Development of Electronic Government Procurement (e-GP) System for Nigeria Public Sector.

Adebiyi, Ayodele A., Ayo, Charles K. and Adebiyi Marion O.
Department of Computer and Information Sciences, Covenant University, Ota, Nigeria
ariyo_adebiyi@yahoo.com, ckayome@yahoo.com, onlimarion@yahoo.com

Abstract-- **Business-to-business electronic procurement success in business organizations (private sectors) has been a major driving force for government organizations (public sectors) in developed nations to adopt electronic government procurement in order to reduce cost and improve administrative efficiency. E-procurement within the government is recognized to be the main area of government-to-business that needs to be exploited by government of developing nations. In this paper, we examined the drawbacks of existing procurement process in Nigeria with a view to offering an improved approach. A prototype e-GP system was designed and developed to eliminate the associated bottlenecks with existing system and showcase the attendant benefits of the proposed system which can lead to an improved procurement cycle process flow.**
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Index Term-- **Electronic Government Procurement, e-Procurement, Procurement Processes, B2B and G2B.**

1. INTRODUCTION

E-Procurement (electronic procurement, sometimes also known as supplier exchange) is the business-to-business or business-to-consumer or business-to-government purchase and sales of supplies, work and services through the Internet as well as other information and networking systems, such as Electronic Data Interchange and Enterprise Resource Planning [1]. E-procurement can be an invaluable tool for enterprises experiencing difficulties in their supply chain. The benefits of e-procurement have been identified in cost saving, improved efficiency and control, and consequently, these are the three catalysts driving the growth in the e-procurement area. It is also believed that there is more benefit to be gained by the public sector from using e-commerce for sourcing, rather than for transaction management [2, 3].

Electronic procurement is quickly emerging as the model procurement method in both the private and public sectors. With the advent of the Internet, many businesses now sell only via computer technology. It is an excellent way for businesses to cut overhead costs and reach a larger customer base. E-procurement systems allow users to search for products and services from pre-selected suppliers (along with negotiated prices and options), verify product availability, and route approvals according to policy or statute. E-procurement also incorporates an easy-to-use, self-documenting infrastructure which arms a procurement department with valuable data to analyze current sourcing practices, leverage volume discounts with suppliers, and manage compliance. With accurate relevant information at hand, procurement professionals become strategists who can focus on strategic activities such as contract negotiations and supplier compliance. This reduces operating costs and turns the procurement department into a far greater asset to the organization. Electronic Government Procurement (e-GP) is defined as the online application of information technology and infrastructure to the management, processing, evaluation and reporting of government procurement. Government procurement represents 18.42% of the world GDP [4]. It is used by government agencies and other actors of procurement community in conducting all activities of the government procurement process cycle (GPPC) for the acquisition of goods, works, and consultancy services with enhanced efficiency in procurement management.

Over the years, the Nigerian government procurement procedure has been done manually by the process of inviting contractors to bid for projects (i.e. Invitation for Prequalification/Tender) to the selection of successful bidders and then finally project completion. In this procurement procedure, purchase orders are not being processed in a timely fashion and delivery dates are not being met. The failure of Nigeria National carrier, Nigeria Airways is traceable to poor procurement system and the resultant effect is that Nigeria and Nigerians have had to suffer this defect for along time [5]. According to [6] procurement accounts for about 80 per cent of Nigerian government expenditures at all levels. In this wise procurement of goods, works and services are central to daily government activities and as such form the centre point of our economic rating. The traditional systems of procurement in government Ministries, Departments and Agencies (MDAs) through manual modes suffer from various problems such as inordinate delays (approximately 4 to 6 months) in tender/order processing, heavy paper work, multi-level scrutiny that consumes a lot of time, physical threats to bidders, cartel formation by the contractors to suppress competition, human interface at every stage, inadequate transparency, discretionary treatment in the entire tender process, etc. Sometimes, contractors claim that they are even unaware of Federal Government Procurement notices or Tenders that are advertised in the national dailies or Federal Tenders Journal.

Nigeria's public procurement system is also reportedly prone to corrupt practices, with as many as 45% of companies expecting to give gifts to public officials in order to secure a government contract. Analysis have shown that most contracts awarded by the government or its officials are awarded

through corrupt means. Some of these contracts are awarded to contractors who have agreed to give the procurement official a certain percentage of the original contract amount. This encourages contractors to use substandard goods, render poor services or sometimes project abandonment [7].

