
2	6	Inadequate Infrastructure	78	0.14
3	3	Navigation/Searching difficulties	64	0.11
4	5	Management of downloaded information	50	0.09
5	2	Specific information not available	32	0.06
6	8	Low Speed of Internet	29	0.05
7	4	Software incompatibilities	-79	-0.14
8	7	Very short Time	-83	-0.15
9	10	Lack of internet Awareness	-116	-0.20
10	9	Power Failure	-129	-0.23

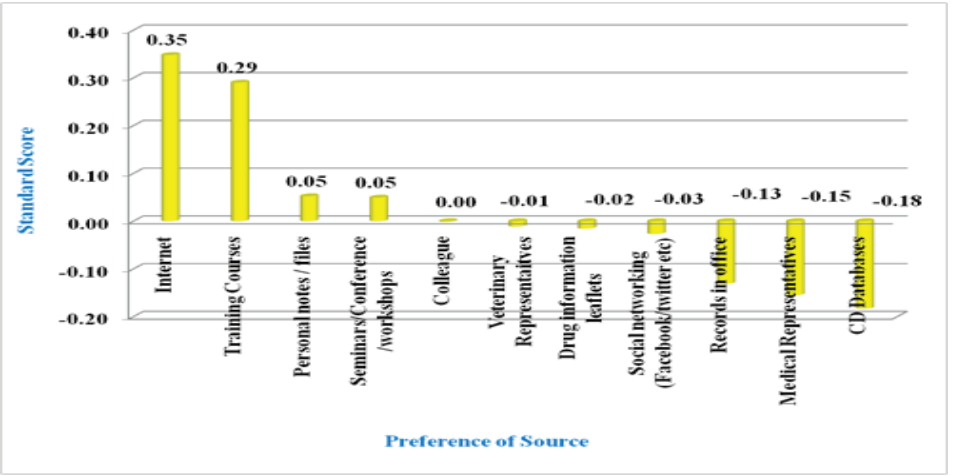

Figure 1: Source of Information of Total Score

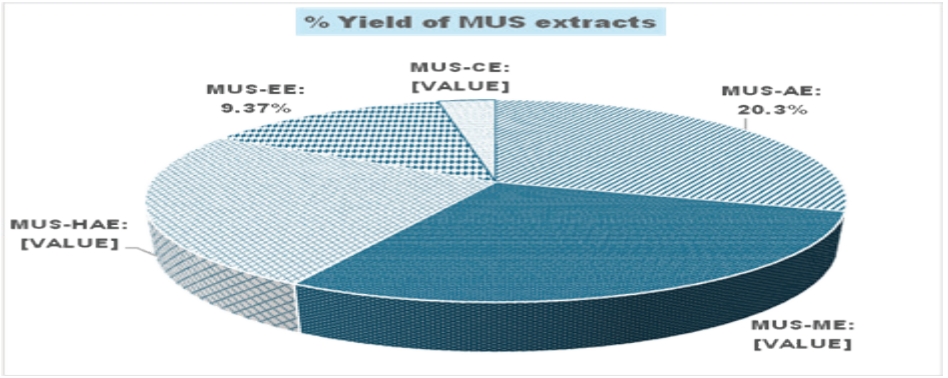

Figure 2: Constraints in Sourceof InformationTotal Score

CONCLUSION

The analysis of information source preferences and constraints among veterinary professionals in India reveals significant insights into the challenges faced in accessing and utilizing information effectively. The internet and training courses emerged as the most preferred sources, underscoring their importance in professional development. Conversely, traditional resources like CD databases were found to be less relevant. Key constraints, particularly information overload and inadequate infrastructure, hinder effective information access. Addressing these challenges through improved infrastructure, better data management practices, and user education is essential for enhancing the utilization of information sources. By overcoming these barriers, the veterinary

profession can foster better decision-making and ultimately improve outcomes for the communities they serve.

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Appendix-A: Most-least questionnaire

1. Preferences for source of information

S.No	Most	Parameter	Least
1		CD Databases	
2		Collogues	
3		Medical Representatives	
4		Internet	
5		Veterinary Representatives	
6		Personal notes / files	
7		Drug information leaflets	
8		Records in office	
9		Seminars/Conference/workshops	
10		Social networking (Face book/twittered.)	
11		Training Courses	

2. Fractional Appearance for Choice sets

Attribute	Choice Set #											Appearance
	1	2	3	4	5	6	7	8	9	10	11	
1	X			x				x	X	x		5
2		X			x				X	x	x	5
3	X		X			x				x	x	5
4		X				x	x	x		x		5
5	X	X		x			x				x	5
6	X	X	X		x			x				5
7		X	X	x		x			X			5
8				x	x	x		x			x	5
9	X				x	x	x		X			5
10			X	x	x		x			x		5
11			X				x	x	X		x	5
# of attributes in a choice set	5	5	5	5	5	5	5	5	5	5	5	

3. Constraints in getting information

S.No	Most	Parameter	Least
1		Too much information	
2		Specific information not available	
3		Navigation/Searching difficulties	
4		Software incompatibilities	
5		Management of downloaded information	
6		Inadequate Infrastructure	
7		Very short Time	
8		Low Speed of Internet	
9		Power Failure	
10		Lack of internet Awareness	
11		Training Courses	

4. Fractional Appearance for Choice sets

Attribute	Choice Set #								Appearance
	1	2	3	4	5	6	7	8	
1	x		x			x		x	4
2	x				x	x	x		4
3		x		x		x		x	4
4	x		x	x				x	4
5		x		x			x	x	4
6	x	x			x	x			4
7			x			x	x	x	4
8		x	x	x	x				4
9	x			x	x		x		4
10		x	x		x		x		4
# of attributes in a choice set	5	5	5	5	5	5	5	5	