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Measuring e-Governance Service Quality from Citizens Perception: Scale Development

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***Abstract*: The online transformed mode of public services, termed as e-Governance service, has become a trend all over the world in recent years. Despite of government's claim for these e-Governance projects being a huge success, in Indian states, adaptability of these services among citizens is yet to achieve. Researchers have proposed e-Governance maturity model as well as other approaches to assess quality of e-Governance services from government or service provider's perspectives. This study proposes an instrument to evaluate e-Governance services from citizen's perception. Based on review of studies performed by various researchers and consultation with academic scholars, domain experts, a set of attributes that assesses citizen perceived e-Governance service quality was identified. Suitable to the specific scenario of the e-Governance services provided in the state of Madhya Pradesh the proposed model using perception based approach, came up with five dimensions namely, reliability, efficiency, content, assurance and utility. The reliability and validity of the proposed model are tested using Cronbach's Alpha. Respondents were citizens of both urban and rural regions of the state of Madhya Pradesh that are accessing various e-Governance public services. The study gets an insight into citizen's perception of e-governance service quality. It can help government stakeholders to improve the design and implementation strategy of e-governance public services.**

***Keywords*: E-Governance, E-service Quality Assessment.**

1. Introduction

E-governance the online interface between government and citizen, also defined by [1] as "the application of electronic means in the interaction between government and citizens and government and businesses, as well as in internal government operations, to simplify and improve democratic, government and business aspects of Governance", have advanced from initial stage of introducing online modes of public services, into reportedly more transparent and efficient government to citizen (G2C) interaction. Despite of impelling a significant amount of public fund into wide range of projects under e-Governance plan, from national to state, district and panchayat level, research practitioners disclosed a lack of quality in such internet based services [2]-[5], through his study, reveals that 35 percent of e-Government projects in developing countries have proved to be total failure and 50 percent were observed as partial failure. [6] Described citizen's awareness level, acceptance level along with hopes and fears about e-Governance as major factors behind success or failure of the e-Governance service. They also conclude 'A high quality of online-service by the government will ensure high acceptance and fewer fears'. Some studies considered citizens' willingness to be important behind acceptance and success of e-Governance initiatives [7], [8]. [9] Opined that the government should be answerable to the citizens about the service quality offered by the new systems. Referring to multiple levels and different stages of implementing e-Governance services, researchers point out that it becomes challenging for service providers to assess the e-service quality of web-based government services. Beyond the conceptual approach followed in most of the previous studies for measuring service quality of e-Governance this empirical study attempts to get insight into citizen's perception of e-Governance service quality. Based on citizens' experience with the online services offered in the state of Madhya Pradesh, the research proposes a model to assess the e-Governance service quality.

A. Objectives

Following objective has been setup or the study proposed study.

- To explore dimensions that contribute to the e-governance service quality from citizen's perception.
- To understand and get insight into the factors, improving which, can motivate the citizens to adopt e-Governance services in the state of Madhya Pradesh.

To achieve the set up objective for the research, an extensive survey of literature from studies performed by various scholars and researchers was carried out in the domains of service quality, e-service quality, e-Governance and related researches. Based upon the literature review, consultation with domain experts and interview with citizens accessing online services, a novel quality assessment tool has been proposed

2. Review of literature

Researches on service quality got triggered when the researchers took into focus the customers' attitude, satisfaction or dissatisfaction from the service (initially products based) offered by the provider. Literature in this area presented 'What is delivered' and 'How it is delivered' as major dimensions to measure service quality [11]-[13]. For assessment of service quality, Twenty-two statement based SERVQUAL, with five dimensions, proposed by [14] has been used in most of the researches to measure service quality of respective services

