

# The Adoption of e-Procurement and its impact on the Procurement Performance of Selected Telecommunication Companies in Rwanda

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## Abstract

Adoption of newer technology & implementing the systems has become the need of time in the midst of competitive environment. Effectiveness, efficiency, innovation are related to the speed of customer service, which is demanded in service industry, like telecommunication industry. Supply Chain Management (SCM) contributes in the performance of both buyers as well as suppliers. Adoption of e-Procurement contributes in improved customer services, customer satisfaction by improving employee contribution through procurement performance. This study highlights the factors affecting the adoption of e-Procurement, & how this e-Procurement affected the procurement performance of New Artel, Rwanda. The study includes employees of New Artel, Rwanda, data collected using structured questionnaire was analysed statistically using SPSS 17, shows positive benefits of adoption of e-Procurement on procurement performance of New Artel, Rwanda.

**Keywords:** e-Procurement, TAM, Performance, Telecommunication, Supply Chain Management

## 1. Introduction:

In the increasing competition, to sustain and to compete against the potential competitors, organizations need to excel at their processes and improve upon their efficiencies through technological adoption. To increase the business volume the consistency in the sales is dependent upon large base of satisfied customers, which in turn allows organizations to deliver better value to internal as well as external customers. Suppliers of resources or services are the better source of knowledge and support for business development hence integration with suppliers is another way out for the business organizations to develop strategic advantage. The better the relationships with the suppliers allows constant supply as well as availability of the required resource. Traditional procurement process was time consuming and involving huge paper work and manpower. Incorporation of ICT for electronic procurement will increase the speed of business transactions as well as improved transparency will allow the development of trust with the suppliers. Adoption of e-Procurement is proving to be benefiting to the organizations. Companies that have adopted the e-Procurement technology found to save 425 in purchasing transactions costs due to simplification of the process as well as reduction in purchasing cycle time, which in turn increases the flexibility and provides more up-to-date information at the time of placing of purchasing orders. (Hawking et al, 2004). e-procurement technological application which has a higher profitability and higher cost savings for the organizations. e-procurement has an increasingly important role in Business-to-Business (B2B) commerce. Use of e-procurement helps to lower the cost of procurement and also provides a platform for better coordination between different suppliers, quicker transaction time and improved process efficiency (Samaniego et al., 2006; Wu et al., 2007). Despite the continued discussion on benefits of e-procurement, there has been a lack of research and development in term of its adoption. Some of the reasons for this may be due to problems associated with people within the organizations, who show the lack of ability to adopt the system. The overhead costs associated with implementation of this technology as well as the problems associated with persuading suppliers to implement e-procurement at their side is showing a poor adoption of the system (Talluri et al., 2006; Puschmann and Alt, 2005). If the e-procurement function implementation is to be done with a strategic approach, it will be vital to consider how it can be strategically, operationally and technologically integrated. Organizations which are operating in the new economy required to align their selves internally with the demands that the ever changing competitive environment imposes the strategic behavior of organizations (Phillips 2003).

## 1.1 Problem Statement:

In the midst of competition, speed & accuracy of service delivery is the need of time. Traditional procurement involves huge paper work as well as it was time consuming and many times error prone operations. e-Procurement improves speed as well integration of suppliers relationships through transparency in procurement process (Carayannis and Popescu 2005). To improve the procurement efficiencies, there are six different forms of e-procurement as e-sourcing, e-tendering, e-informing, e-reverse auctions, e-MRO and web-based enterprise resource planning (Knudsen 2003). If all these activities or any one of them are used for placing orders with suppliers, it consumes a huge time. e-procurement can have a major impact in making the procurement process simpler and more efficient, the limitation adoption of newer technologies by the employees makes the usefulness of the process neglected and still believe in procuring the required materials through traditional methods. The objective of this research is to find out why employees are not adopting the e-Procurement process to a full extent in New Artel and how the e-Procurement has improved their performance through process of procurement in the extent they implemented in New Artel.

## 1.2 Concept towards adoption of e-Procurement based on perceived benefits and risks:

The e-Procurement system adoption at employees as well as the organizational level will depend upon the perceived benefits and risks associated with e-Procurement system.

