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IDENTIFYING VIABILITY PARAMETERS OF ERP SOFTWARE FOR CONSTRUCTION COMPANIES IN AHMEDABAD REGION

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Abstract - *Construction industry have been expanding from the past decade and as a result large, medium and small-scale construction companies are moving toward a well-defined structured system where process optimization can be achieved through efficient database management. The Construction business gains a lot from the Enterprise Resource Planning (ERP) technology. Industry needs much sufficient system to manage the data volume and provide much better interdepartmental coordination. While taking a decision of investing and implementing such ERP system, there are some parameters which govern the process of decision making. These parameters help to check the viability of any ERP system for construction companies. The research identified viability parameters and ranked according to their importance. Research uses qualitative and quantitative approaches. With the help of Relative Importance Index Method and Factor Analysis importance rankings were found. RII method of analysis projected viability parameters like User-friendliness of ERP Software, Acceptance of New Technology, Availability of Data, Initial Training Time, Organization's Growth Plan, Work Process Reengineering, ERP Implementation Priority, IT Infrastructure of the Organization, Customization, and Software Competency as important viability parameters whereas Factor Analysis projected, Geographic Spread of the Organization, Organization Strength, Acceptance of New Technology, Maintenance Cost, Applicability of Available ERP Software in the Market to the Organization, Development/Customization Cost, Software Competency, IT Infrastructure of the Organization, and ERP Implementation Priority as the most important viability parameters. These significant viability parameters can be used while making crucial decisions about testing the viability of any ERP software in construction organizations.*

Key Words: **Enterprise Resource Planning, Viability Parameters, Decision Making, Change Management, Process Optimization, Efficient Database Management**

1. ITRODUCTION

Construction industry is booming in last decade and as a result large, medium and small-scale construction companies are moving toward a well-defined structured system where process optimization can be achieved through efficient database management. Such database management systems provide important information such as data transparency, data clarity, data optimization, data review and analysis. Many database management tools have been present in the industry from past decade and such tools often comes with high cost, initial time investment, lengthy process, implementation & adaption challenges, and unknown risks. Most of the large-scale companies have already adapted such database management tools to streamline their business process, and to optimize work efficiency. Enterprise Resource Planning software is such tool to efficiently manage data for the whole business process. ERP systems provide numerous advantages to construction industry and many construction companies know the advantages of such systems but feel resistance toward such change in the organization. The advantages of ERP systems are such as, standardized information, inter-departmental coordination, improved operational efficiency, data clarity, and reduction in cost and time for completion of the project.

In current practice, only few small-scale companies are using such ERP systems and factors such as lack of awareness, lack of interest, initial time and capital investment requirement, and lack of information are driving their decision-making ability. Identifying viable parameters for ERP system adaption in small scale companies are the current need of the industry. These viability parameters will help the industry in the process of decision making for adapting to such ERP systems. Viability parameters will provide the necessary information to the business owners and will educate them and help decide the viability of such ERP software for their organization.

While taking a decision of investing and implementing such ERP system, there are some parameters which govern the process of decision making. Currently there are not many tools for the decision makers to identify such viability parameters to make this process easier. This research will help decision makers to check the viability of ERP software for their organization, with the help of identified viability parameters.

The objective of the study is to identify key viability parameters of ERP software for construction companies and to rank and prioritize identified viability parameters.

1.3 Research Methodology

For this research mixed-method approach was adopted wherein both the qualitative and quantitative data are collected.

1.3.1 Literature Review

To understand the basics, literatures related to "Business Process Re-engineering", "Change Management", "Process Visualization" were referred. Along with them papers related to "Implementation of ERP" and "Problems in ERP Implementation" were also referred. Further to which research work based on "Journals on tools for change management" and "Components of Work Process Change Management" were studied for better understanding of probable alternate methodologies and research gap and analyse the same. Literature review also resulted in identification of viability factors for ERP systems in other relevant studies.

