

## Study of e-Tendering Solution Implemented by Government of Goa

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**Abstract**— The paper focuses a comprehensive review on implementation of e-Tendering solution in comparison to the conventional envelop-Box (manual Tendering) method in the State of Goa (India). Some of the key issues like Comparative analysis of pre-deployment and post deployment scenarios with the launch of e-Tendering Solution, highlighting the day-to-day problems faced by the System Users. And also, to consider the best practices that can be followed in improving rollout of e-Tendering solution. The study inferred that in spite of several challenges, how Vendors/Contractors and Departmental Users has accepted the e-Tendering system over manual tendering. This research paper is based on the descriptive and exploratory methods used for analysis of collected responses as the primary data for the study from Vendors/Contractors and Departmental Users through the online mode. This paper has targeted the end user of the e-Tendering solution their day-to-day issues and challenges and describing the advancement made by the Government for easy run of Tendering system.

**Keywords**— e-Procurement, e-Tender, Goa, Government, Vendors, Contractors, e-Payment

### I. INTRODUCTION

Government procurement is necessary because Governments cannot produce all the inputs for the goods, they provide themselves. Government usually provides public goods such as national defense, public infrastructure or supply of ICT equipment. In order to provide public and merit goods, the Government has to buy input factors from private companies, e.g., police cars, school buildings, uniforms etc. This process is called government or public procurement or tendering [1].

Government procurement or tendering involves a high risk of corruption because of the great size of financial turnover and the complexity of many procurement processes in which businesses interact very closely with politicians and civil servants. Such a conflict-of-interest problem, known as the principal-agent-problem, increases the risk of corruption. Corruption in public procurement causes inefficiencies and high costs to the public. In order to prevent corruption and to ensure transparency and competition among suppliers, public procurement is subject to legal regulation [2].

Government procurement or tendering regulations normally cover all public works, services and supply contracts entered into by a public authority. However, there may be exceptions. These most notably cover military acquisitions, which account for large parts of government expenditures. The Government of Goa (GoG) has mandated use of e-Tendering system, which is been used by all Department(s)/ Corporation(s)/ Autonomous bodies/

Institutions, etc. under the State Government and is being implemented through M/s. Info Tech Corporation of Goa Limited through (ITG), a Government of Goa Undertaking with the technology partner M/s. C1 India Pvt. Ltd. and its Banking Partners (Axis Bank Limited) as e-Payment gateway service provider. All the tenders with an estimated cost above Rs. 5 Lakhs are floated through the e-Tendering solutions w.e.f. 17-10-2019. The product e-Nivida (<https://goaenivida.gov.in>) implemented for the entire State of Goa is robust, feature-rich, and end-to-end solution for e-Tendering and e-Procurement [3-8].

This paper is organized in nine sections. Section I gives brief introduction of e-Tendering System and e-Procurement, then it is followed by the section II discussed the background study of e-Tendering system. Section III explained about the working model of e-tendering solution. Objective of our paper is discussed in Section IV followed by Section V the research methodology discussed the research strategy and research approaches used in this study. Section VI described the analysis of an empirical study. It also given detailed on the entire analysis of the findings; clarifies the purpose of the study. Section VII provided the conclusion of the paper trailed by acknowledgement and references.

### II. LITERATURE REVIEW

In this paper [9] presents that, benefits, risks, practices and strategies of e-procurement and its emerging usages in the current business to business (B2B) environment. A qualitative method was used for the case studies and

analyzed. The use of e-Procurement can lead to enormous cost saving and efficiency in procurement process. e-Procurement also enlarges customer base, broadens the search for raw materials to lower its production cost. Though, it has benefited the global business tremendously, its expected growth rate has been moving downwards. While E-procurement can be used for the purchase of indirect or direct materials, the risks associated with the e-procurement has been holding the companies from adopting it. The results showed that cost benefit was the main driver for companies to implement e-procurement. Other benefits included were transparency and visibility across process, better internal and external relations and streamlined buying process. The problems of implementation and integration of existing infrastructure and security and control risks were holding back companies from wide usage of e-procurement.

In this paper [10], reports on an evaluation of the performance features of e-Tendering systems from a user-group's perspective. A list of design features of e-Tendering systems is compiled from existing e-Tendering systems and the literature. A Kano model-based methodology is adopted, and data collected from Kano-questionnaire survey is used to evaluate the compiled set of e-Tendering system's features. The analysis of the survey results revealed that the participants perceived as performance features a significant percentage of the e-Tendering system's design features presented to them. It was also established that some of the features are not perceived to contribute to user satisfaction.