### 1.2.1 Benefits of Adoption of e-Procurement:

- 1) **Cost Saving:** various heads under which organizations can get advantages of cost reduction even up to 65% using e-Procurement like labor costs, increased in purchase volume resulting in better price from supplier and through better negotiation with suppliers (Davila et al. 2003)
- 2) **Process efficiency:** If the organization provides tools like spend analysis, transaction analysis, market analysis, and other features relating to strategic activities, a proper utilization of these tools will provide a better improvement in e-Procurement process
- 3) **Better information flow between a firm and Suppliers:** With the help of existing computer systems and Internet network, allows the firm and suppliers to share information in short time which allows both the parties to respond to each other immediately (Quayle, T. 2005).
- 4) **Reduced maverick spending:** e-Procurement allows organizations to reduce maverick spending by making use of internet by reducing the insecurity and uncertainty while purchasing required resources from those suppliers with whom organization do not have any formal relationships.
- 5) **Streamlined process:** e-Procurement allows organizations to streamline the procurement process as internet medium allows firms to make a direct contact with their suppliers eliminating the middlemen, thus significant revenue generation for both the parties (Ross, A.D. 2007).
- 6) **Better inventory level:** e-Procurement process will have a system check of placed orders hence there will be less chances of duplication or orders, wrong orders or wrong specifications of order or even a controlled stock maintenance system will allow reducing the stock outs.
- 7) **Better services to customers:** Not only suppliers but also the customers can be connected with the organizations hence better services can be provided to their customers.
- 8) **Improved speed of services to customers:** with the help of internet, exchange of information between the firm and their customers will be in short time and hence supply speed can be improved.

### 1.2.2 Risks Associated with Adoption of e-Procurement:

- 1) **Internal business risks:** to have a better e-Procurement system work in place, it not only requires to have the required system requirement but it also requires to be integrated with the existing infrastructure information (Talluri, S. 2006)
- 2) **External business risks:** Like the internal integration, firms require to integrate with external customers as well as suppliers, who also need to have investment in development of required system. Since there will be a great amount of exchange of information, there always exists a risk of leak of information (Davila et al. 2003).
- 3) **Technology risks:** e-Procurement system requires to have clear and open standards like coding, technical, and process specifications that can facilitate inter-organization e-procurement technologies or else it may limit and slower the e-Procurement process (Davila et al. 2003).
- 4) **E-procurement process risks:** while using e-Procurement system, organizations also need to

consider the security and safety risk associated with internet connectivity. A better security system installed will allow organizations to have an uninterrupted procurement (Samaniego et al. 2006).

## 2. Literature Review:

In this chapter various factors affecting the adoption of e-Procurement and how e-Procurement helped organizations improve their performance as researched by other authors will be discussed.