1.3.2 Data Collection

Data collection was carried out by adopting both qualitative and quantity research methodologies. Through literature reviews viability parameters were identified and were enlisted followed by one-to-one semi structured interviews were carried out with the relevant industry experts to find out more viability parameters. These parameters were then enlisted in a table along with the viability parameters found in the literature review. Along with viability parameters, plus and delta were also found out with the help of one-to-one semi-structured interviews which contributed to enhanced understanding the applicability of ERP systems in the construction industry.

Identified viability parameters were cleaned for duplicates and classified into three sections: Organization related, Software related, and Cost related. A questionnaire was formulated in such a way that importance of each identified viability parameters can be found out in order to gain in depth knowledge about the factors and how they affect the decision-making process.

The questionnaire was prepared in google survey form and distributed using WhatsApp, email, LinkedIn and through approaching experts individually.

1.3.3 Data Analysis

Based on the responses received on the questionnaire survey data analysis was carried out with the help of Factor Analysis method that assigned weightage to parameters. According to the weightage each viability parameters were ranked where viability parameters with the highest weightage was ranked first and remaining were ranked accordingly. Top ranked viability parameters were then validated by the industry experts.

2. LITERATURE REVIEW

Sharma, Sharma and Shekhavat explains the implementation of ERP system (SAP) in phased manner where in-depth study of critical success factors, implementation strategies and environment of the projects were carried out through focused group method. Paper discussed about factors that lead to failure of implementation of ERP system. Paper also includes the business process reengineering in different phases of the implementation of ERP system. [1] Another study in Greece discussed about development of conceptual framework which investigates the factors affecting the implementation of ERP. [2] Shi and Halphin discussed about ERP technology and its current development in construction industry. Paper also provides brief study on the direct implementation of ERP in construction industry. [3] Syed M. and Ahmed et al. investigated the competency and implementation status of ERP in a contracting firm where they explored various barriers faced by contracting firms while implementing ERP. The major takeaway from the research was lack of knowledge and training lead to poor implementation of ERP in contracting firms. Paper also discussed about the customization needed for the best suitability for contracting firms. [4] Singh and Arora research is based on the reduction of failure in implementing ERP where they discussed about the implementation of lifecycle of ERP which includes selection of ERP, Project Planning, Gap analysis, Work Process Reengineering, Training, Testing, Implementation and Maintenance and failure factors were identified like, lack of customization, insufficient training and insufficient testing. [5] Yu-Rong ZENG, Lin WANG and Xian-Hao XU discussed about its vital investment and its significance of future competitiveness and performance of small and medium-scale enterprises. They discussed importance of qualitative and quantitative factors on selection of best ERP system based on Multiple Criteria Decision Making (MCDM). Brief of each literature review is provided into tabular form. [6]

3. DATA COLLECTION

The data collected for the thesis is both quantitative and qualitative. This also classifies the data into primary and secondary data. The primary data includes interviews and literature review. The secondary data has been collected by questionnaire surveys of stakeholders of ERP users to help validate the hypothesis for the primary data.

Following the literature review, a series of personal interviews are conducted as a part of primary data collection which was followed by an online questionnaire.

The survey form is divided into Five sections, "A-Introduction", section "B- Personal information " and "C-Factors related to Organization", "D- Factors related to ERP Software, and "F- Factors related to Cost" Section -A "Introduction" consists of brief information about the undertaken study. Section -B "Respondents Details" consists of personal information of the participants including fields like name of the respondent, title/designation, organization, years of experience and e-mail address. Section C, D and E consist of the identified factors based on Organization, software and cost in which the respondents were asked to provide a rating to them based on its importance. The online questionnaire was floated, a total of 83 acceptable responses were received.