The above drawbacks of procurement system in Nigeria formed the bases for the following research questions:

- Can the award of contracts of government properties be made transparent for easy monitoring and control?
- Can a system be developed to ensure a fair selection of bidders for government projects?
- Can a system be developed to ensure cost and time reduction in the procurement procedure?
- Can a system be developed to ensure that the process of procurement is as efficient and reliable as possible?
- Can the procurement process be simplified using an e-Government Procurement (e-GP) Portal or System?

The main objectives of this paper is automate and streamline procurement process in order to: reduce the time and cost of doing business for both vendors and government; realize better value for money spent through increased competition and the prevention of cartel formation; standardize the procurement processes across government departments/agencies; allow equal opportunity to all vendors; bring transparency and ultimately reduce corruption.

The rest of the paper is organized as follows. Section 2 highlighted problems of procurement system in Nigeria. Section 3 presents a review of related works. Section 4 describes the research methodology used and the e-GP system developed. The paper is concluded in section 5.

2. PROBLEMS OF PROCUREMENT SYSTEM IN NIGERIA

According to [8] the following are the problems with the procurement system in Nigeria.

- Absence of economic cost/benefit analysis of projects as a way of justifying the need for the project.
- Lack of competition and transparency in project procurement leading to high cost of projects. Where advertisement was made, the applicable rules were tilted in favour of a predetermined winner.
- Projects were not prioritized and harmonized. Consequently, several Ministries were pursuing similar programs simultaneously without coordination.
- Unjustifiable gap existed between budget and actual released leading to underfunding, delayed completion, price escalation and project abandonment.
- Preference for new projects to the detriment of the completion of current projects and needed maintenance/refurbishment of existing ones.
- Absence of efficient and effective project monitoring aimed at ascertaining compliance with original project plans and targets.
- Frequent Government policy reversal.

2.1 Due Process

Due Process is a mechanism for ensuring strict compliance with the openness, competition and cost accuracy rules and procedures that should guide contract award within the Federal Government of Nigeria. The summary of the Nigerian Government Procurement process are as follows:

1. Advertisement in at least two dailies
2. Submission of bids
3. Opening of tenders
4. Analysis of tenders
5. Award of contracts
6. Supply and installation
7. Final payment

3. RELATED WORKS

3.1 E-Procurement in the Government of Andhra Pradesh (GoAP) India.

After the Central Government of India enacted the IT Act of 2000 to provide legal recognition to electronic transactions, the Government of Andhra Pradesh (GoAP) set up an E-Procurement Marketplace linking government departments, agencies and local bodies with their vendors. Prior to the introduction of an e-Procurement platform, procurement in Government departments was carried out through a manual tendering process. The manual tender system was suffering from the following deficiencies [9].

i. Discrimination and delay in issue of tender schedules to suppliers;
ii. Cartel formation to suppress competition
iii. Physical threats to bidders;.
iv. Tampering of tender files;
v. Delays in finalization of tenders;
vi. Human interface at every stage;
vii. Lack of Transparency.

3.2 E-Procurement in the Government of China

China established a government procurement system in 1996. Government procurement increased rapidly, from about 3.1 billion in 1998 to 213.57 billion in 2004, an average annual increase of 88.78 per cent. In 2004, the amount of open bidding was 127.18 billion (which was approximately 57.8 per cent of total bidding for the country). The Government procurement system regulates procurement activities, improves the efficiency of financial expenditures, and safeguards the interests of the country and the public. Government procurement is regarded as a measure to limit corruption and encourage efficient administrative operations [10].

3.3 E-Procurement in the Government of Korea

Korea On-Line E-Procurement System (KONEPS) was originally developed by the Public Procurement Service and now in full operation in Korea. KONEPS is a unified and systematized electronic procurement system that supports all facets of the public procurement of goods, facilities and

services that the government needs. KONEPS is a nucleus in the realization of e-government of the Republic of Korea. Through the unified and comprehensive electronic procurement system, KONEPS offers effective one-stop services to meet the requirements of all public organizations and related businesses. With speedy handling and performance transparency, it eliminates inefficiency in administrative processes and contributes to national budget savings.