In this paper [11], presents a case study highlighting the successful implementation of a state-wide e-Procurement platform across several Government departments, public sector units, urban local bodies in the state of Andhra Pradesh and the quantifiable benefits it has delivered to the suppliers and the Government directly, and to the society, indirectly. This path-breaking initiative has provided transparency, fairness and equal opportunity to private entrepreneurs who are now able to submit bids online on an anywhere and anytime basis for Government contracts and sell products or expertise to Government agencies through the e-Procurement portal.

In this paper [12], aimed at to analyze e-Procurement adoption projects with specific focus on the Italian market. e-Procurement adoption is critical for organizations, both for its internal efficiency and for the deep impact on sustainability issues. Accordingly, analyzed adoption of e-Procurement, its main variables and outputs, by focusing on a comparative case study based on an exploratory-inductive investigation of two Italian leading providers. The data have been collected through primary (semi-structured interviews) and secondary (companies' internal documents and companies' websites) sources. Results highlighted that when firms decide to adopt e-procurement, advisory services have an enabling role that can support them into implementation, and particularly for overcoming barriers and helping them to achieve the expected benefits.

### III. WORKING MODEL OF E-TENDERING SOLUTION

The flow of major activities involved in e-Tendering/e-Procurement with e-Nivida depicted (refer figure 1). The e-Tendering System product e-Nivida comprises of the following major modules like Organization Hierarchy Module, Vendor Management Module, Tender Management Module, Financial Information Module, e-Payment Gateway Module, Security with Digital Signature & Encryption Module and Search, Alert and Bookmarks Module [7].

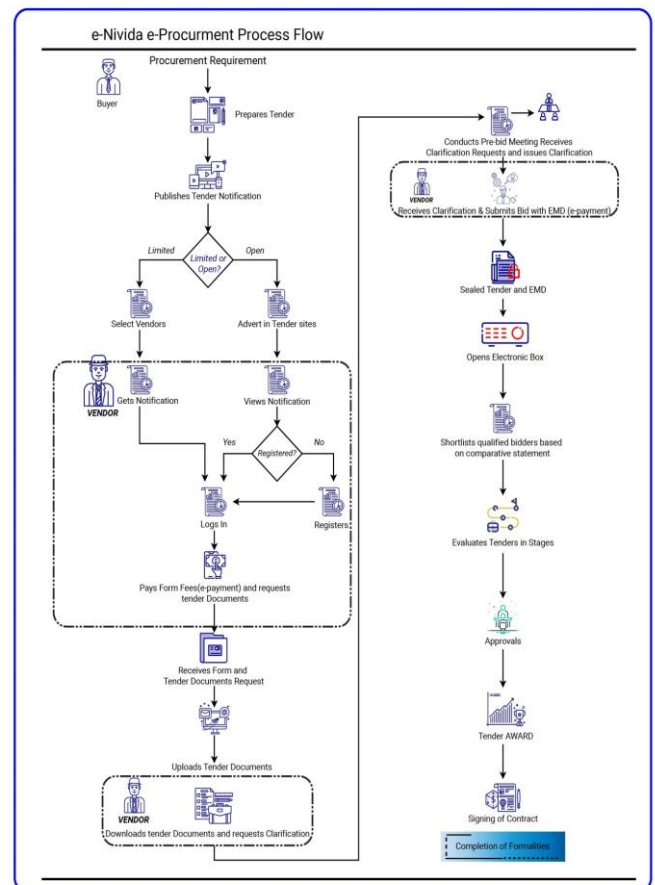


Figure 1. e-Procurement Process Flow

In order to float a tender on portal, there are 3 types of fees collected from each participating vendor involved namely, Tender Document Fee (TDF), Tender Processing Fee (TPF) and Earnest Money Deposit (EMD) [3-6]. Tender Document Fee (TDF) is the fee associated with purchase of tender document same to those of manual tenders. Earnest Money Deposit (EMD) is 2 per cent fee associated as security deposit for tender as same to those of manual tenders. Tender Processing Fee (TPF) is the fee associated with utilizing portal and shared between implementation agency and M/s. ITG.