3.1 Type of Data Collection

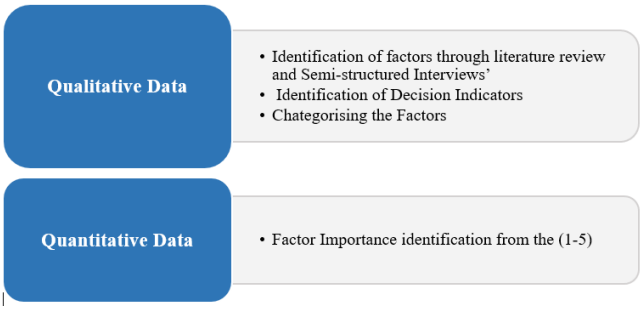

Fig-1: Type of Data Collection

3.1.1 Qualitative Data

For collecting the data, a through literature review was conducted and viability parameters were identified which govern the decision making while investing and implementing ERP system. Based on the literature limited numbers of viability parameters were identified thus came the need of identifying more viability parameters for which open-ended interviews were conducted. Based on the requirement of the research, industry experts having average experience of 22+ years, having good expertise in working with ERP system were identified. Interviewee's roles in the organizations varied from Senior Manager to Top Management. An Interview form was developed where personal details of interviewees were fetched like, Name, Years of Experience, Role and Designation in the Organization, their Highest Qualification and Type of Organization. Along with that, questions related to research were drafted to get needed output (Viability Parameters). Interview contained following questions.

1. Duration for which the organization is using ERP?

2. Awareness regarding ERP?

3. Factors Taken under consideration while investing in ERP?

4. What are the positive and negative factors faced by an organization while adopting an ERP system?

Table -1: Interview Respondent Detail

Sr. No.	Interviewee Details	Designation	Qualification	Years of Experience	Type of Organization	Mode of Interview
1	IN01	DGM Projects	Diploma Civil	30	Contractor	Personal
2	IN02	COO	B.E. Civil	30	Contractor	Personal
3	IN03	Managing Director	Masters in Construction Management	25	Contractor	Personal
4	IN04	VP Planning	MBA	25	Contractor	Personal
5	IN05	DGM IT	B.E. IT	24	Contractor	Personal
6	IN06	CTO	LLB & IT	22	Developer	Online
7	IN07	Senior GM	B.E. Civil	18	Contractor	Personal
8	IN08	Senior Manager Planning	Masters in Construction Project Management	12	Contractor	Personal
9	IN09	Senior Manager	Masters in Construction Project Management	10	Contractor	Personal

Based on the literature review and personal interviews, a total of 25 viability parameters were identified. Among all the viability parameters some were related to organization, some were related to ERP software and rest were related to cost hence, viability parameters were categorized in 3 sections.

- Viability Parameters related to Organization
- Viability Parameters related to ERP Software
- Viability Parameters related to Cost

Table -2: Identified Factors and Nomenclature

SR. NO.	IDENTIFIED FACTORS	NOMENCLATURE
1	Work Process Reengineering	O1
2	Implementation Priority of ERP	O2
3	IT Infrastructure of the Organization	O3
4	Availability of Data	O4
5	Financial Health of Organization	O5
6	Data Volume of the Organization	O6
7	Geographic Spread of the Organization	O7
8	Organization Strength	O8
9	Organization Structure	O9
10	Type of Projects	O10
11	Organization's Growth Plan	O11
12	Number of Projects	O12
13	Acceptance of New Technology	O13
14	Participant Roles	O14

SR. NO.	IDENTIFIED FACTORS	NOMENCLATURE
15	Customization	S1
16	Initial Training Time	S2
17	Software Competency	S3
18	User-friendliness of ERP	S4
19	Available ERP Software in the Market	S5
20	Applicability of Available ERP Software in the Market to the Organization	S6
21	Initial Cost	C1
22	Running Cost	C2
23	Maintenance Cost	C3
24	Development/Customization Cost	C4
25	Training Cost	C5

Factors related to Organization

Factors related to ERP software

Factors related to Cost

3.1.2 Quantitative Data

Quantitative data is obtained through opinion survey. A questionnaire was prepared first which was pilot tested and after corrections it was administered online.

3.1.2.1 Scale of Rating the Viability Parameters Based on its Importance

The parameters are measured on a scale suggesting criticality of that factor. A score of 5 indicates the parameter has a high degree of importance, while the score of 1 indicates the least degree of importance. The respondents rate these factors in an online survey through Google form. The mediums of contacts were, Email, LinkedIn, WhatsApp (Personal & Groups) and In-person.