e-Procurement is a process of procurement of required resources or services by making use of ICT. To make the e-Procurement more effective & efficient, integration of financial, transportation, legal, and communication infrastructure is important (Ohmae, 2000). Other than these four factors, training and development of the personnel handling e-Procurement activities, security concerns, readiness of the society to utilize the information and communication technologies (ICT), and the impact what this wireless technologies can produce should also be considered. Traditionally, the purchasing was a function of having a transaction between a buyer and a seller only. In modern purchasing function, it is required to be executed on a wider level. In today's modern purchasing different procuring partners are interconnected with each other and helping them come up to the desired outcome (Shah, 2002). e-Procurement functions at a multi-level and is connected to auxiliary industries and distribution channels (Emel, Taskin, & Deniz, 2004). Stanton and Stanton (2002) have developed a model of internet procurement to show the link between personality traits & predisposition towards innovativeness, and adoption of e-Procurement function. E-Procurement produces different benefits for the organizations like savings on transactional costs and buying cost, time required for processing of the information exchange and control (Croom 2006). E-procurement has a higher potential for cost savings and improving business transactions than online retailing or ERP systems, and will allow the organizations to permanently and fundamentally redefine the best way, how they can do business in the future (Neef 2010). The B2B e-commerce has a better & strong option for growth as information and communications technologies (ICTs) continue to make organizations' interactions with their suppliers and customers (Mullaney, 2003; European Commission, 2005 a). The author discussed a case of Australia that in 2004-2005 the proportion of Australian businesses placing electronic orders via internet increased to 33%, growing by 2% from 2003-2004 (31%) (ABS 2006). Activities such as electronic procurement have been identified as a key area where the information system (IS) enabled innovations are likely to produce significant benefits to the organizations (European Commission, 2005b 2006, Laub, 2001). Jeyaraj et al. (2006) found that if the top management supports the e-Procurement process through technological adoption; can be one of the best promoters of adoption of Information System innovations by the entire organization. Top management can stimulate the change by communicating and reinforcing the use and benefits of e-Procurement. Jeyaraj et al. (2006) has identified as size of the organization is one of the best predictors of organization towards the adoption of Information System innovations. E-Business has drastically altered the ways in which firms interact with their suppliers (Phillips, 2003). The development of information technology (IT) has further continued improvements in internet connectivity, which provides an opportunity to make procurement of resources and services more transparent and efficient (Carayannis and Popeau, 2005). Over the last decade, e-procurement has emerged as an important component in the Supply Chain Management field. At the most basic level, e-procurement has changed the ways how the businesses purchase goods and services, while at the strategic level it is projected that e-procurement will free purchasing resources from transaction processes to strategic sourcing activities (Rajkumar 2001). Many commercial organizations, different business cases for e-procurement have predicated as being able to deliver a variety of benefits to the organizations such as: lowering prices of resources, lowering transactional costs, improved compliance and speedier processing and delivery time. In one of the empirical studies, Carr and Pearson (1999) provided that strategic purchasing always has a positive impact on organizational financial performance. All those organizations that make a long-term plan and consider purchasing as a strategic decision are also likely to build long-term cooperative relationships with their important key suppliers (Carr and Pearson 1999). e-Commerce tools have provided the opportunity to the organizations to enhance two elements of the procurement process, that is communication and transaction aspects (Oslombekov et al. 2002). Many other surveys have confirmed that e-commerce tools and IT solutions have influenced the procurement-related processes. The key roles in business relations provide two-way communication, cross-functional teams and larger purchasing ability. These factors were used and analyzed by Humphreys et al. (2004) who highlighted that supplier development is associated with improvement in supplier-buyer performance. Carr and Pearson (1999), reported that there are various connections between supplier-buyer relationship and firm's financial performance. (Phillips\_Piotrowicz 2006, e-Procurement & Performance)

### 3. Research Objectives:

#### 3.1 General Objective

To assess the adoption of e-procurement and its impact on the procurement performance of New Artel, Rwanda

#### 3.2 Specific Objectives:

1. To study the adoption of e-procurement practices in New Artel, Rwanda.
2. To evaluate the influence of individual user factors on ICT adoption in Procurement processes (Article-Effects of ICT Adoption)
3. To Study the challenges perceived by the employees towards adoption of e-Procurement (Article-Effects of ICT Adoption)
4. To study the role of e-Procurement in procurement performance of New Artel, Rwanda

#### 4. Hypothesis:

**H<sub>1</sub>:** Behavioral intentions have a positive effect on adoption of e-procurement process in New Artel, Rwanda.

**H<sub>2</sub>:** Perceived benefits of e-Procurement system have a positive effect on adoption of e-procurement process in New Artel, Rwanda.

**H<sub>3</sub>:** Perceived risks of e-Procurement system have a negative effect on adoption of e-procurement process in New Artel, Rwanda.

#### 5. Significance of the study:

The study will allow the organisations to get clear insights on factors that will be affecting the adoption of e-Procurement by the employees. The outcome of this study will also be useful for the further research on e-Procurement process to get further knowledge on the related factors. The study will be also helpful to the research scholars who are interested in conducting research in e- procurement and related areas as a source of information. The study will also be helpful for the policy makers on e- Procurement in organizations both for private as well as public sectors, which will help to redefine the procurement department for efficient performance by applying e- Procurement.

#### 6. Methodology:

A descriptive research was conducted using self administered questionnaire on the employees of New Artel, Rwanda. Since the total number of employees working in New Artel, Rwanda is very limited hence the researcher employed purposive sampling technique to include all the employees in the study. SPSS 17 software was used to analyse the obtained data, various tools employed were like Factors Analysis, correlation, ANOVA, t Test etc.

