

Empirical Exploration Of The Implementation And Challenges Of E-Governance With Special Reference To The Malwa Region Of Madhya Pradesh

Dr. Jitendra Patel¹, Dr. Ajay Malpani², Dr. Sumit Zokarkar³

¹Assistant Professor, STME, SVKM's NMIMS Indore.

²Assistant Professor, Senior Grade, Prestige Institute of Management and Research, Indore.

³Assistant Professor, Prestige Institute of Management and Research, Indore.

Abstract

The present study aims to explore issues and challenges related to the practical implementation of E-governance. The study is based on primary data, where a self-structured questionnaire, developed through an extensive literature review, is used to explore various factors of e-Governance and its usefulness for good governance, assessed on a 5-point Likert scale. The data of one 606 sample is collected from urban, semi-urban, and rural parts of the Malwa region of Madhya Pradesh. The sample consists of housewives, Professionals, Farmers, and students of the Malwa Region of Madhya Pradesh. Research gaps are identified in both theoretical concepts and the practical implementation of E-governance. Exploratory factor analysis is done using appropriate statistical analysis, SPSS and R-Studio is applied for Confirmatory factor analysis. The research will help the government and policymakers to know various e-governance factors responsible for providing good governance to the citizens.

Keywords E-Governance, E-Administration, Good Governance, Advancement, Citizen Welfare, Trust and Accountability, Technological Adoption.

Introduction

According to Former Secretary General of the United Nations, Kofi A. Annan, "Good governance is perhaps the single most important factor in eradicating poverty and promoting development. Governance is an exercise of power for steering social systems, as well as a process by which organisations are directed, controlled, and held to account for their society. Good governance means securing justice, empowerment, employment, and efficient delivery of services." According to the World Bank, governance can be defined as "the rule of the rulers, typically within a given set of rules". Kaufman et al (1999) define governance as "The traditions and institutions by which authority in a country is exercised". Business Dictionary (2009) defines governance as the establishment of policies and continuous monitoring of their proper implementation by the members of the governing body of an organisation. It includes the mechanisms required to balance the powers of the members (with the associated accountability), and their primary duty of enhancing the prosperity and viability of the organisation.

At present, at least three major features can be identified as the key defining properties of the concept of good governance that are First, good governance is predicated upon mutually supportive and cooperative relationships between government, civil society and the private sector. Second, good governance is defined as the sum of the following elements: participation, transparency of decision-making, accountability, the rule of law and

predictability. Democratic practices, civil liberties and access to information are sometimes added to the list. Third, good governance is subjective in concept.

United Nations (www.unpan.org) definition (AOEMA report): “E-government is defined as utilising the Internet and the World Wide Web for delivering government information and services to citizens.” “E-democracy builds on e-governance and focuses on the actions and innovations enabled by ICTs combined with higher levels of democratic motivation and intent” (Clift, 2003).

E-government is a generic term for web-based services from agencies of local, state and federal governments. In e-government, the government uses information technology and particularly the Internet to support government operations, engage citizens, and provide government services. The interaction may be in the form of obtaining information, filing, or making payments and a host of other activities via the World Wide Web (Sharma & Gupta, 2003; Sharma, 2004, Sharma 2006).

While many authors have defined and identified many factors impacting good governance. Our study is an attempt to explore various factors of e-governance for good governance. The study also finds the research gap and suggests the future scope of the research on subject matters.

Review Of Literature

Many authors have done much research on e-governance, not only in India but other parts of the world. Here, we have tried to put some good research as a literature review

Punyaratabandhu (2004), in her research, has reviewed the current status of measuring good governance. Her findings reveal that good governance is a good instrument to measure its benefits, like poverty reduction and development performance. But some empirical evidence also shows that good governance may not turn out to be a necessary condition for poverty reduction. She also suggests that there is a need to identify determinants of good governance and an appropriate framework for enhancing good governance should be developed, proper assistance should be given towards strengthening governance institutions and mechanisms, rather than penalising poor governance by withholding development cooperation. E-Governance uses Information technology, which enables customers to participate in the decision-making process; therefore, the government becomes more transparent, accountable and efficient and hence fits perfectly into the agenda of good governance. (Prabhu 2005).

Heeks and Bailur (2007) have analysed some papers on E-Government and found that these papers lack some specific practical recommendations. They have also found that in e-government research, there is a wide gap between practice and Theory. They observed that most of the authors have failed in linking Practical implementation with theoretical aspects, also they suggested that some institutional factors, like pressures of competition and time, are acting as constrain in the development of e-government as a research agenda.

Singh (2008) in his paper has focused on Gandhian view of e governance he has critically analysed the challenges in post independent India for implementation of good governance he has suggest some way like state-sponsored development programmes must aim at reduction in poverty and improvement in productivity levels of workers, periodic review meets for public expenditure at villages, sub-district and district levels to ensure proper utilization of funds. Anyone with the charge of corruption should not contest an election, and lastly, he focused on innovation in two areas, i.e. lively hood and women empowerment through NGO, as they are the key drivers of good governance.

Kalsi et al (2009) in their empirical research have found that the changing economic and governance scenario demands a greater partnership between various major players in society. So, they suggest that good governance should be a collaborative approach and the focus should be on results, not on process. They emphasise professionalism and new ways of thinking as a must for good governance. They focus on making efforts that can sustain increasing expectations and demand on e-governance, and how the citizens can influence the face of e-governance.