In the past, public bidders had to make numerous visits to procurement offices from the time of application of bidding and screening to the final selection, not to speak of frequent consultation visits. KONEPS has replaced all these complicated and time-consuming procedures with a unified, speedy, efficient and transparent e-procurement agency, getting rid of a hoard of paperwork required in the process. In other words, nowadays, there is no need to make many visits to procurement offices to submit required paperwork for 200,000 odd annual public auctions. This can be handled instantly through nationwide network of KONEPS [11].

4. METHODOLOGY

Over times software (both generic and customized) have been developed using different software development methodologies, approaches, models, and techniques. In this paper, the software development methodology adopted was incremental model to develop the e-GP system. With respect to industry standards, Unified Modelling Language (UML) approach was used to capture the system requirements and design. The e-GP system developed is a web application. The client-side was implemented using HTML (Hypertext Markup Language) and JavaScript while the server-side was implemented with Hypertext Preprocessor (PHP). The

database management system used is MySQL. The web server used is Apache.

4.1   System Design and Implementation
4.1.1   System Design

Generally use case diagrams graphically depict the interactions between the system and external system and users. In other words, it graphically decides who will use the system and in what ways the user expects to interact with the system. In figure 1, the use case diagram illustrates system requirements of one of the actor (user) of the e-GP system among others, for example, the contractor. A contractor can interact with the system in the following ways: A contractor can register is company profile as well as update the profile, view the available new contracts, response to the new contracts if interested by sending bid documents, access related information associated with new contracts, view approved contract and the contractors that won and loss. The contractor that won a contract can send progress reports as the work is being executed.

