IOSR Journal of Computer Engineering (IOSR-JCE)
e-ISSN: 2278-0661, p-ISSN: 2278-8727, Volume 28, Issue 5, Ser. IV (Sep. – Oct. 2026), PP 37-51
www.iosrjournals.org

A Scientific Research on e-BG Process System for e-Governance initiatives: e-Procurement - A Great Economic Development for Nation

Shaikh Imtiyaj, Tapan Kumar Behera, Dr Narayan Chandra Pal, Nihar Ranjan Biswal, Tapan Prakash Ray, Dr Ashok Kumar Hota
Computer Science Engineer-Senior Programmer Level 1, eProcurement Project, Ministry of Elect & IT, NIC, Bhubaneswar, Odisha, India
Scientist- Joint Director IT, Ministry of Elect & IT, Bhubaneswar, Odisha, India
PhD, IIT-KGP, Engineer-in-Chief (Civil), Govt. of Odisha, Bhubaneswar, Odisha, India
Scientist- Senior Technical Director, Ministry of Elect & IT, Bhubaneswar, Odisha, India
Scientist-Senior Technical Director, Ministry of Elect & IT, Bhubaneswar, Odisha, India
Scientist-Deputy Director General, State Informatics Officer, Ministry of Elect & IT, Bhubaneswar, Odisha, India

Date of Submission: 27-10-2026 Date of Acceptance: 07-11-2026

I. Introduction

e-Governance aims to provide good governance to the public by using the Information and Communication Technology (ICT) for speedy, accurate, transparent and secured services. e-Governance tries to eliminate the digital divide among urban and rural people. Timely and efficient delivery of e-Governance services is an important aspect.

Information and Communication Technology (ICT) is being increasingly used in day to day life of a common man and it is rapidly becoming an integral part of providing the better governance services to the citizens of a Country.

Now a days, departments, business sectors and customers alike collect, store and transmit vast amount of information electronically as they have started believing that their information is secure. The digital signature technique is essential for secure transaction over open networks. Hash functions are the most widespread among all cryptographic primitives and are currently used in multiple cryptographic schemes and security protocols.

Odisha is the one of the 29 states of India located in the eastern coast. Odisha which is the eleventh largest state of India in population, is working to provide better services to all the citizens in a transparent manner. Odisha is the first position among smart cities. The capital of Odisha, Bhubaneswar is the Number.1 smart city in the country.

We study from various Government of Odisha departments like Directorate of Technical Education and Training, Works, Water Resources, Rural Development, H & UD, SC & ST Development, Agriculture Dept, Panchayati Raj & DW etc, 33 State PSUs and 106 urban local bodies. Central Government departments like Dept. of Posts, CRPF and Central Government PSUs like NALCO, Paradip Port Trust etc.

This study focuses a humble effort towards nobel goal of developing the easy and secure way of details information of Tender Fee and e-BG (Electronic Bank Guarantee) for a particular Tender ID in the Database for the Country and provide the payment instruction for each concerned beneficiary details in their Bank, for the Nation Development.

In this research paper the study, design, process flow of e-BG is presented. The implementation of online tendering system is increasing day by day among different departments and PSUs for its superior level of security, transparency, strong authentication of Digital Signature Certificate and time stamping technique.

e-Procurement provides the healthy competition among bidders and real time bidding over the internet yielding cost saving to the public exchequer which reduces the tender related crimes is certainly a significant achievement on the way to a better and honest Nation's Development.

To enhance the power of security and better implementation further research is in progress. This research study focuses on different opportunities of G2B initiatives in India. The basic objective of research is to provide a model for better implementation of e-Governance application.