Rahman (2010) studies the framework of E-governance at the local government level in developing countries of South Asia has finds out governance at the local level matters, and e-governance is a better way of providing government services to the common citizens. However, the method by which governments govern their communities, nationally, regionally, and locally, forms an essential element in determining the outcomes that contribute to the quality of life of those communities. He further simplifies it by saying that good governance is a governance that allows the collective aspirations of people at large to be fulfilled effectively and efficiently, depending on the way in which public institutions are designed and operate. In spite of poor infrastructure, poverty, illiteracy, language dominance and all the other reasons, India has several award-winning e-governance Projects. E-Governance is the key to “Good Governance” for developing countries like India to minimise corruption, provide efficient and effective quality services to their citizens. (Dwivedi and Bharti 2010).

Bhatnagar and Singh (2010) found that many respondents (clients and businesses in this case) have backed the preference for the computerised system as it has reduced the cost of accessing services by reducing the number of trips that were needed previously to be made to the concerned offices, also the waiting time came down by nearly 50%. Corruption was significantly reduced or eliminated in many projects, and the quality of service delivery and the quality of governance were also perceived to have improved significantly with computerisation in most cases. They also find out that many developing countries recognise the importance of improving governance for attaining higher economic growth and attracting direct investments. E-government has the potential for lowering bribery, provided that the necessary process reforms are undertaken.

Earle and Scott (2010) have studied some academic and donor research to find out the impact of governance work on poverty reduction and development outcomes. Their study reveals that good governance has both intrinsic and instrumental developmental value in developing countries. They have identified: democratisation, justice and rule of law, corruption, decentralisation, public administration reform and public financial management as the developmental impact of different areas of governance. Their findings also suggest that governance reforms have not always resulted in the expected improvements in development outcomes and poverty reduction. The suggestions to donors include that the donors must take a long-term perspective as change to governance institutions takes place over long time horizons. Donors should also give more attention to the demand side of governance, rather than focusing exclusively on top-down approaches to reform.

Sharma et al (2011) in their research have found that to implement effective E-Governance in India, adequate management and governmental experts are required, rather than technical expertise. Further, they have suggested that the key strategy to make e-governance effective is the formation of the right institutions and agencies and identifying the right human resources for the same. They also recommend that India requires an overall focus on e-governance initiatives in every sector, public or private, with the support of legislation on a

priority basis. They emphasise making a committee of trained, knowledgeable and experienced specialists of e-governance who can provide the right direction for accurate implementation of e-governance.

Trakulmututa and Chaijareonwattana (2013) conducted an empirical study in of Local Government office in Southern Part of Thailand has identified some causal factor which have some direct effects, indirect and negative effects on Achievement of Good Governance. The causal factors which had the direct effects on the achievement of good governance in are fairness of awareness, the characteristics of the implementing agencies and the acceptance of implementers and factors which have indirect effect on achievement of good governance are were policy standard and objectives, resources, the organizational communication, economic, social and political conditions while the 'The Characteristics of the implementing agencies' (org) and ' The acceptance of implementers'(staff) had a direct negative effect on the achievement of good governance.

Bang & Esmark (2013) in their paper map out the strategy of good governance and its main implications for public governance policy and organisation. Further, the paper discusses the main tenets of governance research, in particular the critical responses to good governance based on deliberative and radical democracy. Based on this discussion, they suggest a reintroduction of macro-sociology and a revised analysis of the political system and current modes of governance, also they suggest an alternative analysis of the relation between power and freedom involved in good governance.

Yadav and Tiwari (2014) find that various challenges, are as low literacy, lack of awareness, low broadband penetration, and lack of system integration within a department, are hindering the implementation of e-government in India. They further suggest the requirement of vision and environment for effective implementation of e-government in India.

Aldin .et. al. (2015) studied Demographic factors as determinants of e-governance adoption. This study combines the two dimensions (e-openness and e-participation). Its findings reveal that, except for nationality, all other demographic variables, including gender, age, education and type of employment, clearly explain differences among the respondents of e-governance. Further their findings suggest that respondents perceive moderate satisfaction with e-openness, but less satisfaction with the other dimension e-participation. They suggest policy-makers and decision-makers for a real understanding of the needs of the citizens and to re-conceptualize the government Web sites as an interactive channel of communication in enhancing transparency and participation.

Kalsi and Kiran (2015) attempt to find out whether the new information and communication technologies can make a significant contribution to the achievement of the objective of good governance. According to them major factors causing pain and harassment to the citizens in getting the services from various government departments include: unreasonable delay, multiple visits even for small services; poor public infrastructure and its maintenance in government offices. They suggest overall convenience and experience of the citizens; reduction in the corruption levels by improvement in the transparency of government functioning and awareness about the availability of service amongst the general masses as some factors for the success of e-governance.

According to Gupta (2012), the government has played a significant role in establishing E-governance structures, by which governance has become more transparent and efficient at the grassroots level.

Research Gap.

The previous studies done on e-governance are mainly conceptual and theoretical in nature, like Punyaratabandhu (2004), Heeks and Bailur (2007) and Singh (2008). There is a lack of empirical research on the subject particularly in the context of a developing country like India. Heeks and Bailur (2007), Kalsi et al (2009), and Rahman (2010), in their studies mainly focused on developing countries, have found that a wide gap concept and practical implementation of e-governance and good governance is a collaborative approach and collective aspirations of people at large to be fulfilled effectively and efficiently. In a country like India, there are major projects that are successful in providing good governance through e-governance but a lot needs to be done to make the change reach to grassroots level. Research gaps are identified in both theoretical concepts and the practical implementation of e-governance. There is a need for empirical research covering all the parameters and relational research covering the different variables/factors identified by different authors, especially in a country like India, where e-governance has deeply influenced every section of society.

A significant research gap was found in good quality empirical research suggesting a collaborative framework to implement E-governance at the grass root level, factors like language barrier, IT infrastructure and illiteracy, Proper Vision, Adequate environment, Designing of Public Institutions, Operations of Public Institutions, Governmental Experts and social and political conditions are needed to be considered especially in developing countries as a challenge for implementing e-governance.