#### 6.1 Hypothesis testing:

**6.1.1 H<sub>1</sub>:** Behavioral intentions have a positive effect on adoption of e-procurement process in Telecommunication Companies, Rwanda.

In the testing of first hypothesis, the researcher used the components of TAM model that can affect the behavioral intention of the employees towards adoption of e-Procurement. The components of TAM model used for the study are as shown in following figure 1.

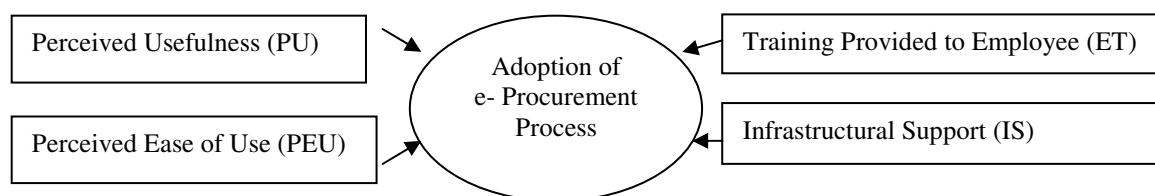


Figure 1. Research Model for TAM

Technology Adoption Model (TAM) defines different factors (components) that influence the adoption of any new technology in the any working organization. In this study the researcher used 4 factors of TAM i.e. Perceived Usefulness (PU), Perceived Ease of Use (PEU) ( which are individual factors of employees), & Training Provided to Employees (ET), Infrastructural Support (IS) (which are organizational factors).

Perceived Usefulness (PU), is the degree at which, the technology can help the employees to improve upon their

own performance, Perceived Ease of Use (PEU), is the advantage to the employee how easily & efficiently the employee can make use of the technology to perform better, Training Provided to Employees (ET) is the organizational factors, by the organization provides the training to make employees competent to use the new technology & Infrastructural Support (IS) to apply knowledge to use technology so that above both employee factors can be achieved, and both employees as well as the organization both can achieve their strategic goals.

#### 6.1.1.1. Factor Analysis:

The statements included in the study under the four factors of the study obtained values more than 0.6 as can be seen from the table. The factor loading values obtained for the statements under Perceived Usage (PU) were Improved Performance (0.786), Effectiveness of Use (0.74) & Improved Speed of Working (0.768) & Convenience of Use (0.746). The factor loading values obtained for the statements under Perceived Ease of Use (PEU) were Simplicity of Operation (0.788), Easy to Understand (0.754) & for Easy to Use (0.728).

Table 1. Factors under study

Factors under Study	No. of Items	Mean	Min	Max	Cronbach's Alpha
Perceived Usefulness	150	2.825	1.58	3.834	0.792
Perceived Ease of Use		2.934	1.48	3.864	0.785
Training Provided to Employee (ET)		2.806	1.78	4.112	0.776
Infrastructure Support		2.944	1.64	3.986	0.793

The data obtained from the respondents on 4 factors under study were analysed using factor analysis method. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy indicates the normality of the collected data. Kaiser recommends accepting values greater than 0.5, values in between 0.5 to 0.7 are mediocre, 0.7 to 0.8 are good, 0.8 to 0.9 are great & above 0.9 is superb. All the factors included in the study scored more than 0.5 of KMO value, hence all the factors included in the study. Eigen values obtained for Perceived Usage was (3.328) with 79.453% of variance, for PEU (3.364 & 70.442), ET (3.016 & 72.826) & for IS was (3.146 & 69.885)

The factor loading values obtained for the statements under Training Provided to Employee (ET) are Easy to Learn (0.811), Easy to Apply (0.783) & for Training Manual Provided was (0.764). The factor loading values obtained for the statements under Infrastructure Support (IS) were System Up-gradation (0.785), for Support on Technical Difficulties (0.715) and on Time for Learning and Understanding was (0.652). All the factors under study have shown a factor loading more than 0.6, hence all the factors included in the study are found to be important and considered by the respondents as factors that can affect the adoption of e-Procurement.