The use of Information Technology particularly web based internet applications to enhance the access to and delivery of government information and services to their citizens, public agencies, employees, business partners, financial institutions and government departments. The rapid growth of competition in the market and the consequent changes in economic conditions impose organizations and firms to implement new technologies to stay competitive. The Central, State Government, Judiciary, Autonomous Bodies, Boards & Corporations, PSUs, Joint Ventures, Statutory Bodies, Commissions and Councils have invested in numerous initiatives throughout the length and breadth of the country aimed at extending the benefits of information revolution to rural and remote area. The Government envisions providing good governance by establishing a Committed, Accountable,

Responsive, Inspiring, Nationalist, and Genuine Government - CARING Government. e-Procurement is one of the best vehicles that are being gainfully used in reaching the goal of CARING governance

e-Governance : Objective

- Providing information speedily to all citizens
- Improving transparency
- Improving public services such as transportation, power, health, water, security and municipal services etc.
- Reduce Corruption

e-Governance development models :

The e-Governance Models are

- G2C : Government to Citizens
- G2B : Government to Business
- G2G : Government to Government

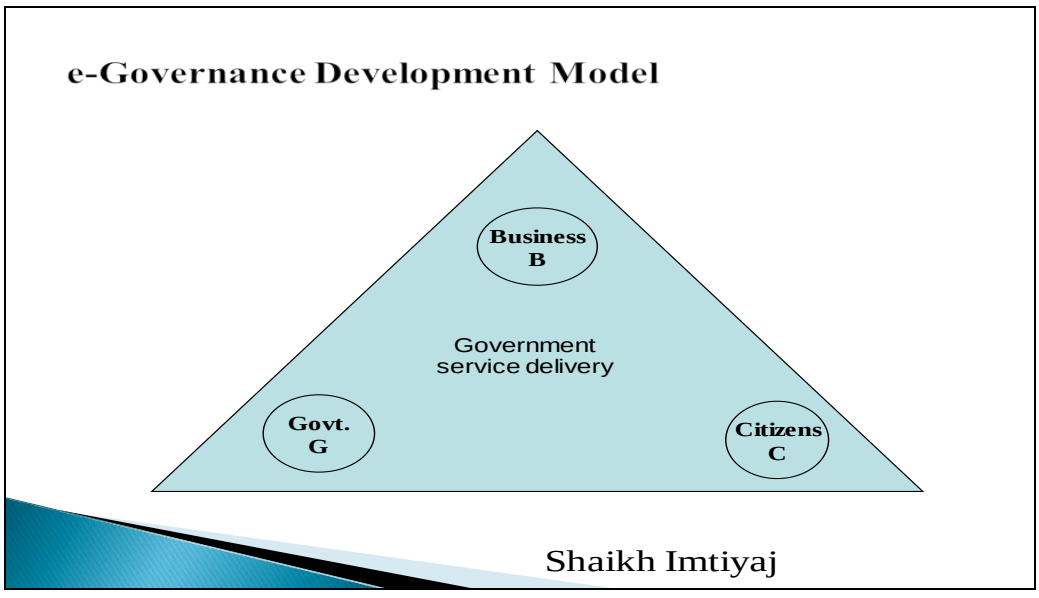

Figure 1: e-Governance Development Model

II. e-Procurement

A major Government to Business e-Governance initiative to bring transparency in public procurement process is e-Procurement.

e-Procurement, commonly known as Electronic procurement.