Objective of the Study

- i. **To understand the importance and concept of good governance.**
- ii. **To identify the research gap in the area of e-governance implementation.**
- iii. **To determine the factors of good e-governance.**

Research Methodology

The Study

The study is carried out to empirically analyse the effect and to explore the factors of e-governance on Good Governance. The study is exploratory research. The study will be beneficial for policymakers and agencies working in the governance area to know the factors associated with good governance, as well as the role and effectiveness of e-governance in providing good governance to the people.

The Sample

A sample of 606 respondents has been taken into consideration for the study. The sample is further divided based on age, gender, Education, occupation, income, Technical Experience, and Background. The data was collected using Google Forms and by personal interaction. A sufficient number of respondents are taken in different subgroups. The data is collected from residents of the Malwa Region of Madhya Pradesh, India. (**Refer to Annexure 1 for Sample Description**)

Tools for Data Collection

Self-designed questionnaire based on qualitative inputs and factors determined in previous literature is used for the collection of data. A five-point Likert scale has been taken by providing options to the respondent as Strongly Agree, Agree, Neutral, Disagree, and

Strongly Disagree. A total of twenty-five questions have been asked of the respondents based on various factors where e-governance affects good governance. The questionnaire has been divided into two parts. The first part is based on questions related to e-governance. The second part of the questionnaire is regarding the personal information of the respondent. The data is collected from the Malwa region of Madhya Pradesh.

Tools for Data Analysis

Collected data was tabulated, edited, and coded using MS Excel software. For further analysis of data, SPSS version 16 software was used. Further, for doing confirmatory factor analysis R software is used.

Hypotheses:

H1: All the factors of e-governance are contributing equally towards the good governance system.

Result and Discussion

Reliability Analysis: The data was found to be reliable due to high values of Cronbach's Alpha at 70%. (**Refer to Annexure 2 for Reliability Analysis**)

Exploratory Factor Analysis

In the study factor analysis technique – a multivariate analysis technique was employed to identify the factors of e-governance influencing good governance.

Correlation Matrix was studied to study the coefficients and significance levels for each combination of variables. The determinant score was 0.000 which indicates the effectiveness of the questionnaire scaling and the validity of the variables included in it. (**Refer to Annexure 3 for Factor Analysis**)

The Total variance Explained is also calculated (**Refer to Annexure 4 (a) for Factor Analysis**) and for Rotated Component Matrix^a (**Refer to Annexure 4 (b)**)

Result of Factor Analysis

The research identified five major factors that affect e-governance Role of IT in e-governance, Success of e-governance, Implementation of e-governance, system and management of e-governance, and people-orientation and services. (**Refer Annexure 5**)

Confirmatory Factor Analysis

The study further analyses the factors by doing confirmatory factor analysis using R Studio software. The CFI Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) are best fit at 0.910 and 0.898, further, two more iterations of the CFI Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) have improved to 0.943 and 0.932 also the Robust RMSEA Root Mean Squared Error of Approximation (RMSEA) at 90 per cent confident interval were improved. And SRMJ Standardized Root Mean Squared Residual is 0.037. (**Refer to Annexure 6 for Confirmatory Factor Analysis**).

Discussion

Implications for governance are impacted by eGovernment and its performance valuation measures (Mitra and Gupta 2008). Our research has found e-governance effective in reducing corruption; similar findings were found by (Ojha et al. 2008). E-government has shown promise in this regard, and in many instances, it has delivered by eliminating or at least reducing corruption in public service delivery.

Limitations and Further Scope of Research

The study only covers the Malwa Region of Madhya Pradesh, also the effect of various demographic variables is not studied in the present study. Hence, we suggest research covering the overall geographical location of a diversified country like India. The factors mentioned above are generally the outcomes of empirical research in foreign and developed countries there is a need for such research in developing countries especially developing continents like Africa.

Conclusion

The objective of the study was to determine the factors of good e-governance. In all, five factors were identified for good e-governance. e-governance has proved to be an effective tool to implement good governance in developing countries, it also helped in making the process more transparent, accountable, and efficient. But there is a lot to be done on process improvement and implementation side, a good collaborative approach and deep grassroots implementation and impact issues need to be addressed to get the real picture of e-governance for good Governance.

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Annexure

Annexure 1 *Sample Description*

Age

Scale	No of Respondent
15-25	160
26-35	153
36-45	144
6 and above	149

Gender

Category	No of Respondent
Male	309
Female	297

Education

Category	No of Respondent
Higher Secondary	195
Graduate	209
Post Graduate	202

Occupation

Category	No of Respondent
Professionals	178
Student	149
Farmers	139
Housewife	140

Income

Technical Experience

Scale	No of Respondent
Less than 1 lac	95
1-3	112
3-5	141
5-10	115
10 lac and above	143

Scale	No of Respondent
Less than 1 year	152
1-3 year	154
3-5 year	148
5 years and more	152

Background

Category	No of Respondent
Urban	213
Semiurban	187
Rural	206

Annexure 2

Annexure 3

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.676
Bartlett's Test of Approx. Chi-Sphericity	1.424E3

Reliability Statistics

KMO and Bartlett's

Test

Cronbach's Alpha	N of Items
.702	25

	Df	300
	Sig.	.000

Annexure 4 (a)

Compon ent	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Varianc e	Cumulati ve %	Total	% of Varianc e	Cumulati ve %	Total	% of Varianc e	Cumulativ e %
1	4.118	16.472	16.472	4.118	16.472	16.472	3.390	13.560	13.560
2	3.535	14.138	30.610	3.535	14.138	30.610	3.140	12.562	26.122
3	2.317	9.268	39.878	2.317	9.268	39.878	2.387	9.549	35.671
4	1.457	5.826	45.704	1.457	5.826	45.704	1.982	7.928	43.598
5	1.342	5.367	51.072	1.342	5.367	51.072	1.868	7.473	51.072
6	1.211	4.844	55.916						
7	1.155	4.621	60.537						
8	.999	3.996	64.533						
9	.900	3.601	68.133						
10	.893	3.571	71.705						
11	.829	3.317	75.022						
12	.663	2.652	77.674						
13	.624	2.495	80.169						
14	.605	2.419	82.588						
15	.567	2.267	84.855						
16	.523	2.091	86.946						
17	.494	1.977	88.923						
18	.458	1.831	90.754						
19	.437	1.749	92.503						
20	.408	1.633	94.136						
21	.368	1.473	95.609						

22	.346	1.385	96.994						
23	.311	1.244	98.238						
24	.274	1.095	99.334						
25	.167	.666	100.000						
Extraction Method: Principal Component Analysis.									