Figure 2 shows the class diagram for e-Government Procurement System (e-GPS) that consists of classes of the system, their interrelationships and the methods and attributes of the classes. The procuring entity for instance can accept contractors, reject contractors, accept contracts, reject contracts, and approve contracts. The contractors on the other hand, can bid for contracts, update profile, download contract document from the database.
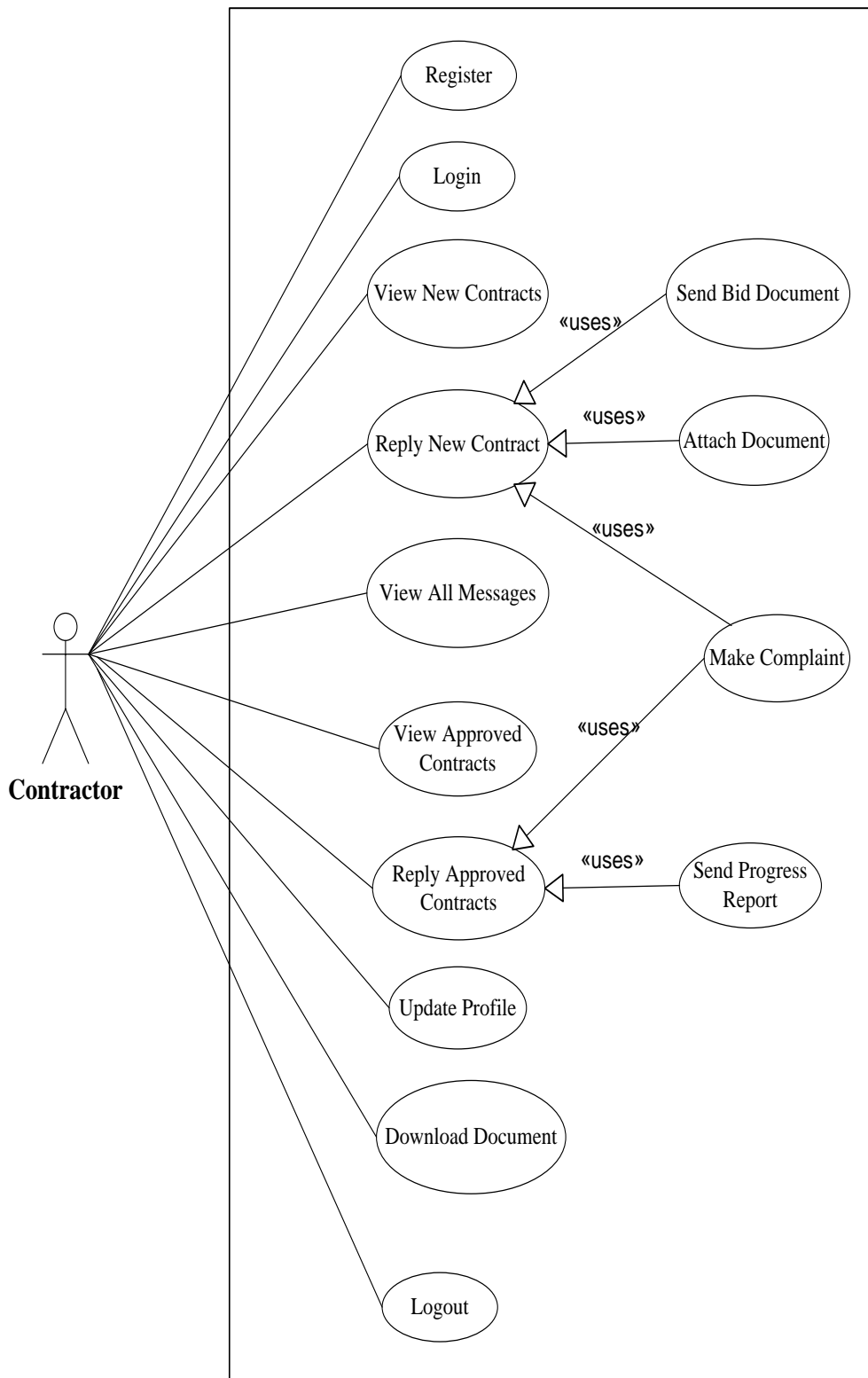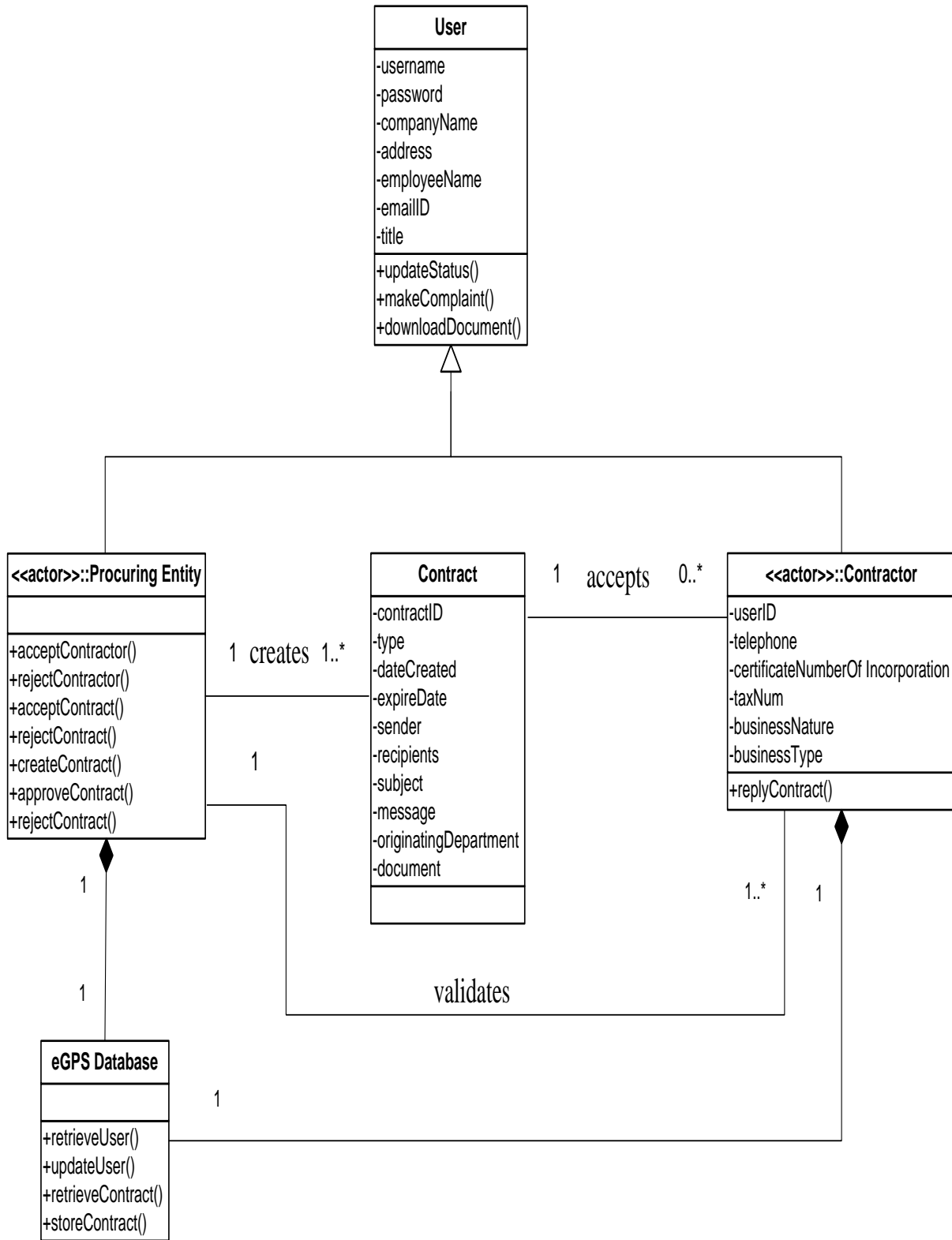
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Fig. 1. Use case of user requirement