The working model of e-Tendering system with e-Payment gateway as explained below (refer figure 2 with chronology of events):

1. Tender is floated by Respective Department/ Corporation/Autonomous Body/ Institution, etc.

- with use of UI and Password for tendering portal and Digital Key of Tender Inviting Official.
- For Departments, a specific DDO Code and Major-Minor Heads are collected.
  - For Corporation and Autonomous Body, respective Account Details for TDF and EMD are collected.
2. Bidders participate in tenders floated on portal and will remit TDF, TPF and EMD through online Payment Gateway through following four modes of payment:
    - Internet Payment Gateway: Any Bank Visa/Master Credit Card/Debit Card can be used for the payment process.
    - Direct Pay/Internet Banking: Payment can be made through the Internet Banking of Any Bank.
    - NEFT/RTGS (National Electronic Fund Transfer/Real Time Gross Settlement): Bidder requires downloading NEFT/RTGS Challan and making payment to dynamically generated Account No. through any of the Bank.
    - OTC (Over the Counter): Bidder requires to download OTC Challan and make payment to dynamically generated Serial No. through any of the Authorized Axis Bank Limited.
  3. In order to accomplish the above, M/s. ITG has enabled e-Payment through Axis Bank Ltd. with three Accounts for TPF, TDF and EMD.
  4. After opening of tender, the TDF of all the Bidders, for Department it will automatically be deposited to Govt. Treasury by way of e-Challans on respective major-minor heads and for Corporations/ Autonomous Bodies, etc. will be transferred to respective Accounts.

5. After opening of tender, the TDF of all the Bidders, for Corporations/ Autonomous Bodies, etc. will be transferred to respective Accounts.
6. The Departments/ Corporations/ Autonomous Bodies, etc. should identify successful bidder.
7. After receiving instructions to M/s. ITG from Tender Inviting Officials of Departments through e-Tendering Portal, the EMD of the Successful Bidders, for Department will be deposited to Govt. Treasury by way of e-Challans on respective major-minor heads.
8. After receiving instructions to M/s. ITG from Tender Inviting Officials of Corporations/ Autonomous Bodies, etc. through e-Tendering Portal, the EMD of the Successful Bidders, for Corporations/ Autonomous Bodies, etc. will be transferred to respective Accounts.
9. The Departments/ Corporations/ Autonomous Bodies, etc. should immediately initiate the refund of EMD after opening of the tender and after identifying successful bidder. The EMD of the unsuccessful Bidders would be deposited into their respective bank Accounts via NEFT/RTGS mode after receiving Refund Report by M/s. ITG generated using Digital Signature and User Id of Portal by Tender Inviting Officials of Departments/Corporations/ Autonomous Bodies, etc. Bidders are required to furnish bank Account details on portal for Refund as detailed in portal.
10. M/s. ITG processes Bills of TPF with e-Tendering Agency by retaining its share.

#### IV. OBJECTIVE OF THE PROJECT

The objective of the study is to provide a comprehensive review of implemented e-Tendering System in comparison to the conventional envelop-Box (manual) method. Particularly, the study has the following sub-objectives:

1. Comparative analysis of pre-deployment and post deployment scenarios with the launch of e-Tendering System.
2. Capture information that will be able to highlight the day-to-day problems faced by the System Users.
3. To analyze the best practices that can be followed in improving its rollout of e-Tendering System.

The result of this study would be valuable to Department Users of Government Organization and Vendors/ Contractors in improving and following best practices in rollout of e-Tendering System.

#### V. RESEARCH METHODOLOGY

The purpose of the study is to assess the impact of implementation of e-Tendering System (e-Nivida) to Department Users of Government Organization and Vendors/Contractors. It provides a detailed description of the research approach adopted in the study.