Annexure 4 (b)

Rotated Component Matrix^a

	Component				
	1	2	3	4	5
VAR00017	.731	-.110			.102
VAR00019	.725	.255		-.169	-.160
VAR00018	.690		.113	.135	.179
VAR00010	.637		.205		
VAR00008	.628			-.145	
VAR00015	.620		.180	.182	-.279
VAR00013	.511			.395	
VAR00022		.770			
VAR00021	-.110	.765			
VAR00020		.690		.179	.175
VAR00023	-.109	.686	.116	.166	
VAR00006		.621	-.135	.268	.195
VAR00001		.521	-.170		.149
VAR00009	.124		.768		-.173
VAR00024	.125		.667	-.103	.151
VAR00005	.132	.378	-.552	.125	.168
VAR00004	.172		.353	-.115	
VAR00014		.122	-.181	.762	
VAR00012		.215		.663	.108
VAR00003			-.502	.503	-.199
VAR00002		.181	.150	.168	.616
VAR00016	.160	.137	-.133	.440	.564
VAR00007			.488	.113	-.542
VAR00025	.498			.142	-.521
VAR00011	.146		.447	-.114	-.453

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

Annexure 5

Calculation of factor loading for factor 1 (Role of IT in e-governance)

S. No.	Factor 1	Variable id	Variable Name	Load
1	F-1 Role of IT in e-governance With 16.472 % Variance	EV17	Information technology has play vital role for running good e-governance	0.731
2		EV19	use of Information technology for good governance has brought down the cost of accessing services	.725
3		EV18	use of Information technology for good governance has helped in reducing the waiting time for any services under governance	.690
4		EV10	use of Information technology for good governance has helped in reducing corruption	.637
5		EV8	use of Information technology for good governance has improved the quality-of-service delivery	.628
6		EV15	use of Information technology for good governance has improved the quality of governance in India	.620
7		EV13	Information technology is a key driver for innovation in good governance project in India	0.511

Factor 1 namely Role of IT in e-governance with variance 16.472% is significantly loaded with seven variables in which EV17 is loaded with highest 0.731 load while EV13 with lowest 0.511 load.

Calculation of factor loading for factor 2 (Success of e-governance)

S. No.	Factor 2	Variable id	Variable Name	Load
1	F-2 Success of e-governance With 14.138 % Variance	EV22	illiteracy has proved to be a major constraint in the success of e-governance in India	.770
2		EV21	success of any e-governance project will depend on citizen participation and respond	.765
3		EV20	local language dominance has proved to be a major constraint in the success of E-governance in India	.690
4		EV23	lack of awareness has proved to be a major constraint in the success of E-governance in India	.686
5		EV6	lack of broadband penetration has proved to be a major constraint in the success of E-governance in India	.621
6		EV1	lack of system integration within a department has proved to be a major constraint in the success of E-governance in India	.521

Factor 2 namely success of e-governance with variance 14.138% is significantly loaded with six variables in which EV22 is loaded with highest 0.770 load while EV1 with lowest 0.521 load.

Calculation of factor loading for factor 3 (Implementation of e-governance)

S.	Factor 3	Variable	Variable Name	Load
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No.		id		
1	F-3 Implementation of e- governance With 9.268 % Variance	EV9	implementation of e-governance processes makes the process of getting an Aadhar Card, PAN Card, License, etc easy.	.768
2		EV24	the e-governance projects differ in their implementation and planning stage	.667
3		EV5	contribution from IT industry helped the proper implementation of e governance in Indian Society	-.552
4		EV4	policies for good infrastructure have proved to be a major factor in the implementation of e-governance in India	.353

Factor 3 namely Implementation of e-governance with a variance of 9.268% is significantly loaded with four variables in which EV9 is loaded with the highest 0.768 load while EV4 with lowest 0.353 load.

Calculation of factor loading for factor 4 (system and management of e-governance):

S. No.	Factor 4	Variable id	Variable Name	Load
1	F-4 system and management of e- governance With 5.826 % Variance	EV14	for effective implementation of E-Governance in India, adequate management and governmental experts are required rather than technical expertise	.762
2		EV12	use of computerization instead of a manual system is better for effective governance in India	.663
3		EV3	poverty has played a major role in developing a new e-governance system in India	.503

Factor 4 namely system and management of e-governance with a variance 5.826% is significantly loaded with three variables in which EV14 is loaded with highest 0.762 load while EV3 with lowest 0.503 load.

Calculation of factor loading for factor 5 (people orientation and services)

S. No.	Factor 5	Variable id	Variable Name	Load
1	F-5 people orientation and services With 5.367 % Variance	EV2	e-governance is a better way of providing government services to the common citizens	.616
2		EV16	rural areas people facing difficulties to getting advantages of e-governance schemes	.564
3		EV7	The main aim of any good governance scheme or project should be to reduce poverty from society	-.542
4		EV25	IT has significantly reduced the gap between Rich and poor in the Indian Society	-.521
5		EV11	good governance has made the government more transparent, accountable, efficient, and accessible to common people	-.453

Factor 5 namely people-orientation and services with a variance of 5.367% is significantly loaded with five variables in which EV2 is loaded with the highest 0.616 load while EV3 with lowest -0.453 load.