User

-username
-password
-companyName
-address
-employeeName
-emailID
-title

+updateStatus()
+makeComplaint()
+downloadDocument()

<<actor>>::Procuring Entity

+acceptContractor()
+rejectContractor()
+acceptContract()
+rejectContract()
+createContract()
+approveContract()
+rejectContract()

1 creates 1..*

1

Contract

-contractID
-type
-dateCreated
-expireDate
-sender
-recipients
-subject
-message
-originatingDepartment
-document

1 accepts 0..*

<<actor>>::Contractor

-userID
-telephone
-certificateNumberOf Incorporation
-taxNum
-businessNature
-businessType

+replyContract()

1..*   1

1

1

validates

1..*   1

eGPS Database

1

+retrieveUser()
+updateUser()
+retrieveContract()
+storeContract()

Fig. 2. Class diagram for e-Government Procurement System (e-GPS)

4.1.2   System Implementation

Few interfaces and reports from the software application development are captured in the figures below. In figure 3 is the contractor home page that shows a list of new contracts and approved contracts that have not yet been viewed. It also displays links to other pages of the e-GPS and the current (server) date and time.

Contractor Home Page

Fig. 3. Contractor Home Page

The page in figure 4 contains newly received contract notifications or invitations. It contains Invitations for Pre-qualification and Tender, Request for Proposal, Request for Quotations and Request for Information. When a procuring entity creates a contract and sends the bid to contractors, it appears in the new contract page. A contractor can view all contracts, new contracts, responded contracts (i.e. contracts that he has sent a reply) and disapproved contacts (i.e. contracts that he lost in the bid). He can also print all these views by clicking on the print link on the top right corner of the page.

New Contracts Page

Fig. 4. New Contracts Page

Figure 5 is the bid document page that a procuring entity is redirected to when he selects the winner of a bid. It is from here that the procuring entity fills the contract amount, attaches the contract document, states the contract's originating department, states a brief description of the

contract document and the reason for accepting a contractor(s). After the procuring entity submits the contract, a notification is sent to the winning contractors that they won the bid and another notification is also sent to the other contractors that lost the bid.
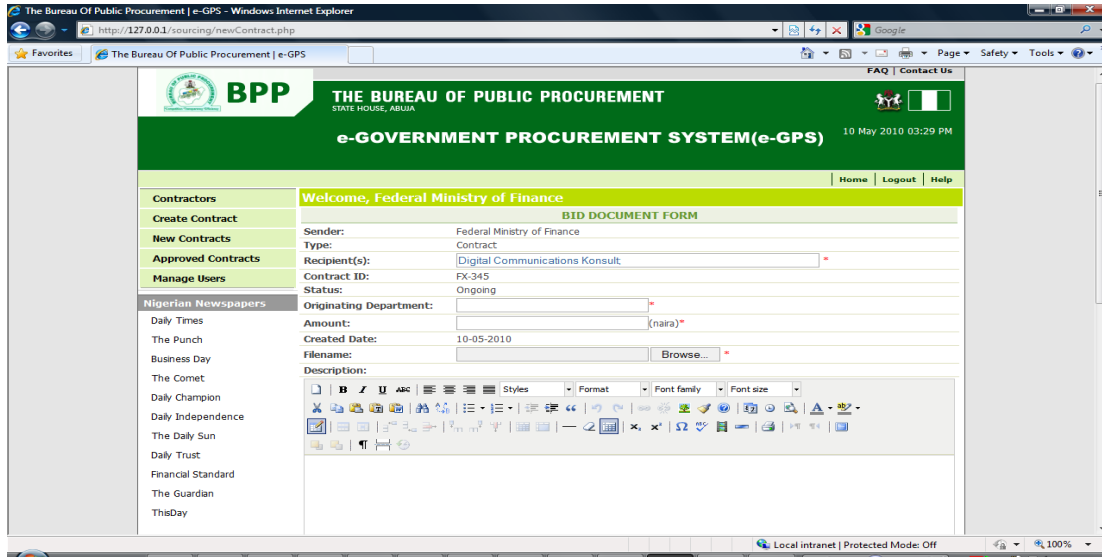
Bid Document Form