under study. The instrument proposes to assess the service quality, on the basis of discrepancy between consumers' perception and expectation. The discrepancy based measurement is also known as the gap approach. Another scale, SERVPERF, proposed by [15] claims to measure the service quality only through perception based measure of service performance. Though the SERVQUAL have been used in a number of researches, yet some authors questioned the approach, pointing out the lack of specifically measuring any particular aspect of service quality. Redefining the service quality assessment models for online mode of services termed as e-service quality, brought into the picture some new tools such as website quality [16], [17]. Empirical studies by [18], [19] and [20] explored variation in the e-government service quality, with administrative levels of a country. 'Users' overall assessment is the key factor in determining success of failure of e-Government [21]-[24] Suggested three dimensions namely information content, customization and response rate for assessing e-service quality. [25] Proposed their tool that comprised of 6 dimensions such as ease of use, reliability, responsiveness, competence and product portfolio to measure e-service quality. [26] Found services of national level e-government to be more advanced and of better quality as compared to those at state government level. [27] Through e-SQUAL, proposed dimensions like reliability, tangibility, responsiveness, quality of information, empathy, assurance and integration of communication to assess e-service quality. The study disclosed influence of efficiency and fulfillment on customer's overall perception while. Also it describes system availability as a critical contributor to the customer perceived e-service quality while privacy and security had been revealed to be least critical out of the examined attributes. However the authors mentioned suitability of the tool for assessing product based services provided in online mode. They also suggested little customization in the tool to adapt for service industry based e-service quality assessment. [28] Pointed out non-existence of comparative studies finding best approach (out of gap/discrepancy and perception based approaches) for measuring e-service quality. In this study, the researcher suggests that gap approach is superior to the perception approach to measure e-service quality. [29] , while studying e-government portals of Thailand, found that improved service quality, information quality and system quality can ensure continued use of e-government services by citizens. [30] Believes usability or utility of web portal to be important aspect contributing to the quality of web portal. The model proposed by [10] attempts to investigate factors enhancing e-service quality of government portals. In the study, researchers took a dig into citizen's perspective of government portals service quality. The model claims to assess the demand side service quality of government portals, using seven dimensions including citizen centricity, transparency, technical adequacy, usability, complete information, privacy and security and usefulness of information. The above studies have appreciable implications for service providing stakeholders and are helpful to develop trustworthy and efficient model for assessing e-governance services.

A. Rationale

Many research scholars in previous studies have suggested conceptual models explaining technological complication and administrative integration to implement and assess Government projects. Most of existing studies in this domain, are focused, either on the need to develop and implement their respective projects or conforming to the quality standards with respect to the engineering and system dimensions. Others found to consider streamlining administrative and organizational process for the benefit of service providers only. There is lack of empirical studies focusing on citizen's attitude and their satisfaction with the public services availed in online mode. Also reviewed literature in the domain and related domains, reveal that the dimensions identified by various researchers related to the service quality of e-Governance, may vary with advancement in technology as well as changing social economic and political conditions. Researchers emphasized the need of services with primary objective to provide online services to the citizens with transparent, reliable and efficient portals. This signifies the need of research to explore the factors that enhance the e-governance service quality from citizen's perception.

3. Research methodology

For developing the quality assessment tool for this empirical research, as proposed by [31], the process has been in divided into three phases.

Phase I: In the first phase along with conceptualization of the model, we used qualitative techniques of focus groups and interviews with subject experts, academicians and citizens using the public service.

Phase II : A preliminary questionnaire, based on twenty eight items (selected out of pool of indicators recognized by previous researchers, as well as those suggested by subject experts and academicians) described in table I, was developed The preliminary questionnaire was designed to collect pre-test data from the focus group participants. The focus group participants of the survey were 30 no. of users of mponline.gov.in visiting IT center, Library and teaching departments of a university in Indore.

Phase III: The exploratory factor analysis of the pretest data using principal axis factoring method, extracted 5 factors. Out of Twenty items of the model, 6 items with loadings below 0.30, were dropped and Twenty Two items, with higher loadings were selected for developing the final questionnaire. The factor analysis extracted 5 factors from the pretest sample using item-to-total correlation criteria for data reduction. Alpha reliabilities for the extracted five factors were found to be, Factor1-0.793, Factor2-0.864, Factor3-0.716, Factor4-0.686 and Factor5-0.851. Inter item correlations of extracted factors were observed

to be Factor1- 0.77 to 0.87 level of sig.0.000, Factor-2 0.80 to 0.84 at sig. level 0.001, Factor3- 0.45 to 0.65 sig. 0.000, Factor4- 0.37 to 0.59 at 0.05 and Factor5- 0.59 to 0.72 at sig. 0.001. The final questionnaire consists of:

- Twenty Two items on e-governance service quality. Items stated citizen's response on different aspects of the online public service they have accessed. The responses were measured on five point Likert scale as 1-Strongly Disagree, 2- Somewhat Disagree, 3-Neither/Undecided, 4-Somewhat Agree, 5- Strongly Agree.
- Set of two items rating citizen's satisfaction from the accessed e-governance service. Measured on five point Likert scale (1-Very Poor, 2-Poor/Below Average, 3-Neither/Average, 4-Good/Above Average, 5-Excellent).
- Set of two items measuring return value perception from the concerned e-governance service (1-Very Poor, 2-Poor/Below Average, 3-Neither/Average, 4-Good/Above Average, 5-Excellent).
- One global measure to rate overall quality of the e-Governance service over 5-point likert scale (1-Very Poor, 2-Poor/Below Average, 3-Neither/Average, 4-Good/Above Average, 5-Excellent).
- Twelve items on demographic and usage related questions.

A. Demographic profile of participants

The questionnaire designed to collect primary data was hosted on Google forms for online survey and links were circulated through the social media. Respondents using convenience sampling were invited to participate in the online survey. Responses for a period of more than 4 months were collected or the research. Total 863 responses received from the survey. Participants of the survey responded about multiple e-governance portals and sites of Madhya Pradesh. As suggested by experts, we attempted to select the single portal providing different online services and as many public services as possible. Fitting into the defined criteria, 407 valid responses accessing mponline.gov.in, for different services were selected for analysis. As recommended by [32], item-to-response ratio 1:10, is acceptable for analysis. In the present study the response ratio is 47 percent, which is satisfactory. Demographic detail of respondents is given in table II.

4. Analysis and findings

Exploratory Factor Analysis, using SPSS 20, was performed in the pre-test to understand factor loading and data reduction. Proceeding the same way as in pre-test analysis, we performed EFA using principal axis factoring method with varimax rotation (orthogonal) and Kaiser Normalization. All the five factors of the refined scale demonstrated good inter-item correlations. Results of factor loading are displayed in Table III. Determinants having satisfactory inter-item correlations with other items under same factor resemble with, those recognized by previous researchers, hence we named them accordingly. The extracted factors and items with acceptable factor loading, are renamed as described in table IV.

5. Validity and reliability of the scale

Validity and reliability are two important aspects to be verified for a proposed scale, [33]. For establishing validity, researchers suggested to verify content validity, convergent validity and discriminant validity. Researchers such as [34] suggest content validity of scale to be a minimum psychometric requirement. In the present study, the content validity is ensured by administering, the scale development and pre-test analysis phase of the model, through group of academicians and subject experts. The validation process resulted in scale reduction and refinement, by dropping items with low factor loadings and weaker correlations found in EFA during pre-test analysis. The other aspect of validity i.e. convergent validity confirms the internal consistency of items in a construct, while discriminant validity establishes that all the constructs measure different criteria and no two constructs measure the same variable. Factor score and correlations results found in the present study, reveal, that items having factor loading under one factor have shown good association with other items under the same factor in the scale. Inter-item correlations of the constructs are given table V to table IX. To simplify the correlation matrix structure factor wise, correlation tables have been split factor wise. Indicator items measuring a factor in the table are replaced with their corresponding variable names as shown in table IV. [33] Correlations tables, disclose, that all inter-item correlations under same factor are found to be >0.4, i.e. all the items under same factor show strong correlations. The correlations hence verify convergent validity. Also correlations of each item of a factor, with items of other factors measured to be <0.2, verifying discriminant validity. Cronbach's alpha (α) is commonly used by researchers to determine the reliability of a scale. [35] Explained that alpha value $0.7 \leq \alpha$ is considered to be acceptable. In the present study cronbach's alpha for the scale is measured to be 0.900, while alpha values of extracted factors were found (See table X) as , Factor1-Reliability (0.900), Factor2-Efficiency (0.896), Factor3-Content (0.763), Factor4-Utility (0.778), Factor5-Assurance (0.825) at sig. level < 0.05 . The alpha values of all the factors, and that of the overall scale confirms the reliability of the model in context of the present research. In addition to verifying convergent and discriminant validity, the predictive validity of the scale was also ensured. To assess the predictive validity, regression analysis of the global measure of overall quality with the summed up score of each factor extracted (Total of score of predictors under each factor) is performed. Results of regression analysis are shown in table-11. Regression coefficient R2 value of overall scale was observed to be 0.809, while F-value was measured to be 152.36 significant at p = 0.0 with df between 5 to 501. Researches on service quality got triggered when the