Annexure 6

```
> data1<-Final.Data.Sheet.606
> jmodel<-'
+ FACT1=~ EV17+EV19+EV18+EV10+EV8+EV15+EV13
+ FACT2=~ EV22+EV21+EV20+EV23+EV6+EV1
+ FACT3=~ EV9+EV24+EV5+EV4
+ FACT4=~ EV14+EV12+EV3
+ FACT5=~ EV2+EV16+EV7+EV25+EV11'
> jfit<-cfa(jmodel, data = data1, estimator="MLR", std.ov=T)
Warning message:
In lav_object_post_check(object) :
  lavaan WARNING: covariance matrix of latent variables is not positive definite; use lavInspect(fit, "cov.lv") to investigate.
> summary(fit1, rsquare = T, fit.measures=T, standardized = T)
Error in summary(fit1, rsquare = T, fit.measures = T, standardized = T) : object 'fit1' not found
> summary(jfit, rsquare = T, fit.measures=T, standardized = T)
lavaan 0.6-5 ended normally after 86 iterations
```

Estimator	ML
Optimization method	NLMINB
Number of free parameters	60
Number of observations	606

Model Test User Model:

	Standard	Robust
Test Statistic	344.448	316.185
Degrees of freedom	265	265
P-value (Chi-square)	0.001	0.017
Scaling correction factor	1.089 for the Yuan-Bentler correction (Mplus variant)	

Model Test Baseline Model:

Test statistic	940.400	867.436
Degrees of freedom	300	300
P-value	0.000	0.000
Scaling correction factor	1.084	

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.876	0.910
Tucker-Lewis Index (TLI)	0.860	0.898

Robust Comparative Fit Index (CFI)	0.909
Robust Tucker-Lewis Index (TLI)	0.897

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-21186.433	-21186.433
Scaling correction factor	0.791	for the MLR correction

Loglikelihood unrestricted model (H1)	-21014.209	-21014.209
Scaling correction factor	1.034	for the MLR correction

Akaike (AIC)	42492.865	42492.865
Bayesian (BIC)	42757.278	42757.278
Sample-size adjusted Bayesian (BIC)	42566.792	42566.792

Root Mean Square Error of Approximation:

RMSEA	0.022	0.018
90 Percent confidence interval - lower	0.015	0.009
90 Percent confidence interval - upper	0.029	0.025
P-value RMSEA <= 0.05	1.000	1.000

Robust RMSEA	0.019
90 Percent confidence interval - lower	0.009
90 Percent confidence interval - upper	0.026

Standardized Root Mean Square Residual:

SRMR	0.040	0.040
------	-------	-------

Parameter Estimates:

Information	Observed
Observed information based on	Hessian
Standard errors	Robust.huber.white

Latent Variables:

	Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
FACT1 =~						
EV17	1.000			0.262	0.262	
EV19	1.406	0.510	2.759	0.006	0.368	0.368
EV18	1.485	0.551	2.698	0.007	0.389	0.389
EV10	0.846	0.302	2.802	0.005	0.221	0.222
EV8	0.602	0.300	2.003	0.045	0.157	0.158
EV15	1.365	0.428	3.189	0.001	0.357	0.357
EV13	0.726	0.318	2.285	0.022	0.190	0.190
FACT2 =~						

EV22	1.000		0.369	0.369		
EV21	0.632	0.143	4.436	0.000	0.233	0.233
EV20	1.213	0.187	6.476	0.000	0.448	0.448
EV23	1.188	0.158	7.497	0.000	0.438	0.439
EV6	0.963	0.161	5.970	0.000	0.355	0.356
EV1	1.304	0.216	6.048	0.000	0.481	0.482
FACT3 ~~						
EV9	1.000		0.358	0.358		
EV24	0.256	0.150	1.712	0.087	0.092	0.092
EV5	-1.038	0.180	-5.761	0.000	-0.372	-0.372
EV4	0.344	0.150	2.297	0.022	0.123	0.123
FACT4 ~~						
EV14	1.000		0.382	0.382		
EV12	0.752	0.157	4.805	0.000	0.287	0.287
EV3	0.871	0.164	5.327	0.000	0.333	0.333
FACT5 ~~						
EV2	1.000		0.361	0.362		
EV16	0.879	0.181	4.857	0.000	0.318	0.318
EV7	-0.891	0.198	-4.504	0.000	-0.322	-0.322
EV25	-0.373	0.175	-2.135	0.033	-0.135	-0.135
EV11	-1.005	0.194	-5.182	0.000	-0.363	-0.363

Covariances:	Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
FACT1 ~~						
FACT2	0.027	0.012	2.185	0.029	0.279	0.279
FACT3	0.001	0.015	0.055	0.956	0.009	0.009
FACT4	0.035	0.017	2.130	0.033	0.353	0.353
FACT5	0.009	0.015	0.590	0.555	0.096	0.096
FACT2 ~~						
FACT3	-0.095	0.019	-4.982	0.000	-0.719	-0.719
FACT4	0.125	0.023	5.482	0.000	0.884	0.884
FACT5	0.100	0.020	4.959	0.000	0.747	0.747
FACT3 ~~						
FACT4	-0.126	0.027	-4.624	0.000	-0.924	-0.924
FACT5	-0.147	0.030	-4.988	0.000	-1.139	-1.139
FACT4 ~~						
FACT5	0.109	0.025	4.302	0.000	0.793	0.793