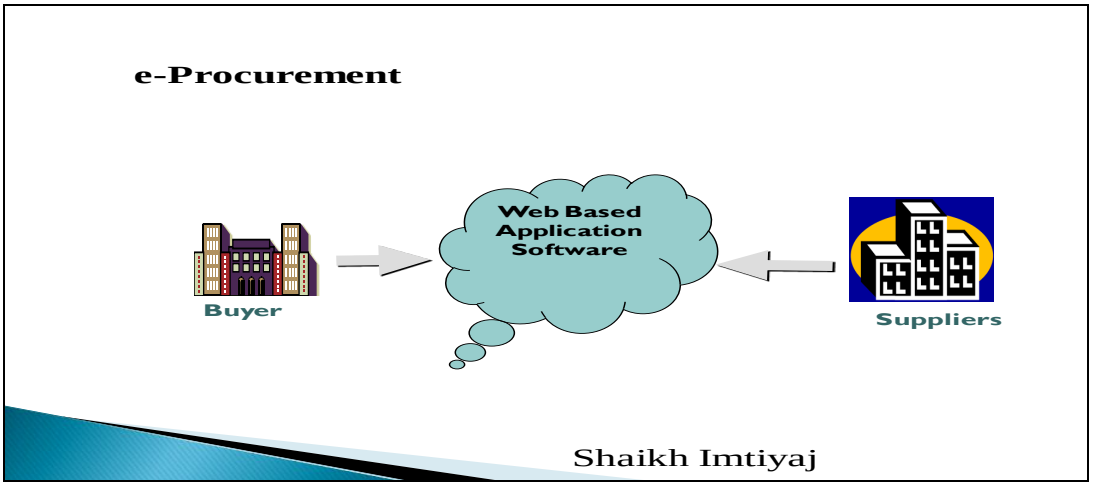

Figure 2: e-Procurement Cycle

e-Procurement is the business-to-business or business-to-consumer or business-to-Government purchase and sale of Supplies, Works and Services using the Internet. e-Procurement caters to the online tendering process from online tender creation to award of contract(AOC).

Using e-Tendering the Departments can create the tender, publish the tender, receive bids, open the tenders, evaluate the tenders and finally publish award of contract. Using e-Tendering, the bidders can search tenders, submit bids online and track the status of their bids. Timely and efficient delivery of e-Governance services is an important aspect. Indian IT-Act 2000 has mandated the usage of Digital Signature Certificate (DSC) for e-Procurement.

Benefits of e-Procurement:

For data encryption and security purposes, the Digital Signature Certificate is essential to operate in e-Procurement.

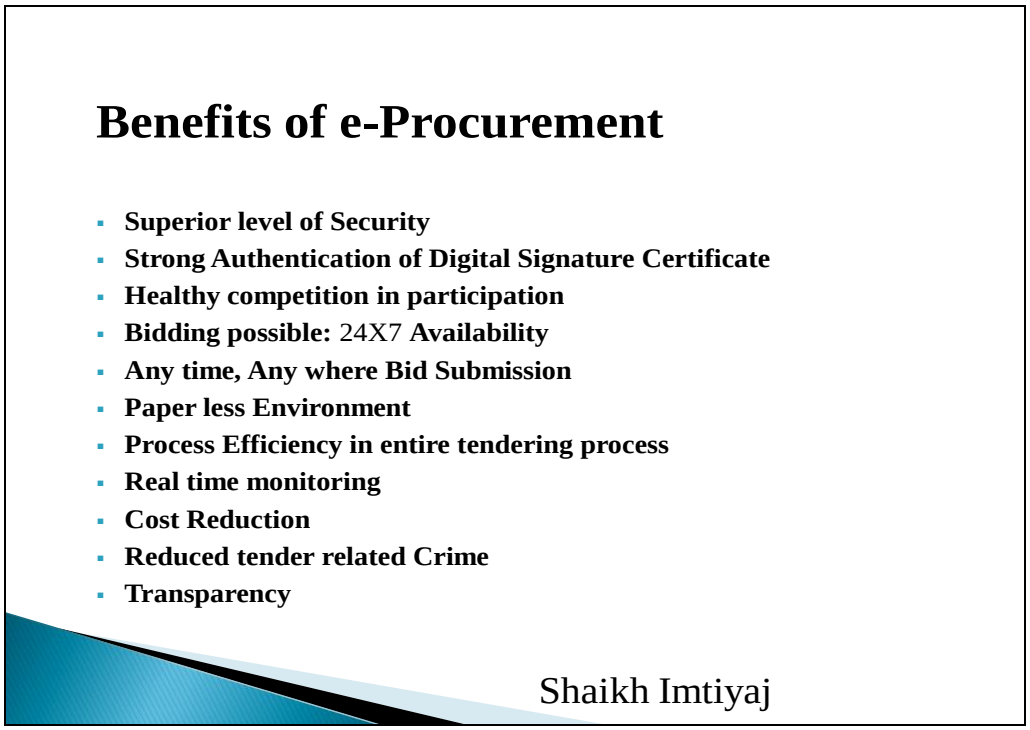

Figure 3: Benefits of e-Procurement

Roles in e-Procurement:

- **Creater of the Tender: -** The Tender will be created by the officer by using his/her Digital Signature Certificate, as per approved by the Department Nodal Officer.
- **Publisher of the Tender**:- He will be normally the Head of the Dept (HOD) of the concerned technical department and will be the responsible person for timely and accurately hosting of tender on the portal
- **Opener of the Tender: -** The tender will be decrypted and opened with the Digital Signature Certificates of each opener as identified during publishing the tender. Each opener will have to access one by one for bid opening. The Tender technical core committee members will be normally the openers of tender as decided by the Nodal Officer.
- **Evaluator of the Tender: -** The Evaluator is the person who will evaluate the tenders and upload the final decision of the Tender Evaluation Committee.
- **Auditor:** He will be given privileged access to audit tendering process.