Table 1
Collection of indicators (suggested by experts) used to develop the model

S. No.	Description
1	Protection of privacy and user's personal data
2	In-time completion of overall operation concerned
3	Free of Jams and crashes
4	Transaction security
5	Due Transparency of Payment
6	Robust navigation(downloading)
7	Global Accessibility of portal
8	Hindrance free uploading
9	Automated Paperless operation
10	Simplified and Time Efficient process
11*	Avails multilingual User Interface
12	Useful complete contents
13	Visual guide or tutorial
14	Relevant FAQs
15	Wide range of useful public services
16	Compatible soft copy of useful reports
17	Device portable User Interface
18	Single point solution for the concerned service
19*	Avails discussion forums other user's reviews/feedback from citizens regarding the service
20*	Compensate users for loss due to service failure
21	Provide substitute service on failure of online service
22	Timely grievance redressing
23	User friendly grievance redressing staff from service provider
24	Responsible control on failure of service (Responsibility)
25*	Avails user friendly search facility to find the desired information regarding services.
26*	Citizen centric customizations of service
27*	Avails multiple payment options
28	Timely update of contents

Note: Items marks * were having very low factor loadings and dropped after pre-test exploratory factor analysis.

researchers took into focus the customers' attitude, satisfaction or dissatisfaction.

6. Discussion and implications

The research attempts to explore citizens' perception of e-Governance service quality as experience with the online public services. Getting advantage of literature on previous researches and recommendation of academic experts, we initially developed the preliminary scale. Based on results of EFA from the focus group preliminary survey, the refined scale with items having significant factor scores and satisfactory correlation was developed. The factor scores and correlation confirmed the validity and reliability of the model.

The regression analysis of predictors disclosed that Efficiency with highest beta value of 0.319 and t-value = 8.20 at 0.00 level of significance, appeared to have most influence on the overall e-Governance service quality perception. Next to this is the Reliability factor with 0.311 with t-value 10.416, at 0.00 level of significance. Content with beta (0.275), t=4.711 significant at 0.038 level and Assurance beta (0.262), t=7.076 sig. 0.0 and are found to moderately predict citizens overall e-Governance quality perception. Utility beta (0.246), t=5.819 significant at 0.0 level resulted with lowest but significant beta value. The efficiency dimension, comprising of robust navigation , global accessibility of the concerned portal, hindrance-free uploading, automated operation and simplified process, as predictors demonstrated highest influence on the perceive overall e-Governance quality. The scale defines reliability in terms of predictors like privacy of data, completion of requested service operation within time frame, keeping due transparency in payments for the service. Higher factor loadings and regression score of this factor with overall service quality score, reveals that, citizens accessing online public service

Table 2
Demographic details of respondents (N=407)

	Frequency (Citizens)	%
Age Group		
<25	112	28%
25-40	208	51%
41-55	87	21%
Gender		
Male	261	64%
Female	146	36%
Access Location type		
Urban	311	76%
Rural/Tehsil/Town	96	24%
Education Level		
Higher Secondary or less	99	24%
Graduate	214	53%
PG or above	94	23%
Occupation		
Student	203	50%
Unemployed	7	2%
Service	83	20%
Business or Self Employed	113	28%
Tenure (in years) of using Internet and Online Services		
3-6	124	30%
6 or above	283	70%
Frequency of visiting Assessed e-Gov. Online Services		
<5 times a month	10	3%
3-8 Times a month	135	33%
Very frequently	262	64%
No. of e-Gov. Online Services You have accessed		
1	23	6%
1-3	279	69%
More Than 3	105	26%
Purpose of using assessed e-Gov. Online service		
Tax/Bills Payment	90	22%
Admission/Exam/Fees Payment	209	51%
Apply for Job	108	27%

expect more reliability regarding the concerned e-governance service. Also they look ahead for more assurance in form of better control over failure of service, as well empathetic support from the coordinating staff at service provider's end. Present analysis confirms a significant role of reliability in citizens' perception of overall e-Governance service quality perception. Concerned government departments claim online e-government portal to providing more convenience and yet the scores of utility as perceived by the end user citizens, are kept behind efficiency, assurance and reliability. Yet it is found through the regression analysis, that utility and content of the e-governance portal have significant influence on citizens' overall e-Governance service quality perception. Insights into citizens' need and expectation can improve service quality of e-governance services by based on reducing the gap between design concepts and implantation reality at the ground level. In this way this research may act as positive trigger for the service providing stakeholders to improve those aspects of online public services which are recognized as influencer of citizens overall quality perception regarding e-Governance services. Service providers accordingly may take appropriate initiatives for motivating citizens to adopt e-governance services with their own interest. The developers and implementation stakeholders can use this study to get close view of users' needs