Table -3: Importance Ranking

1	2	3	4	5
Not Important	Slightly Important	Moderately Important	Important	Very Important

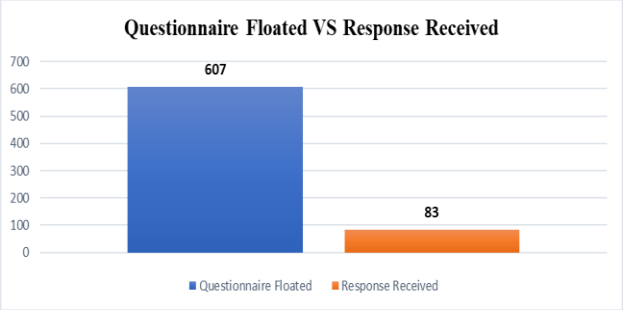

Chart -1: Questionnaire Floated VS Response Received

4. DATA ANALYSIS

Two of the very standard methods were used to analyze the data which was collected from the questionnaire survey. The analysis is divided into two major parts, basic analysis and advance analysis. Basic analysis consists of analysis based on the rating and its relevance with the indirect variables like, Type of Organization, Experience and Qualification. The advance analysis consists of analysis through RII method and Factor Analysis with Principal Component.

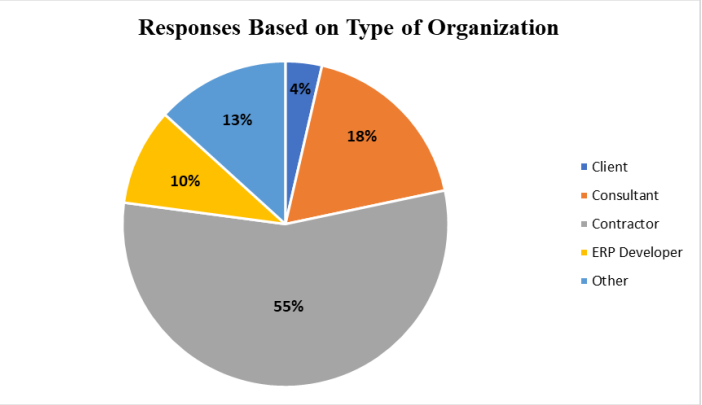

Chart -2: Responses Based on the Type of Organization

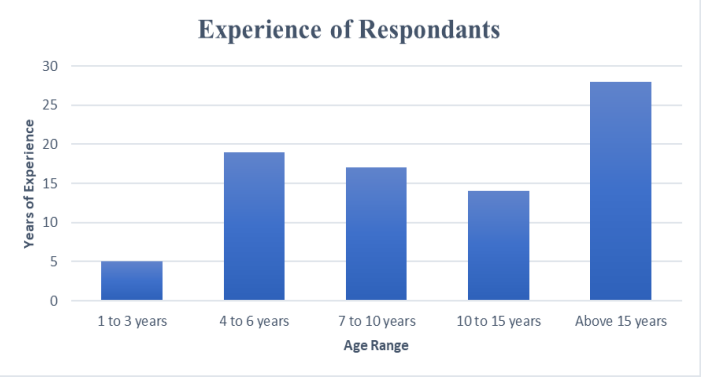

Chart -3: Experience of Respondents

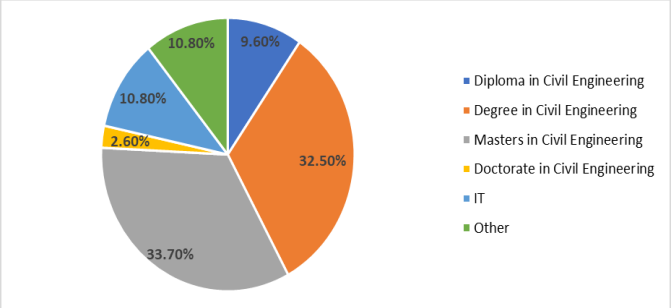

Chart -4: Highest Qualification of Respondent

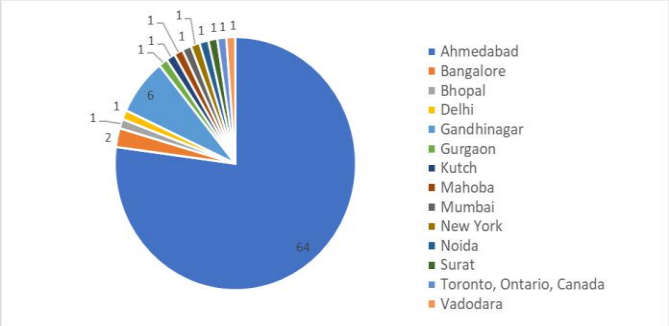

Chart -5: Responses Based on the Location

4.1 Analysis Based on the Mean Value of the Responses

Mean values were carried out for each viability parameters and top five mean values were carried out to know which viability parameters the maximum importance. Table below shows the top 5 viability parameters base on the mean values.

Table -4: Ranking Based on Mean Value

Ranking	Code	Category	Viability Parameter	Mean Value
1	**S4**	Software	User-friendliness of ERP	**4.578313**
2	**O13**	Organization	Acceptance of New Technology	**4.542169**
3	**O4**	Organization	Availability of Data	**4.506024**
4	**S2**	Software	Initial Training Time	**4.433735**
5	**O11**	Organization	Organization Structure	**4.349398**

Top 5 ranked viability parameters shows that software's user-friendliness affects the most when it comes to the decision making of investing and implementing in any ERP system. Acceptance of new technology is commonly faced hurdle in any organization because it comes with challenges and behavioral changes in each individual, it also depends on the age of the individual. Followed by availability of the data; in any ERP system availability of the data is the major concern and authenticity of the data an also a driving factor. 4th ranked factor is Organization's growth plan, where future plan of the organization to grow and expand.