Details of e-Procurement:

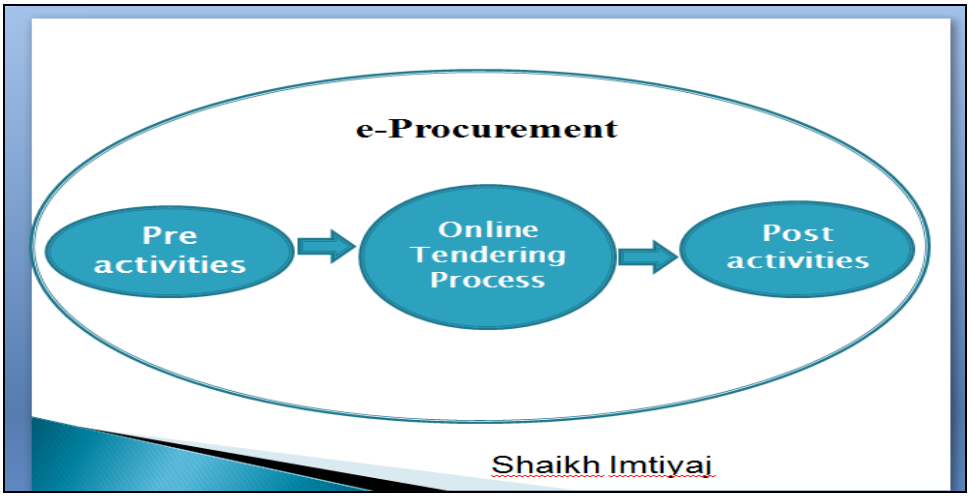

Figure 4: Knowledge of e-Procurement

III. Details of e-Tendering Process

e-Tendering Process :

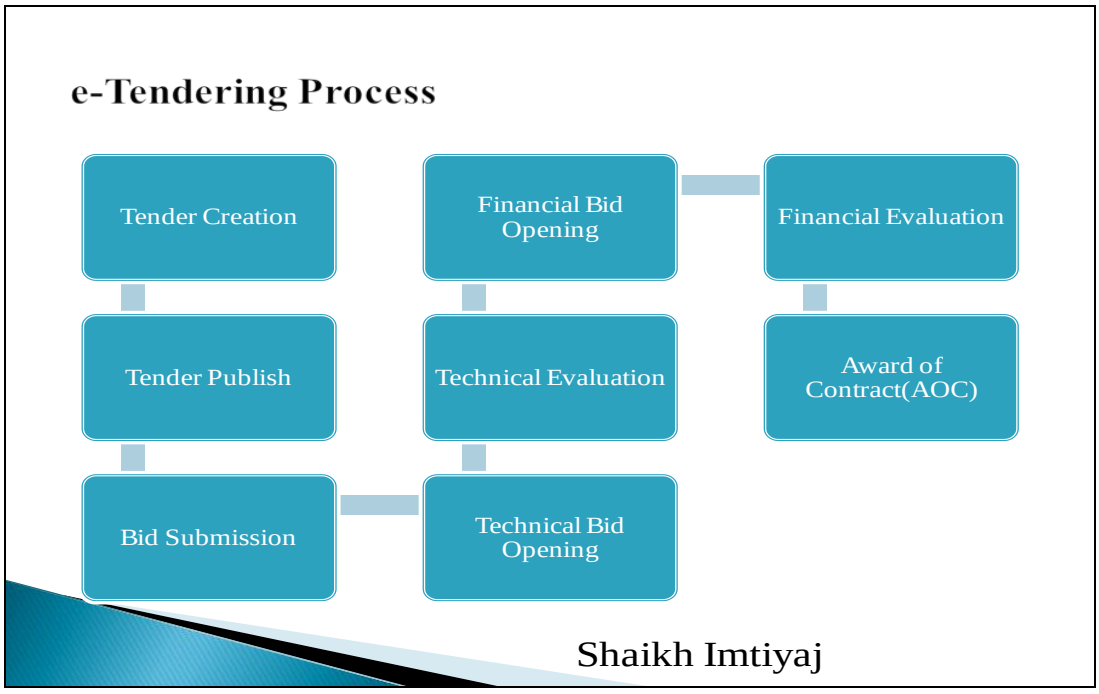

Figure 5: e-Tendering Process

Bid Submission:

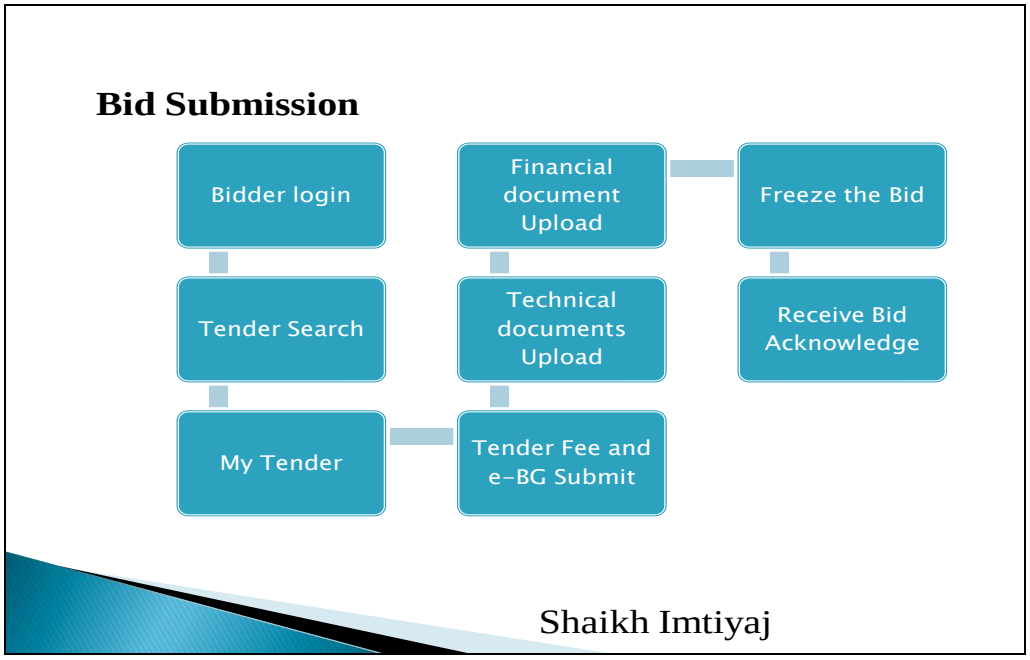

Figure 6: Bid Submission

IV. Process Flow of e-BG Process System