Table 3
Loadings of Extracted factors

Indicator	Factor1 (REL)	Factor2 (EFF)	Factor3 (CNT)	Factor4 (UTL)	Factor5 (ASR)
Protection of privacy and user's personal data	**.838**				
In-time completion of operation	**.847**				
Free of Jams and crashes	**.703**				
Transaction security	**.814**				
Due Transparency of Payment	**.806**				
Robust navigation and downloading		**.784**			
Global Accessibility of portal		**.733**			
Hindrance free uploading		**.705**			
Automated Paperless operation		**.702**			
Simplified and Time Efficient process		**.788**			
Timely Content updates			**.741**		
Visual guide or tutorial			**.717**		
Relevant FAQs			**.651**		
Useful complete contents			**.587**		
Wide range of useful public services				**.724**	
Compatible soft copy of useful reports				**.680**	
Device portable User Interface				**.598**	
Single point solution for the concerned service				**.518**	
User friendly grievance redressing from service provider					**.789**
Responsibility and control on failure of service					**.642**
Substitutive service					**.594**
Timely resolution of grievances					**.758**

to improve the design and implementation of online services. The predictors and dimensions recognized in this research are empirically found to be significant and may not be ignored in practice.

7. Conclusion and limitations

In lineup with the countries across the globe, the central as well as the state government, has aggressively developed and implemented e-Governance plans and projects. Investment on most of these projects are made from public funds and from the taxes paid by the citizens. Stakeholders at government department widely publish such e-Government projects to be huge success. Many researches, have disclosed that self-assessment of government department and showing, their e-Governance projects as successful, is apart from the ground level reality, as there are gaps between design and reality [36], [37]. Also many of the existing service quality models based on conceptual design, are considered to be inadequate to assess the e-Governance services from citizen's point of view. The Objective of this study is to explore the dimensions of citizens' perceived quality of e-Governance service in the state of Madhya Pradesh. Out of extracted factors, reliability predicted by privacy and security of data, in-time completion of service operations as well as transparency of payment. The predictors collectively had shown strong inter-item correlations as higher factor loadings. Transparency has been recognized as important factor for online transactions by [38]. In the present study, these attributes contributed to citizens' perception of service quality. Dimensions like assurance and efficiency also demonstrated higher factor loadings as well regression values with overall e-Governance service quality perception. Some researchers [39] and [40] argued that with open communication and public dialogue along with public participation to formulate national regulations, citizen services may reshape the public sector and citizen's relationship with government. Along with important and useful findings regarding e-Governance perceived service quality, the present research has certain limitations such as: The findings of the study are based on present state of awareness, skills and experience of respondents under study. On changing, skill as ICT awareness, the results may vary. Also the present responses are dependent on current status of technological infrastructure in the state. Upgrade in technology as well introduction of any new technology, in the public services may require adding new dimensions or changing existing variables.