Initial Training Time: ERP software requires training to each user and while implementing the ERP software it is really time consuming to train the users of the organization and it usually takes a lot of time which makes it a very important viability parameter. Organization structure and its complexity has good impact on the decision making. If the organization's structure is lengthy and complex and individuals of the organization has multiple roles it will be really hard to implement the ERP system in the organization.

Table -5: Ranking Based on Mean Value

Ranking	Category	Mean Value
1	Organization	4.129
2	Software	4.240
3	Cost	4.089

Among all three categories mean value of ERP Software is the highest hence, importance of ERP software, its user-friendliness, its initial training time, its suitability, flexibility in terms of customization are all important parameters before investing and implementing in any ERP System.

4.2 Analysis Based on the Importance Rating

Based on the response "Very Important" each viability parameters are rated and ranked. Below table show ranking of viability parameters based on the response "Very Important".

Table -6: Ranking Based on the Importance Rating (Very Important)

Ranking	Code	Viability Parameter	Number of "Very Important" Responses
1	S4	User-friendliness of ERP	**54**
2	O4	Availability of Data	**54**

3	O13	Acceptance of New Technology	**49**
4	O3	IT Infrastructure of the Organization	**43**
5	S2	Initial Training Time	**42**

User-friendliness of an ERP Software is ranked 1 as 54 out of 83 respondents found it very important as a viability parameter. Availability of the data is again a driving viability parameter as authentic and timely data availability is really important in any ERP system to carry out the required information. 49 out of 83 also found Acceptance of New Technology is a very important viability parameter as new technology introduces new changes and challenges and to some extent it also increases the efforts of each individual in terms of data entry. To operate and maintain the ERP system good IT Infrastructure is required. 43 out of 83 respondents find IT Infrastructure of the Organization a Very Important viability parameter. 42 out of 83 respondents also found Initial Training Time is also a Very Important viability Parameter.

4.3 ANALYSIS WITH RELATIVE IMPORTANCE INDEX METHOD

Data Analysis was carried out with two methods where initial method of data analysis was done through RII Method. This method is used to define relative importance of various factors, caused and delay effect. This method is only used when the samples are collected on a Likert scale. Answers provided by the responder is then transformed into relative importance indices which is carried out with the help of the equation shown below.