Variances:	Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
.EV17	0.930	0.050	18.661	0.000	0.930	0.931
.EV19	0.863	0.062	13.915	0.000	0.863	0.864
.EV18	0.847	0.068	12.538	0.000	0.847	0.849
.EV10	0.949	0.048	19.744	0.000	0.949	0.951
.EV8	0.974	0.047	20.593	0.000	0.974	0.975
.EV15	0.871	0.059	14.864	0.000	0.871	0.872
.EV13	0.962	0.047	20.271	0.000	0.962	0.964
.EV22	0.862	0.043	20.052	0.000	0.862	0.864
.EV21	0.944	0.040	23.344	0.000	0.944	0.945

.EV20	0.798	0.047	17.148	0.000	0.798	0.799
.EV23	0.806	0.044	18.335	0.000	0.806	0.808
.EV6	0.872	0.045	19.536	0.000	0.872	0.874
.EV1	0.767	0.049	15.681	0.000	0.767	0.768
.EV9	0.870	0.052	16.886	0.000	0.870	0.872
.EV24	0.990	0.037	26.550	0.000	0.990	0.992
.EV5	0.860	0.050	17.056	0.000	0.860	0.862
.EV4	0.983	0.040	24.797	0.000	0.983	0.985
.EV14	0.853	0.052	16.545	0.000	0.853	0.854
.EV12	0.916	0.045	20.523	0.000	0.916	0.917
.EV3	0.888	0.046	19.343	0.000	0.888	0.889
.EV2	0.868	0.046	19.014	0.000	0.868	0.869
.EV16	0.898	0.046	19.592	0.000	0.898	0.899
.EV7	0.895	0.047	19.019	0.000	0.895	0.896
.EV25	0.980	0.039	25.432	0.000	0.980	0.982
.EV11	0.867	0.048	18.098	0.000	0.867	0.868
FACT1	0.068	0.036	1.881	0.060	1.000	1.000
FACT2	0.136	0.033	4.163	0.000	1.000	1.000
FACT3	0.128	0.044	2.912	0.004	1.000	1.000
FACT4	0.146	0.044	3.316	0.001	1.000	1.000
FACT5	0.131	0.034	3.868	0.000	1.000	1.000

R-Square:

	Estimate
EV17	0.069
EV19	0.136
EV18	0.151
EV10	0.049
EV8	0.025
EV15	0.128
EV13	0.036
EV22	0.136
EV21	0.055
EV20	0.201
EV23	0.192
EV6	0.126
EV1	0.232
EV9	0.128
EV24	0.008
EV5	0.138
EV4	0.015
EV14	0.146
EV12	0.083
EV3	0.111
EV2	0.131
EV16	0.101
EV7	0.104
EV25	0.018

EV11 0.132

```
> # removed item due to low factor load<.3
> jmodel1<-
+ FACT1=~ EV17+EV19+EV18+EV15
+ FACT2=~ EV22+EV21+EV20+EV23+EV6+EV1
+ FACT3=~ EV9+EV5
+ FACT4=~ EV14+EV12+EV3
+ FACT5=~ EV2+EV16+EV7+EV11'
> jfit1<-cfa(jmodel1, data = data1, estimator="MLR", std.ov=T )
Warning message:
```

In lav_object_post_check(object) :

lavaan WARNING: covariance matrix of latent variables is not positive definite; use lavInspect(fit, "cov.lv") to investigate.

```
> summary(jfit1, rsquare = T, fit.measures=T, standardized = T)
```

lavaan 0.6-5 ended normally after 86 iterations

Estimator	ML
Optimization method	NLMINB
Number of free parameters	60
Number of observations	606

Model Test User Model:

	Standard	Robust
Test Statistic	344.448	316.185
Degrees of freedom	265	265
P-value (Chi-square)	0.001	0.017
Scaling correction factor (variant)		1.089 for the Yuan-Bentler correction (Mplus variant)

Model Test Baseline Model:

Test statistic	940.400	867.436
Degrees of freedom	300	300
P-value	0.000	0.000
Scaling correction factor		1.084

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.876	0.910
Tucker-Lewis Index (TLI)	0.860	0.898
Robust Comparative Fit Index (CFI)		0.909
Robust Tucker-Lewis Index (TLI)		0.897

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-21186.433	-21186.433
Scaling correction factor	0.791	for the MLR correction
Loglikelihood unrestricted model (H1)	-21014.209	-21014.209
Scaling correction factor	1.034	for the MLR correction
Akaike (AIC)	42492.865	42492.865
Bayesian (BIC)	42757.278	42757.278
Sample-size adjusted Bayesian (BIC)	42566.792	42566.792

Root Mean Square Error of Approximation:

RMSEA	0.022	0.018
90 Percent confidence interval - lower	0.015	0.009
90 Percent confidence interval - upper	0.029	0.025
P-value RMSEA <= 0.05	1.000	1.000
Robust RMSEA	0.019	
90 Percent confidence interval - lower	0.009	
90 Percent confidence interval - upper	0.026	

Standardized Root Mean Square Residual:

SRMR	0.040	0.040
------	-------	-------

Parameter Estimates:

Information	Observed
Observed information based on	Hessian
Standard errors	Robust.huber.white

Latent Variables: Estimate Std.Err z-value P(>|z|) Std.lv Std.all

FACT1 =~						
EV17	1.000			0.262	0.262	
EV19	1.406	0.510	2.759	0.006	0.368	0.368
EV18	1.485	0.551	2.698	0.007	0.389	0.389
EV10	0.846	0.302	2.802	0.005	0.221	0.222
EV8	0.602	0.300	2.003	0.045	0.157	0.158
EV15	1.365	0.428	3.189	0.001	0.357	0.357
EV13	0.726	0.318	2.285	0.022	0.190	0.190
FACT2 =~						
EV22	1.000			0.369	0.369	
EV21	0.632	0.143	4.436	0.000	0.233	0.233
EV20	1.213	0.187	6.476	0.000	0.448	0.448
EV23	1.188	0.158	7.497	0.000	0.438	0.439
EV6	0.963	0.161	5.970	0.000	0.355	0.356
EV1	1.304	0.216	6.048	0.000	0.481	0.482