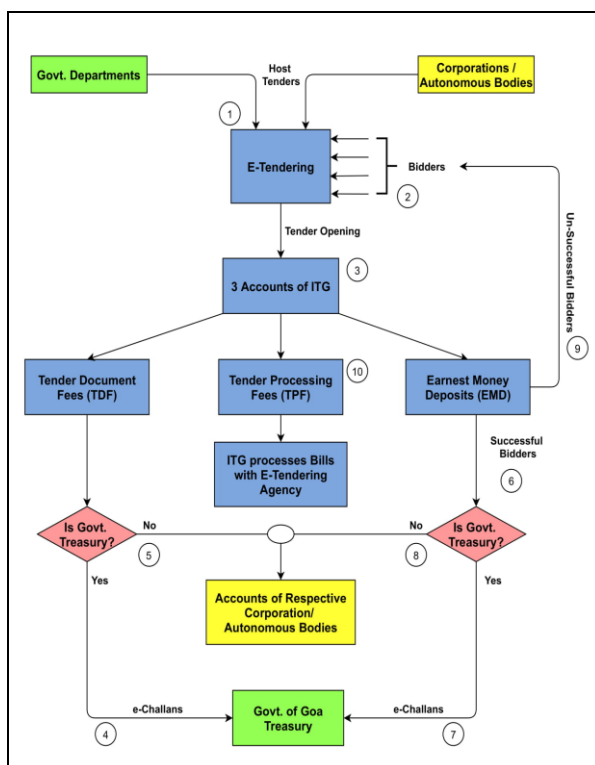


Figure 2. Working Model of e-Tendering System

### A. Population of the Study

The population of the study is comprised of all Government Department Users and Vendors/Contractors across Goa involved in operating e-Tendering System (e-Nivida). Furthermore, ITG key Officials also form part of the population of the study.

### B. Research Design

The study adopted both descriptive and exploratory design. Methods like Relative Importance Index, Weighted Average Rank and Chi-Square test were used for analysis of the responses.

### C. Method of Data Analysis

The study adopts both descriptive and statistical analysis to draw the inferences. Primary data collected through online Google form. The questionnaire had both open-ended questions to enable guide the respondent through filling of the questionnaire as well as probe them for more information. The questionnaire was divided into five sections such as Background Information (Collected demographic details of respondents), Feature analysis of Manual tendering with e-Tendering: Vendor/Contractor (section based on the comparison of Manual and e-Tendering at Vendor/Contractor side), Feature Analysis between Manual Tendering and e-Tendering: Department Users (section based on the comparison of Manual and e-tendering at Department side), Problems faced by the Users using e-Tendering( section collected information about difficulties faced by both Vendor/Contractor side and Department side), Best Practices(Collected preferences of tendering from both Vendor/Contractor side and Department side).

Collected responses were analyzed using few statistical approaches as given below:

1) *Weighted Average Ranking Method*: Ranked questions calculate the average ranking for each answer choice so you can determine which answer choice was most preferred overall. The answer choice with the largest average ranking is the most preferred choice. The average ranking is calculated as follows, where  $w$  is the weight of ranked position,  $x$  is the response count for answer choice. Below given is the formula to calculate Weighted Average Rank;

$$\frac{x_1w_1 + x_2w_2 + x_3w_3 + \dots + x_nw_n}{total} \quad (1)$$

We apply weights to ensure that when the data is presented on a chart, it's clear which answer choice is most preferred [13].

2) *Relative Importance Index method*: Relative index analysis was selected in this study to rank the criteria according to their relative importance. The following formula is used to determine the relative index

$$RI = \sum_{i=1}^n \frac{w}{A \times N} \quad (2)$$

where  $w$  is the weighting as assigned by each respondent on a scale of one to five with one implying the least and five the highest.  $A$  is the highest weight and  $N$  is the total number of the sample. Based on the ranking ( $R$ ) of relative indices ( $RI$ ), the weighted average for the two groups will be determined [14].

3) *Chi-Square Method*: A chi-squared test ( $\chi^2$ ) is a statistical hypothesis test that is valid to perform when the test statistic is chi-squared distributed under the null hypothesis. In the standard applications of this test, the observations are classified into mutually exclusive classes. If the null hypothesis that there are no differences between the classes in the population is true, the test statistic computed from the observations follows a  $\chi^2$  frequency distribution. The purpose of the test is to evaluate how likely the observed frequencies would be assuming the null hypothesis is true [15].

4) *Graphical form of representation*: Graphical representation refers to the use of charts and graphs to visually display, analyze, interpret numerical data, functions and other qualitative structures. [16].

## VI. RESULTS & ANALYSIS

This section presents analysis and findings of the study as set out in the research methodology in line with the objectives of the study.

### A. Demographic Analysis

The study initially sought to ascertain the general information on the respondents involved in the study with regards to the age group, location, email, registration with e-Tendering and User Type. To study our objective, we have carried out online survey through Google form consisting of few questionnaires for Government Departments and for Vendors/Contractor who undergoes the process of Tendering. Below given table 4.1 gives more detailed of respondent and also, most of the collected respondent are of 30-40 age group.