$RII = \Sigma W / (A \times N)$

Where,

W = Weightage given by the responder (1 to 5)

A = Highest Weightage (5)

N = Number of responder (83)

Higher the value of RII, greater the importance of that factor which is viability parameter in current research. Out of 25 viability parameters, the top 10 parameters according to their RII Value are ranked and its shown in the table below.

Table -7: Viability Parameters as per RII Value

Ranking	Code	Viability Parameter	RII Value
1	S4	User-friendliness of ERP	**0.916**
2	O13	Acceptance of New Technology	**0.908**
3	O4	Availability of Data	**0.901**
4	S2	Initial Training Time	**0.887**
5	O11	Organization's Growth Plan	**0.870**
6	O1	Work Process Reengineering	**0.865**
7	O2	Implementation Priority of ERP	**0.865**
8	O3	IT Infrastructure of the Organization	**0.865**
9	S1	Customization	**0.865**
10	S3	Software Competency	**0.865**

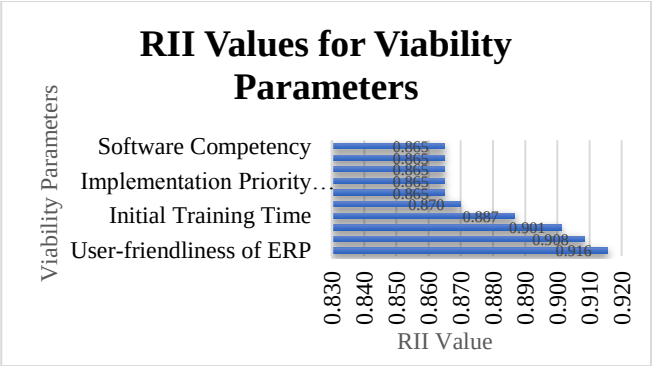

Chart -6: Viability Parameters as per RII Value

4.3.1 Reliability Testing of Questionnaire Results

For reliability testing Cronbach's Alpha Scale was used and validation was done through SPSS Software.

Table -8: Reliability Testing Results

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.787	0.872	25

Here as per the reliability statistics the value of alpha lies between 0.7 to 0.8. 0.787 indicates acceptable internal consistency of each factor.

4.4 Factor Analysis (Principal Component Analysis)

A statistical method is factor analysis. It's a term used to characterize the variation between observable and associated variables. Factors are a type of unobservable variable that has a lesser number of possibilities. It's a data compression technique. It's a method for condensing a big number of variables into a small number of variables based on their importance. Factors are small sets of variables that have been minimized. The goal is to keep the original variables' nature and character while reducing their number to make multivariate analysis easier. A factor is a set of variables that are connected in a linear way. These are the variables that account for the majority of the variations in the original data set. The variables are statistically unrelated. This aids in the resolution of the multi-collinearity issue. Here KMO & Bartlett's Test is carried out to determine the appropriateness of factor analysis.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.625
Bartlett's Test of Sphericity	Approx. Chi-Square	636.927
	df	300
	Sig.	<.001

The result indicates the Kaiser-Meyer-Olkin measure of sampling adequacy is 0.625 which is above 0.5 hence the measure is adequate. Bartlett's Test of significance should have value of significance less than 0.05, here its 0.01, that means that the variables are correlated high enough to carry out factor analysis.

4.4.1 Total Variance Between Factors Extracted

Table -9: Total Variance

Total Variance Explained

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.593	18.370	18.370	2.785	11.140	11.140
2	2.430	9.719	28.089	2.324	9.295	20.434
3	2.054	8.215	36.304	2.132	8.530	28.964
4	1.747	6.988	43.292	2.069	8.274	37.238
5	1.552	6.210	49.502	1.841	7.364	44.602
6	1.392	5.566	55.068	1.711	6.846	51.448
7	1.348	5.392	60.460	1.547	6.187	57.635
8	1.070	4.278	64.738	1.525	6.099	63.734
9	1.035	4.141	68.879	1.286	5.144	68.879

Extraction Method: Principal Component Analysis.