Fig. 5. Bid Document Form

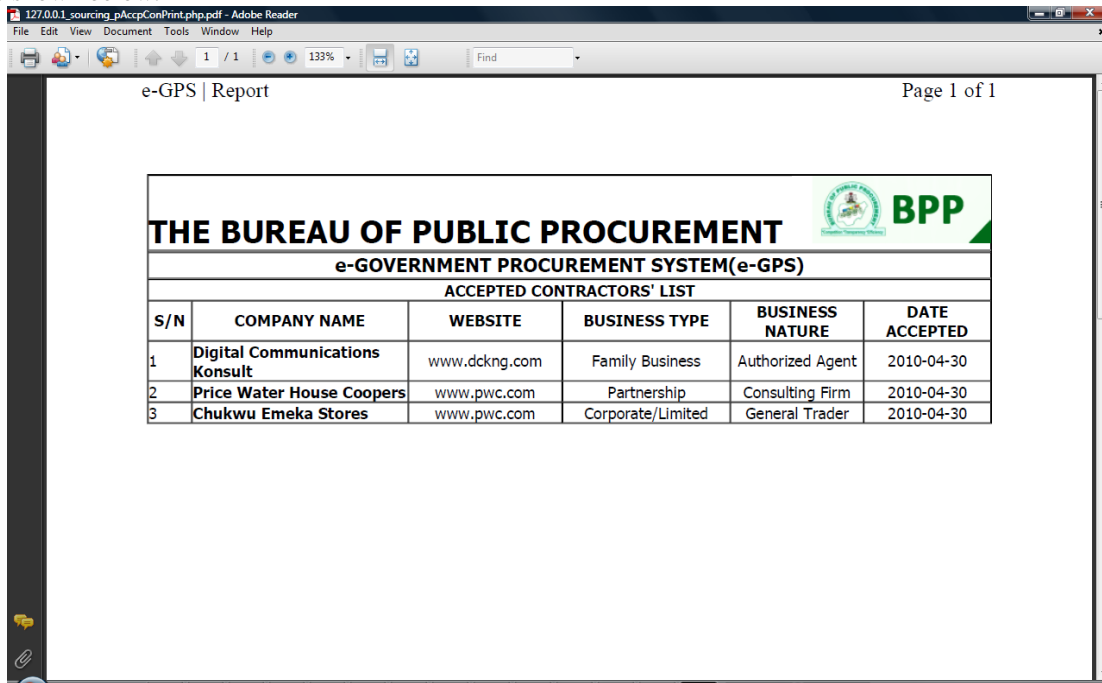Figure 6 and 7 are the few sample reports that can be generated are shown below:

Fig. 6. Report showing accepted contractors

Fig. 7. Report showing list of approved contracts

5.   CONCLUSION

There has been a great need over the years for the procurement activities of the Nigerian government to be automated in order to be able to facilitate work effectiveness, efficiency, reduce cost, and increase accountability. There has also been an increase in the need for the freedom of information and transparency in government projects and activities. The e-GP system developed can lead to improve management of government procurement processes, thereby ensuring transparency, monitoring, control, fair selection of bidders, reduced cost of transactions and increased efficiency. In future work, the integration of an encryption system for bids document to be encrypted in a manner that even with the connivance of the system administrator, designated authority, software developer, service provider or any entity will not be possible for any other bidder or third party to view, tamper, delete, open, modify, or manipulate the confidential contents of a bidder's bid till the time of Public Tender Opening and also the issue e-payment system be examined and incorporated.

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