Table 1. Age wise distribution of the Respondents

Age Group in years	Total Count in nos.	Percentage
20-30	8	22.85
30-40	15	42.85
40-50	11	31.42
50-60	01	2.85
60 and above	0	0
<i>Source: Primary Data</i>		

In this survey, as depicted in pie chart (refer fig 4.1), majority of respondent are from North Goa, 23% from south Goa and few from outside the Goa.

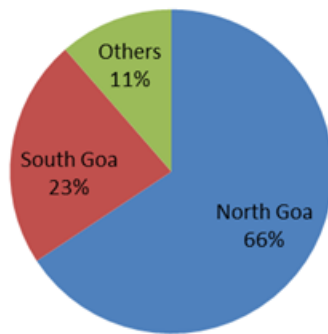


Figure 3. Pie chart depicting the area of respondent

1) *Objective I: To study the relationship between the Demographic Factors i.e. 'sector belongs to' and 'mode on tendering respondent preferred'*

We applied Chi-Square test in order to examine the Hypothesis to study the relationship between the Demographic Factor i.e., sector belongs to i.e. Government, Vendors, Contractors and mode of tendering preferred.

Hypothesis considered for analysis:

- H0: There is no significant association between sector the respondent belongs to and mode of tendering they preferred
- H1: There is significant association between sector the respondent belongs to and mode of tendering they preferred

Table 2: Observed Values based on respondent sector belongs to and preference of Tendering mode

Sector	Tendering mode		Total
	Manual	e-Tendering	
Government Department	2	15	17
Vendors/Contractors	0	18	18
	2	33	70

After applying Chi-square test, the summarized table is presented below.

Table 3: Observed Values based on respondent sector belongs to and preference of Tendering mode

Calculated Chi-Square Value	Degrees of Freedom	Level of Significance	Chi-Square Table Value	Decision
21.99	1	0.05	3.841	Accept H <sub>1</sub> hypothesis

From the above table, it was observed that the Calculated Chi-Square Value (21.99) was more than the Chi-Square Table Value (3.841), thus it is accepted that the H1 Hypothesis at 5% level of Significance i.e., there is significant relationship between sector belongs to and mode of Tendering.

2) *Objective II: Comparative analysis of pre-deployment and post deployment scenarios with the launch of e-Tendering Solution*

In order to understand the impact of e-Tendering System versus manual Tendering method, both Department Users and Vendors/Contractors were asked with similar sets of questions. To study the difference between scenario of pre-deployment and post-deployment of e-Tendering solution, Relative Importance Index (RII) method was used. Using RII, calculated the importance index between e-Tendering System and manual Tendering. Following factors with respect to Government sector for manual tendering as well as e-Tendering and its RII index

Table 4: Comparison between Manual tendering and e-Tendering factor with respect to RII index

Sr. No.	Factors with respect to Government sector	Mode of Tendering	RII	Importance Level
1	Publishing e-tendering notification	Manual	0.48	High
		e-tendering	0.76	
2	Preparation of Blank Tender Document	Manual	0.51	High
		e-tendering	0.8	
3	Opening tender document	Manual	0.53	High
		e-tendering	0.79	
4	Vendor Request for tender documents and issuing the tender documents	Manual	0.46	High
		e-tendering	0.86	
5	Submission of Tender Document	Manual	0.49	High
		e-tendering	0.89	
6	Processing of Tender	Manual	0.48	High
		e-tendering	0.9	
7	Consistent and Sustainable Vendor Development	Manual	0.43	High
		e-tendering	0.81	
8	Data Security	Manual	0.49	High
		e-tendering	0.83	

From above calculated RII for different factors of manual and e-Tendering for both Department Users and Vendors/Contractors, it was observed that the online e-Tendering System have high RII index as compared to manual tendering in both Department Users and Vendors/Contractors as well. For every aspect of online e-Tendering as received strong positive reply from the respondents. From the above estimated RII for every factor with respect to manual tendering i.e., pre-deployment of e-Tendering and post deployment of e-Tendering was studied, it has observed in both Department Users and Vendors/Contractors as well that respondent has chosen online way of tendering instead of manual tendering.

3) *Objective II: Capture information that will be able to highlight the day to day problems faced with System Users*

To understand different features of e-Tendering that respondent has liked the most. Questionnaire had designed to collect responses of user based on the features of e-Tendering.

a) Depending on the responses collected from respondent, had analyzed the features and also ranked them based on its highly preferred features for Department Users using Weighted Average Rank method.