A total of 9 components are extracted from the factor analysis through SPSS Software. These 9 components consist of viability parameters groups. Each component contains 1 group of viability parameters and each parameter in single components has equal impact on the results. Here in total variance table explains the variance is divided into 25 viability parameters. Please note that all 9 components have eigen values more than 1 which means all these components has greater impact on the outcome. Cumulative loading variance is 68.879% which is above 60%, that means the identified factor which were grouped in 9 components has 68.870% of impact based on the analysis which is good.

4.4.2 Rotated Component Matrix

Table -10: Rotated Component Matrix with Identified Viability Parameters

Code	Name of Viability Parameter	Component								
		1	2	3	4	5	6	7	8	9
O1	Work Process Reengineering	-0.107	0.474	-0.154	0.244	0.208	0.039	0.267	-0.132	0.521
O2	Implementation Priority of ERP	0.046	-0.047	0.048	-0.096	-0.020	-0.065	-0.035	0.132	0.882
O3	IT Infrastructure of the Organization	0.056	0.111	0.099	0.024	0.330	0.067	-0.056	0.797	0.028
O4	Availability of Data	0.175	0.457	-0.050	0.300	-0.049	-0.266	-0.074	0.575	0.017
O5	Financial Health of Organization	0.279	0.154	0.274	-0.050	0.171	-0.232	-0.174	-0.553	-0.218
O6	Data Volume of the Organization	0.278	-0.031	-0.027	0.695	0.198	-0.023	-0.038	0.113	-0.026
O7	Geographic Spread of the Organization	0.743	0.001	-0.029	0.248	-0.034	-0.093	0.028	-0.054	0.123
O8	Organization Strength	0.763	-0.017	0.122	0.054	0.054	0.030	0.287	-0.020	-0.101
O9	Organization Structure	0.314	0.531	0.137	0.395	0.285	-0.320	-0.078	0.040	-0.006
O10	Type of Projects	0.651	0.318	-0.288	-0.030	0.203	0.141	-0.248	-0.115	0.107
O11	Organization's Growth Plan	0.064	0.408	0.004	-0.013	0.536	-0.009	-0.106	-0.020	0.288
O12	Number of Projects	0.567	0.341	0.373	-0.056	0.027	-0.241	0.045	-0.016	-0.064
O13	Acceptance of New Technology	0.012	0.703	-0.057	-0.273	-0.157	-0.081	0.304	0.144	0.003
O14	Participant Roles	0.218	0.681	0.125	0.238	0.150	0.171	-0.103	0.074	-0.045
S1	Customization	0.611	0.105	0.164	0.129	0.041	0.190	0.121	0.286	-0.035
S2	Initial Training Time	0.066	0.099	0.494	0.519	-0.037	-0.069	0.150	0.153	0.130
S3	Software Competency	0.120	0.131	0.060	0.081	-0.028	-0.032	0.783	0.000	0.029
S4	User-friendliness of ERP	-0.078	0.026	0.043	0.414	0.540	-0.099	0.071	0.021	-0.088
S5	Available ERP Software in the Market	0.314	-0.257	0.266	-0.171	0.409	-0.051	0.551	-0.038	-0.065
S6	Applicability of Available ERP Software in the Market to the Organization	0.113	-0.011	-0.038	0.054	0.824	0.120	0.042	0.162	-0.008
C1	Initial Cost	0.106	0.017	0.578	-0.303	0.105	0.387	0.290	0.027	0.082
C2	Running Cost	-0.009	0.237	0.559	0.390	0.022	0.329	-0.322	-0.147	-0.071
C3	Maintenance Cost	0.072	-0.060	0.852	0.071	-0.018	0.063	0.063	-0.028	-0.031
C4	Development/ Customization Cost	-0.017	-0.080	0.138	-0.064	0.051	0.840	-0.097	0.070	-0.026
C5	Training Cost	0.158	0.234	0.064	0.565	-0.032	0.560	0.070	0.006	-0.127

The rotated component matrix as shown in the Table - 13 above was used with 0.7 as a cut-off point. In the SEM (Structural Equation Modeling) approach, as a rule of thumb, 0.7 or higher factor loading represents that the factor extracts sufficient variance from that variable for factor loading for grouping the factors. Factor Loading is basically the correlation coefficient for the variable and factor. It shows the variance explained by the variable on that particular factor.