FACT3 =~

EV9	1.000		0.358	0.358		
EV24	0.256	0.150	1.712	0.087	0.092	0.092
EV5	-1.038	0.180	-5.761	0.000	-0.372	-0.372
EV4	0.344	0.150	2.297	0.022	0.123	0.123

FACT4 =~

EV14	1.000		0.382	0.382		
EV12	0.752	0.157	4.805	0.000	0.287	0.287
EV3	0.871	0.164	5.327	0.000	0.333	0.333

FACT5 =~

EV2	1.000		0.361	0.362		
EV16	0.879	0.181	4.857	0.000	0.318	0.318
EV7	-0.891	0.198	-4.504	0.000	-0.322	-0.322
EV25	-0.373	0.175	-2.135	0.033	-0.135	-0.135
EV11	-1.005	0.194	-5.182	0.000	-0.363	-0.363

Covariances: Estimate Std.Err z-value P(>|z|) Std.lv Std.all

FACT1 ~~

FACT2	0.027	0.012	2.185	0.029	0.279	0.279
FACT3	0.001	0.015	0.055	0.956	0.009	0.009
FACT4	0.035	0.017	2.130	0.033	0.353	0.353
FACT5	0.009	0.015	0.590	0.555	0.096	0.096

FACT2 ~~

FACT3	-0.095	0.019	-4.982	0.000	-0.719	-0.719
FACT4	0.125	0.023	5.482	0.000	0.884	0.884
FACT5	0.100	0.020	4.959	0.000	0.747	0.747

FACT3 ~~

FACT4	-0.126	0.027	-4.624	0.000	-0.924	-0.924
FACT5	-0.147	0.030	-4.988	0.000	-1.139	-1.139

FACT4 ~~

FACT5	0.109	0.025	4.302	0.000	0.793	0.793
-------	-------	-------	-------	-------	-------	-------

Variances: Estimate Std.Err z-value P(>|z|) Std.lv Std.all

.EV17	0.930	0.050	18.661	0.000	0.930	0.931
.EV19	0.863	0.062	13.915	0.000	0.863	0.864
.EV18	0.847	0.068	12.538	0.000	0.847	0.849
.EV10	0.949	0.048	19.744	0.000	0.949	0.951
.EV8	0.974	0.047	20.593	0.000	0.974	0.975
.EV15	0.871	0.059	14.864	0.000	0.871	0.872
.EV13	0.962	0.047	20.271	0.000	0.962	0.964
.EV22	0.862	0.043	20.052	0.000	0.862	0.864
.EV21	0.944	0.040	23.344	0.000	0.944	0.945
.EV20	0.798	0.047	17.148	0.000	0.798	0.799
.EV23	0.806	0.044	18.335	0.000	0.806	0.808
.EV6	0.872	0.045	19.536	0.000	0.872	0.874
.EV1	0.767	0.049	15.681	0.000	0.767	0.768
.EV9	0.870	0.052	16.886	0.000	0.870	0.872
.EV24	0.990	0.037	26.550	0.000	0.990	0.992

.EV5	0.860	0.050	17.056	0.000	0.860	0.862
.EV4	0.983	0.040	24.797	0.000	0.983	0.985
.EV14	0.853	0.052	16.545	0.000	0.853	0.854
.EV12	0.916	0.045	20.523	0.000	0.916	0.917
.EV3	0.888	0.046	19.343	0.000	0.888	0.889
.EV2	0.868	0.046	19.014	0.000	0.868	0.869
.EV16	0.898	0.046	19.592	0.000	0.898	0.899
.EV7	0.895	0.047	19.019	0.000	0.895	0.896
.EV25	0.980	0.039	25.432	0.000	0.980	0.982
.EV11	0.867	0.048	18.098	0.000	0.867	0.868
FACT1	0.068	0.036	1.881	0.060	1.000	1.000
FACT2	0.136	0.033	4.163	0.000	1.000	1.000
FACT3	0.128	0.044	2.912	0.004	1.000	1.000
FACT4	0.146	0.044	3.316	0.001	1.000	1.000
FACT5	0.131	0.034	3.868	0.000	1.000	1.000

R-Square: Estimate

EV17	0.069
EV19	0.136
EV18	0.151
EV10	0.049
EV8	0.025
EV15	0.128
EV13	0.036
EV22	0.136
EV21	0.055
EV20	0.201
EV23	0.192
EV6	0.126
EV1	0.232
EV9	0.128
EV24	0.008
EV5	0.138
EV4	0.015
EV14	0.146
EV12	0.083
EV3	0.111
EV2	0.131
EV16	0.101
EV7	0.104
EV25	0.018
EV11	0.132

```

> # removed item due to low factor load<.3
> jmodel1<-''
+ FACT1~~ EV17+EV19+EV18+EV15
+ FACT2~~ EV22+EV21+EV20+EV23+EV6+EV1
+ FACT3~~ EV9+EV5

```

```
+ FACT4=~ EV14+EV12+EV3
+ FACT5=~ EV2+EV16+EV7+EV11'
> summary(jfit1, rsquare = T, fit.measures=T, standardized = T)
lavaan 0.6-5 ended normally after 89 iterations
```

Estimator	ML
Optimization method	NLMINB
Number of free parameters	48
Number of observations	606

Model Test User Model:

	Standard	Robust
Test Statistic	189.597	170.818
Degrees of freedom	142	142
P-value (Chi-square)	0.005	0.050
Scaling correction factor	1.110	for the Yuan-Bentler correction (Mplus variant)