#### 6.1.1.2 Correlation Analysis of Variables:

Pearson correlations analysis was done with all the factors under study to find out, if there is any correlation between the variables under study and to identify the relationship between the dependent variables and the outcome of the study. The average score of the statements under the factors of study was used for correlation analysis and regression analysis. In this study the highest correlation coefficient value obtained was 0.572 which is less than 0.8, there is no multi-co-linearity problem in this research.

#### 6.1.1.3 Multiple Regression Analysis

Multiple Regression analysis was performed to test the hypothesis relationship between independent and dependent variables. Four hypotheses were proposed and results were enumerated in Table 4. The F-statistics produced (F = 31.714) was significant at 5 per cent level (Sig. F<0.05), thus confirming the fitness for the model.

Therefore, there is a statistically significant relationship between the four factors (Perceived Usefulness, Perceived Ease of Use, Training Provided to Employee and Infrastructure Support) and adoption of e-procurement process in Telecommunication Companies, Rwanda.

Table 2: Factor Analysis on variables under study

Factors under Study	PU	PEU	BI	ATD
<b>Perceived Usefulness (PU)</b>				
Improved Performance	0.786			
Effectiveness of Use (time saving)	0.774			
Improved Speed of Working	0.768			
Convenience of Use	0.746			
<b>Perceived Ease of Use (PEU)</b>				
Simplicity of Operation		0.788		
Easy to Understand		0.754		
Easy to Use		0.728		
<b>Training Provided to Employee (ET)</b>				
Easy to Learn			0.811	
Easy to Apply			0.783	
Training Manual Provided			0.764	
Handful of Practical Experience			0.723	
<b>Infrastructural Support (IS)</b>				
System Up-gradation				0.785
Secured data Connectivity				0.738
Support on Technical Difficulties				0.715
Time for Learning & Understanding				0.652
Kaiser-Meyer-Olkin (KMO)	0.794	0.748	0.738	0.766
Eigenvalues	3.328	3.364	3.016	3.146
Percentage of Variance Explained	79.453	70.442	72.826	69.885
Cumulative Percentage	79.453	70.442	72.826	69.885

Table No. 3: Model Summary

R	R Square	Adjusted R Square	SE	F
0.771	0.5764	0.578	5.2644	31.714
F @ (4, 95) = 31.714, is Significant				

The coefficient of determination  $R^2$  was 57.64 per cent. Thus, the four factors can significantly account for 57.64 per cent towards adoption of e-Procurement in Rwanda. (Table 3.)

Table No. 4: Coefficients

Factors under Study	UnStandardized Coefficient		Standardized Coefficient	t	Sig.
	b	Std. Error	Beta ( $\beta$ )		
Perceived Usefulness	1.350	0.154	0.286	5.501	0.000*
Perceived Ease of Use	0.838	0.364	0.332	(-) 1.697	0.0240
Employee Training	(-) 0.762	0.308	(-) 0.250	2.574	0.000*
Infrastructure Support	1.435	0.233	0.275	3.242	0.016

Table 4 shows the coefficient values for the data obtained for testing hypothesis no. 1

**6.1.2 H2:** Perceived benefits of e-Procurement system have a positive effect on adoption of e-procurement process in Telecommunication Companies, Rwanda. The data collected on 8 factors related to perceived benefits of adoption of e-Procurement system, shows a strong Cronbach's value for reliability of the data as in table 5.

Table No. 5: Correlation R Value & Reliability

Perceived Benefits	Cronbach's alpha	No. of Items	R	R <sup>2</sup>	SE
	0.766	8	.711 <sup>a</sup>	0.505	.70554

The table 5 gives the R values for assessing the overall fit of the model. The coefficients of determination R<sup>2</sup> obtained is 50.5%, thus showing factors related to perceived benefits included in the study significantly account for 50.5% of positive effect towards adoption of e-Procurement system in telecommunication companies in Rwanda

Table No. 6: ANOVA

ANOVA <sup>b</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.515	8	1.939	3.896	.001 <sup>a</sup>
	Residual	43.805	88	.498		
	Total	59.320	96			
a. Predictors: (Constant), SS, BIF, CS, BCS, RMS, BIL, SP, PE						
b. Dependent Variable: Perceived Benefits						

Table 6 of ANOVA indicates the F value as 3.896 at 5% level of significance and the corresponding *p* value is 0.001 confirms the stated hypothesis is proved.