Structural Equation Modeling (SEM) is a multivariate statistical analysis technique that is used to analyze structural relationships. This technique is the combination of factor analysis and multiple regression analysis, and it is

used to analyze the structural relationship between measured variables and latent constructs. In the table below, nine factors were formed having linear variables into each factor. One factor, factor no. 4 which did not have any variable crossing the cut-off point. The variables in each factor were listed as below:

Table -11: Component wise Identified Viability Parameters

Component	Viability Parameters	Loading Variance
Component 1	Geographic Spread of the Organization	11.14%
	Organization Strength	
Component 2	Acceptance of New Technology	9.30%
Component 3	Maintenance Cost	8.53%
Component 4	Did not meet the cut-off point (0.7)	8.27%
Component 5	Applicability of Available ERP Software in the Market to the Organization	7.36%
Component 6	Development/Customization Cost	6.85%
Component 7	Software Competency	6.19%
Component 8	IT Infrastructure of the Organization	6.10%
Component 9	Implementation Priority of ERP	5.14%
	Cumulative Loading Variance	**68.88%**

4.5 Result Discussion

Data analysis were carried out using both – RII and Factor Analysis methods to identify the most important viability parameters impacting the decision making of investing and implementing ERP software in construction organizations.

Based on the analysis done through RII method, the important viability parameters are User-friendliness of ERP Software, Acceptance of New Technology, Availability of Data, Initial Training Time, Organization's Growth Plan, Work Process Reengineering, Implementation Priority of ERP, IT Infrastructure of the Organization, Customization and Software Competency, respectively.

Whereas the factor analysis is an entirely different approach than RII method. As per the Rotated Component Matrix, the most important viability parameters are Geographic Spread of the Organization, Organization Strength, Acceptance of New Technology, Maintenance Cost, Applicability of Available ERP Software in the Market to the Organization, Development/Customization Cost, Software Competency, IT Infrastructure of the Organization and Implementation Priority of ERP, respectively.

5 CONCLUSIONS

Understanding the need of the organization before investing & implementing an ERP software is a vital step for a successful adaption of the new technology. This research aimed to identify such viability parameters by conducting qualitative and quantitative study by involving various industry experts.

Based on the reviewed literatures & interviews, a total of 25 viability parameters were identified. These parameters were then rated on Likert scale based on their importance by 83 experienced professionals through a questionnaire survey. The responses were analyzed using RII and Factor analysis method.

User-friendliness of ERP Software, Acceptance of New Technology, Availability of Data, Initial Training Time, Organization's Growth Plan, Work Process Reengineering, ERP Implementation Priority, IT Infrastructure of the Organization, Customization, and Software Competency are the important viability parameters, according to the analysis done using the RII method. Factor analysis, on the other hand, is a completely different technique than the RII method. Geographic Spread of the Organization, Organization Strength, Acceptance of New Technology, Maintenance Cost, Applicability of Available ERP Software in the Market to the Organization, Development/Customization Cost, Software Competency, IT Infrastructure of the Organization, and ERP Implementation Priority are the most important viability parameters, according to the Rotated Component Matrix.

Identified viability parameters differs for both the analysis methods as RII is an absolute method and focused on one variable at a time, whereas factor analysis being the relative method focusing on group of factors simultaneously. Factor analysis provides group of factors cumulatively impact the decision making for the viability of any ERP software in construction organization.

These significant viability parameters can be used while making crucial decisions about testing the viability of any ERP software in construction organizations.

5.1 Future Scope

The current research work identified important viability parameters using RII and Factor analysis method where results were found to be different for both. Future research work can focus on identifying the most suitable method. Apart from this, the research is limited to identifying viability parameters and its importance rating. The future research work may focus on conducting a live case study to validate the analysis results. This research is centered on the Indian environment and conditions; however, similar factors can be researched globally.

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