Model Test Baseline Model:

Test statistic	751.522	687.128
Degrees of freedom	171	171
P-value	0.000	0.000
Scaling correction factor	1.094	

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.918	0.944
Tucker-Lewis Index (TLI)	0.901	0.933
Robust Comparative Fit Index (CFI)	0.943	
Robust Tucker-Lewis Index (TLI)	0.932	

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-16047.188	-16047.188
Scaling correction factor		0.785 for the MLR correction
Loglikelihood unrestricted model (H1)	-15952.389	-15952.389
Scaling correction factor		1.028 for the MLR correction
Akaike (AIC)	32190.376	32190.376
Bayesian (BIC)	32401.906	32401.906
Sample-size adjusted Bayesian (BIC)	32249.518	32249.518

Root Mean Square Error of Approximation:

RMSEA	0.024	0.018
90 Percent confidence interval - lower	0.014	0.004
90 Percent confidence interval - upper	0.032	0.027
P-value RMSEA <= 0.05	1.000	1.000

Robust RMSEA	0.019	
90 Percent confidence interval - lower	0.000	
90 Percent confidence interval - upper	0.029	

Standardized Root Mean Square Residual:

SRMR	0.037	0.037
------	-------	-------

Parameter Estimates:

Information	Observed
Observed information based on	Hessian
Standard errors	Robust.huber.white

	Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
FACT1 =~						
EV17	1.000				0.212	0.213
EV19	1.817	0.687	2.645	0.008	0.386	0.386
EV18	2.100	0.802	2.620	0.009	0.446	0.446
EV15	1.432	0.525	2.726	0.006	0.304	0.304
FACT2 =~						
EV22	1.000				0.367	0.367
EV21	0.646	0.143	4.505	0.000	0.237	0.237
EV20	1.226	0.188	6.534	0.000	0.449	0.450
EV23	1.204	0.160	7.529	0.000	0.442	0.442
EV6	0.966	0.164	5.909	0.000	0.354	0.355
EV1	1.305	0.216	6.040	0.000	0.478	0.479
FACT3 =~						
EV9	1.000				0.346	0.346
EV5	-1.075	0.182	-5.909	0.000	-0.371	-0.372
FACT4 =~						
EV14	1.000				0.381	0.381
EV12	0.755	0.160	4.725	0.000	0.287	0.288
EV3	0.876	0.163	5.373	0.000	0.334	0.334
FACT5 =~						
EV2	1.000				0.359	0.359
EV16	0.900	0.190	4.746	0.000	0.323	0.323
EV7	-0.903	0.192	-4.703	0.000	-0.324	-0.324
EV11	-0.954	0.181	-5.281	0.000	-0.342	-0.342

Covariances: Estimate Std.Err z-value P(>|z|) Std.lv Std.all

FACT1 ~

FACT2	0.030	0.012	2.515	0.012	0.382	0.382
FACT3	0.001	0.011	0.121	0.904	0.018	0.018
FACT4	0.030	0.015	2.035	0.042	0.369	0.369
FACT5	0.009	0.011	0.806	0.420	0.121	0.121
FACT2 ~						
FACT3	-0.093	0.019	-4.895	0.000	-0.731	-0.731
FACT4	0.123	0.023	5.454	0.000	0.884	0.884
FACT5	0.098	0.020	4.874	0.000	0.747	0.747
FACT3 ~						
FACT4	-0.121	0.028	-4.394	0.000	-0.923	-0.923
FACT5	-0.149	0.030	-4.958	0.000	-1.202	-1.202
FACT4 ~						
FACT5	0.116	0.025	4.642	0.000	0.850	0.850

Variances:	Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
.EV17	0.953	0.047	20.225	0.000	0.953	0.955
.EV19	0.850	0.069	12.368	0.000	0.850	0.851
.EV18	0.799	0.072	11.105	0.000	0.799	0.801
.EV15	0.906	0.054	16.661	0.000	0.906	0.907
.EV22	0.864	0.043	20.087	0.000	0.864	0.865
.EV21	0.942	0.040	23.320	0.000	0.942	0.944
.EV20	0.796	0.046	17.169	0.000	0.796	0.798
.EV23	0.803	0.044	18.254	0.000	0.803	0.805
.EV6	0.873	0.045	19.516	0.000	0.873	0.874
.EV1	0.770	0.049	15.743	0.000	0.770	0.771
.EV9	0.879	0.052	16.944	0.000	0.879	0.880
.EV5	0.860	0.056	15.287	0.000	0.860	0.862
.EV14	0.853	0.051	16.662	0.000	0.853	0.855
.EV12	0.916	0.045	20.351	0.000	0.916	0.917
.EV3	0.887	0.046	19.346	0.000	0.887	0.889
.EV2	0.870	0.046	18.869	0.000	0.870	0.871
.EV16	0.894	0.046	19.362	0.000	0.894	0.896
.EV7	0.894	0.047	19.035	0.000	0.894	0.895
.EV11	0.881	0.046	19.165	0.000	0.881	0.883
FACT1	0.045	0.029	1.540	0.124	1.000	1.000
FACT2	0.134	0.032	4.153	0.000	1.000	1.000
FACT3	0.119	0.044	2.739	0.006	1.000	1.000
FACT4	0.145	0.044	3.328	0.001	1.000	1.000
FACT5	0.129	0.033	3.866	0.000	1.000	1.000

R-Square:	Estimate
EV17	0.045
EV19	0.149
EV18	0.199
EV15	0.093
EV22	0.135
EV21	0.056
EV20	0.202

EV23	0.195
EV6	0.126
EV1	0.229
EV9	0.120
EV5	0.138
EV14	0.145
EV12	0.083
EV3	0.111
EV2	0.129
EV16	0.104
EV7	0.105
EV11	0.117