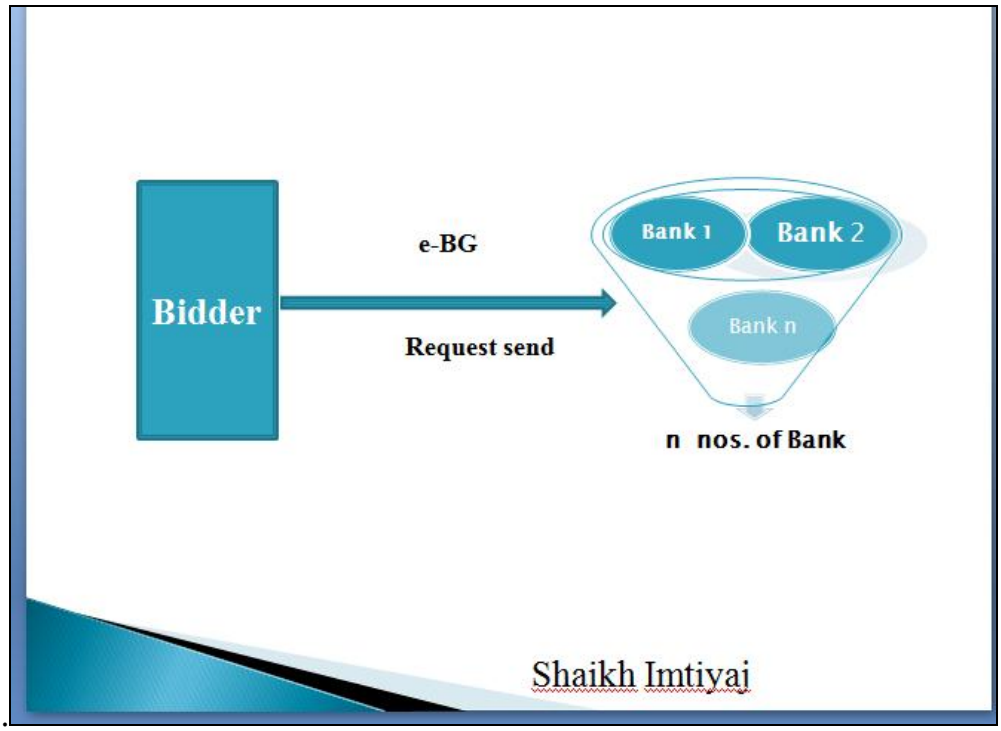

Figure 7: Process 1

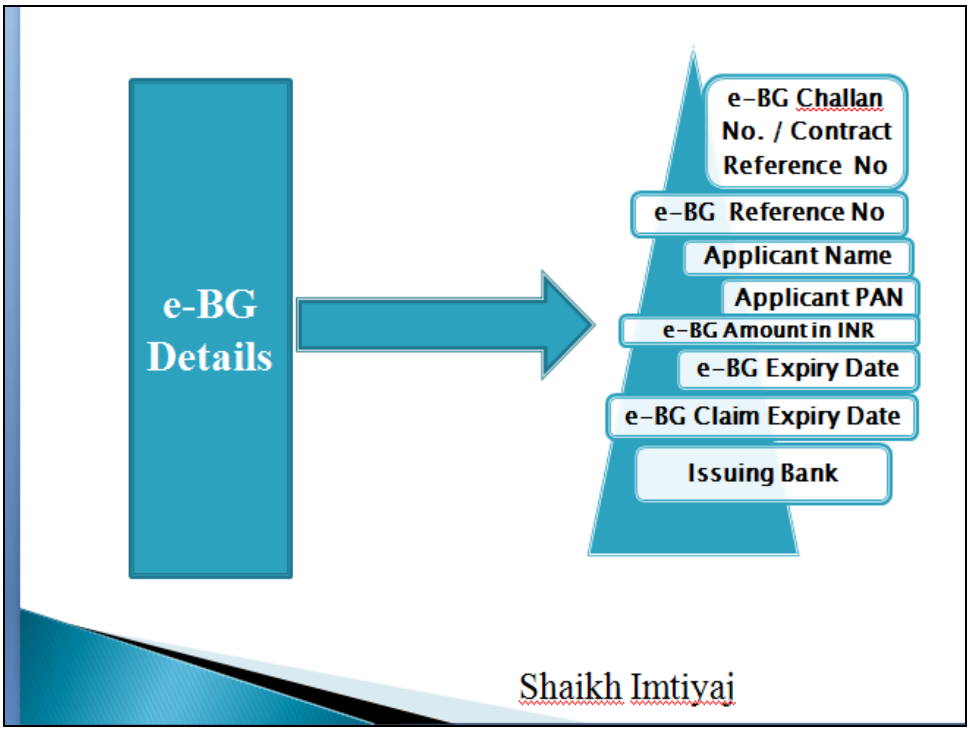

Figure 8: Process 2