Table 7. Coefficients

Coefficients <sup>a</sup>								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	3.223	.617		5.224	.000	1.997	4.449
	CS	-.003	.090	-.004	-.037	.971	-.182	.175
	PE	.372	.105	.414	3.557	.001	.164	.580
	BIF	.140	.115	.143	1.224	.224	-.088	.369
	RMS	-.205	.083	-.249	-2.475	.015	-.370	-.040
	SP	-.159	.104	-.169	-1.533	.129	-.365	.047
	BIL	.007	.101	.007	.067	.947	-.194	.207
	BCS	-.010	.097	-.011	-.103	.918	-.203	.183
SS	-.009	.088	-.011	-.106	.916	-.184	.165	
a. Dependent Variable: PercBenfts								

Table 7 shows the coefficient values for the data obtained for testing hypothesis no. 2

**6.1.3 H3:** Perceived risks of e-Procurement system have a negative effect on adoption of procurement process in Telecommunication Companies, Rwanda. e-

Table 8. Model Summary

Model	R	R Square	Std. Error of the Estimate
1	.633 <sup>a</sup>	.4007	.94216

Table 8. of Model Summary gives us the R value for assessing the overall fit of the model. The table 8 shows R2 value as 40.07%, indicating factors related to risk of e-procurement system are only 40.07% related to each other. This model also indicates that there could be some other factors associated with risk may have negative impact on adoption of e-procurement.

Table 9. ANOVA

ANOVA <sup>b</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.211	4	2.553	2.876	.027 <sup>a</sup>
	Residual	81.665	92	.888		
	Total	91.876	96			
a. Predictors: (Constant), ProcRisk, TechRisk, ExBRisk, IBRisk						
b. Dependent Variable: PercevBenfts						

Table 9 of ANOVA, shows the F value obtained is 2.876 & the corresponding p value obtained is 0.027, which is lesser than 0.05 at 5% level of significance, confirms that the stated hypothesis is proved. Factors related to perceived risk included in the study produces negative impact towards adoption of e-procurement system in telecommunication companies in Rwanda.

Table 10. Coefficients

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.193	.409		5.360	.000
	IBRisk	.034	.105	.040	.323	.747
	ExBRisk	.118	.093	.152	1.269	.208
	TechRisk	.202	.101	.226	2.003	.048
	ProcRisk	-.032	.098	-.039	-.331	.741
a. Dependent Variable: PercevBenfts						

Table 10 shows the coefficient values for the data obtained for testing hypothesis no. 3

## 7. Discussion and Finding

The data obtained through structured questionnaire from the respondents included in the study & after analysis using SPSS 17, all the result shown that all hypotheses included in the study are proved. The factors related to PU, PEOU, ET, IS has a positive effect on behavioral intention towards adoption of e-procurement system. The result obtained from regression analysis conducted between the included dependent and independent variables indicates that all the 4 independent factors (PU, PEOU, ET, IS) found to be most influential factors, explaining the intention towards adoption of e-procurement system.

Where e-procurement system is being found useful, which will positively affect the performance of the employees through time saving; simplicity of technology, easy understanding as well support system for up-gradation, towards the employee's intention to adopt this system will be improved.



## 8. Conclusion

The primary objective of this research was to understand the factors that influence the intention of employees towards adoption of e-procurement system. Technology Adoption Model (TAM) is found to be the most useful in the field of information systems for the adoption of new technologies. This study was conducted to explore and understand the influential factors towards the adoption of e-procurement system. In this research study, four determinants were used from TAM, PU, PEOU, ET, IS have positive effect on intension towards adoption of e-procurement system. In order to improve adoption level at employee's level, the organizations have to work on factors related to perceived risks, which will improve adoption of e-procurement system. A well secured IT system and with a complete training program, infrastructural support system to enhance job performance and improve the quality of output from employees found to affect performance of organization positively.

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