Table 4
Predictor items grouped under extracted factors according to loadings

Factors & variables	Item	Authors with similar dimension
Reliability		Parasuraman (2000, 2001), Yang et al.(2002, 2003), Santos (2003)
REL1	Protection of privacy and user's personal data	
REL2	In-time completion of operation through this service	
REL3	Free of Jams and crashes	
REL4	Transaction security	
REL5	Due Transparency of Payment	
Efficiency		Zeithaml (2001, 2002), Santos (2003), Parasuraman, Zeithaml, Malhotra (2005)
EFF1	Robust navigation and downloading	
EFF2	Global Accessibility of portal	
EFF3	Hindrance free uploading	
EFF4	Automated Paperless operation	
EFF5	Simplified and Time Efficient process	
Content		Kaynama and Black (2000), Sukasame (2004).
CNT1	Timely Content updates	
CNT2	Visual guide or tutorial availed	
CNT3	Relevant FAQs	
CNT4	Useful complete contents	
Utility orusefullness		Nelson (2002), Palmer (2002), Huang (2003), Riel (2004), Zeng et al.(2004), Yang (2005), Agrawal (2007).
UTL1	Wide range of useful public services	
UTL2	Compatible soft copy of useful reports	
UTL3	Device portable User Interface	
UTL4	Single point solution for the concerned service	
Assurance		Parasuraman , Zeithaml and Berry (1985,1988, 1991), Yoo and Donthu (2001), Liljander (2001), Zeithaml (2001), Parasuraman, Zeithaml, Malhotra (2005), Agrawal (2007).
ASR1	User friendly grievance redressing from service provider	
ASR2	Responsibility and control on failure of service	
ASR3	Substitutive service	
ASR4	Timely resolution of grievance	

Beyond technical aspects, the present study considers only operational performance of the portal as perceived and experienced by the citizens. Assessing service quality from technical point of view, may require additional study, to add further technical attributes and procedures to the existing model.

Table 5
Inter-Item Correlation Matrix of Factor1 (Reliability- REL)

Items	REL1	REL2	REL3	REL4	REL5
REL1	1	.765**	.603**	.637**	.658**
REL2		1	.556*	.689*	.663**
REL3			1	.592**	.583**
REL4				1	.686*
REL5					1

** - Correlations is significant at 0.01 level (2-tailed),
* - Correlation is significant at level 0.05 (2- tailed)

Table 6
Inter-Item Correlation Matrix of Factor2 (Efficiency- EFF)

Items	EFF1	EFF2	EFF3	EFF4	EFF5
EFF1	1	.655**	.661**	.655**	.679**
EFF2		1	.623*	.624*	.675**
EFF3			1	.569**	.643**
EFF4				1	.625*
EFF5					1

** - Correlations is significant at 0.01 level (2-tailed),
* - Correlation is significant at level 0.05 (2- tailed)

Table 11
Regression Model of e-GSQual scale dimensions and perceived overall e-Governance service Quality – Citizens

Model	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
	B	Std. Error	Beta		
(Constant)	.278	.100		2.778	.006
RELIABILITY	.047	.004	.311	10.416	.000
EFFICIENCY	.049	.006	.319	8.204	.000
CONTENT	.033	.007	.275	4.711	.038
UTILITY	.042	.007	.246	5.819	.000
ASSURANCE	.043	.006	.262	7.076	.000

Dependent Variable: Overall e-Governance Service Quality Perception, R^2 (.809), F-value (ANOVA) =152.36 sig. p=0.0, df1=5,df2=401

Table 7
Inter-Item Correlation Matrix of Factor3 (Content-CNT)

Items	CNT1	CNT2	CNT3	CNT4
CNT1	1	.542**	.552**	.617**
CNT2		1	.510*	.533*
CNT3			1	.571**
CNT4				1

** - Correlations is significant at 0.01 level (2-tailed),
* - Correlation is significant at level 0.05 (2- tailed)

Table 8
Inter-Item Correlation Matrix of Factor4 (Utility-UTL)

Items	UTL11	UTL2	UTL3	UTL4
UTL1	1	.626**	.585**	.527**
UTL2		1	.536*	.527*
UTL3			1	.472**
UTL4				1

** - Correlation is significant at 0.01 level (2-tailed),
* - Correlation is significant at level 0.05 (2- tailed)

Table 9
Inter-Item Correlation Matrix of Factor5 (Assurance-ASR)

Items	ASR1	ASR2	ASR3	ASR4
ASR1	1	.601**	.526**	.659**
ASR2		1	.430*	.542*
ASR3			1	.502**
ASR4				1

** - Correlation is significant at 0.01 level (2-tailed),
* - Correlation is significant at level 0.05 (2- tailed)

Table 10
Cronbach's Alpha values of Dimensions

Factor	Cronbach's Alpha
Factor1 (Reliability-REL)	0.900
Factor2 (Efficiency-EFF)	0.896
Factor3 (Content-CNT)	0.733
Factor4 (Utility-UTL)	0.778
Factor5 (Assurance-ASR)	0.825

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