Table 5: Weighted Average Score & Rank for preferred features for Users of e-Tendering

Sr. No.	Factors	WAS	Rank
1	Cost & Time saving in publishing huge tender advertisement in newspapers	3.6	3
2	Better staff Performance of Government Staff	3.51	6
3	Improved business opportunity	3.6	4
4	Improve IT facilities of Government office	3.62	1
5	Easy availability of required MIS reports	3.46	9
6	Improved competitiveness, more participation	3.57	7
7	Time saving in Tender Scrutiny, auto generation of comparative Statements, et	3.57	8
8	Smart Governance: Fair trade practices as business in conducted online under robust security	3.63	2
9	Greater accounting and tracking mechanisms as entire transaction is online	3.6	5

From above table 4.12, it could be seen the features such as “Improve IT facilities of Government office” and “Smart Governance: Fair trade practices as business in conducted online under robust security” was the most liked feature among the rest.

b) Similarly, to understand the difficulties faced by the Vendors/Contractors & Department Users using e-Tendering. We had examined certain problems and requested user to give their feedback. Based on collected feedback, responses were analysed by using Weighted Average Score and had ranked them accordingly.

Table 6: Weighted Average Score & Rank for difficulties faced by Users of e-Tendering

Sr. No.	Factors	WAS	Rank
1	High operating cost (Such as Laptop, Internet Service, Digital Signatures, etc)	2.89	5
2	Lack of local professional knowledge and IT Expert to Operate e-Tendering portal	2.46	8
3	Vulnerable to Cyber Attacks like Hacking, virus, worms, trojan, Denial of Service	2.89	9
4	Risk of leakage of restricted information	2.66	8
5	Authenticating documents and Price Bids using Digital Signature Certificates	3.60	1
6	Software configuration and system compatibility	2.77	7
7	More Investment in keeping pace with the changing technology	2.97	3
8	High initial outlay on e-Tendering systems	2.94	4
9	Concern of Confidentiality of Technical and Price bids submitted	3.09	2

From above table 4.13, it could be seen that difficulties such as “Authenticating documents and Price Bids using Digital Signature Certificates” and “Concern of Confidentiality of Technical and Price bids submitted” was the most challenging amongst the rest.

c) *Objective III: To analyze the best practices that can be followed in improving its rollout of e-Tendering Solution*

Finally, all Users (Vendor/Contractor and Department side) were inquired about their preferences on e-Tendering system as well as manual Tendering mode i.e. to know more depth about their likeliness (refer Section E under Appendix-I).

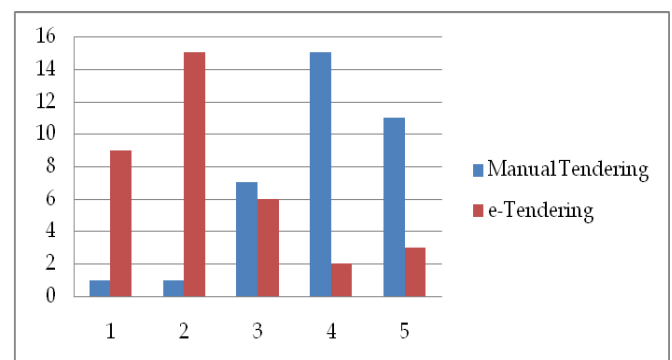


Figure 4: Bar Graph for Rating between manual Tendering and e-Tendering System

Rating ranges from 1 to 5 wherein ‘1’ indicates highest liking to that of ‘5’ for lowest liking of type of tendering mode. It was observed from below chart, that maximum respondent has chosen e-Tendering over the manual tendering.

## VII. CONSLUSION

Based on the conducted study on the e-tendering solution initiated by the Government of Goa, it has observed that e-tendering is preferred over manual tendering by estimating RII on different factors that affect tendering procedure. Secondly, it has also been examined the various features of e-Tendering that influenced the respondent to favour new Government initiative. It was observed that fair means of tendering, cost and time saving, easy way of communication with application at any time through online mode has made convenient for user to adapt for e-Tendering. Similarly, paper has tried to inquire about the problems faced by user using e-tendering. Lack of knowledge of technology, poor connectivity of internet, confidentiality and lack of authentications are some of the factors which respondent has shown their concern towards e-Tendering.

## VIII. ACKNOWLEDGMENT

We would like to acknowledge all respondent from IT professional of various firm for providing their valuable responses.

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