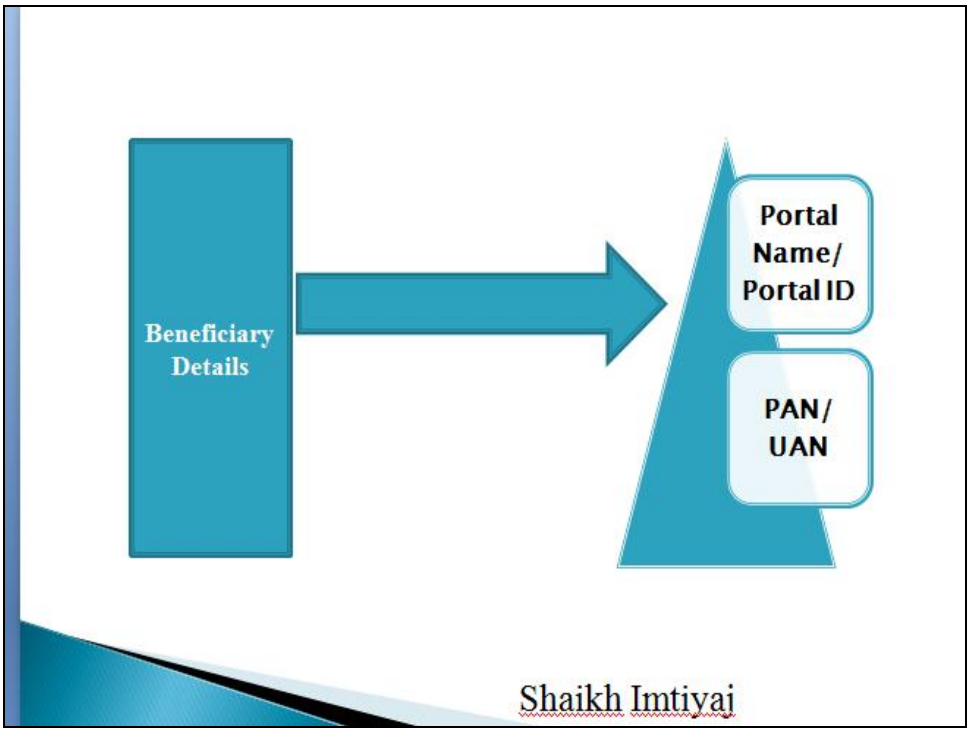

Figure 9: Process 3

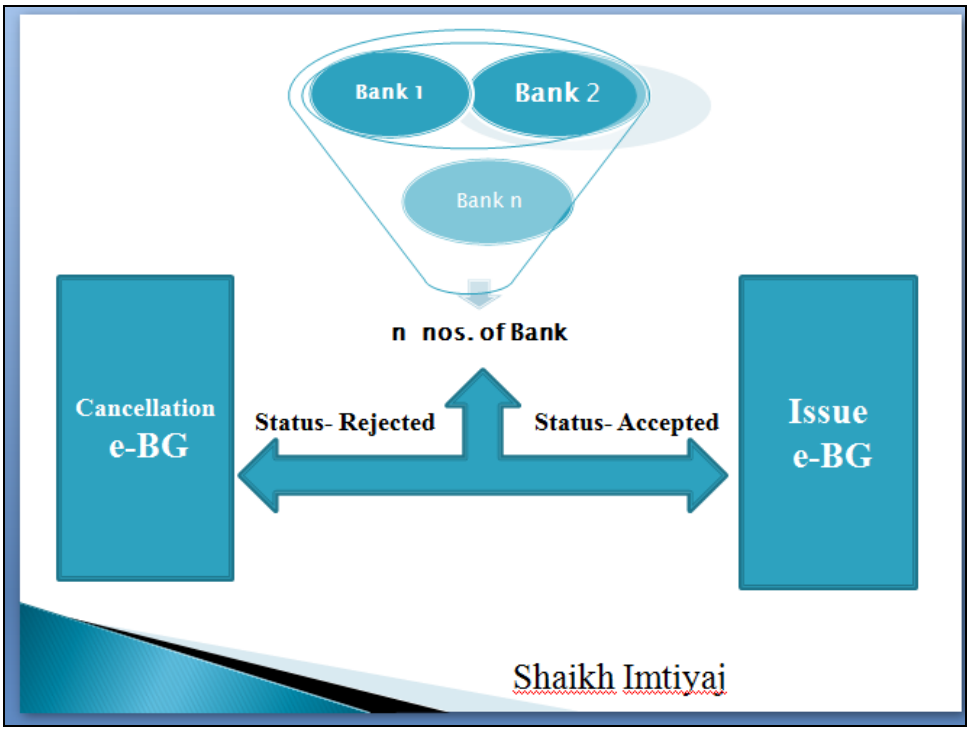

Figure 10: Process 4

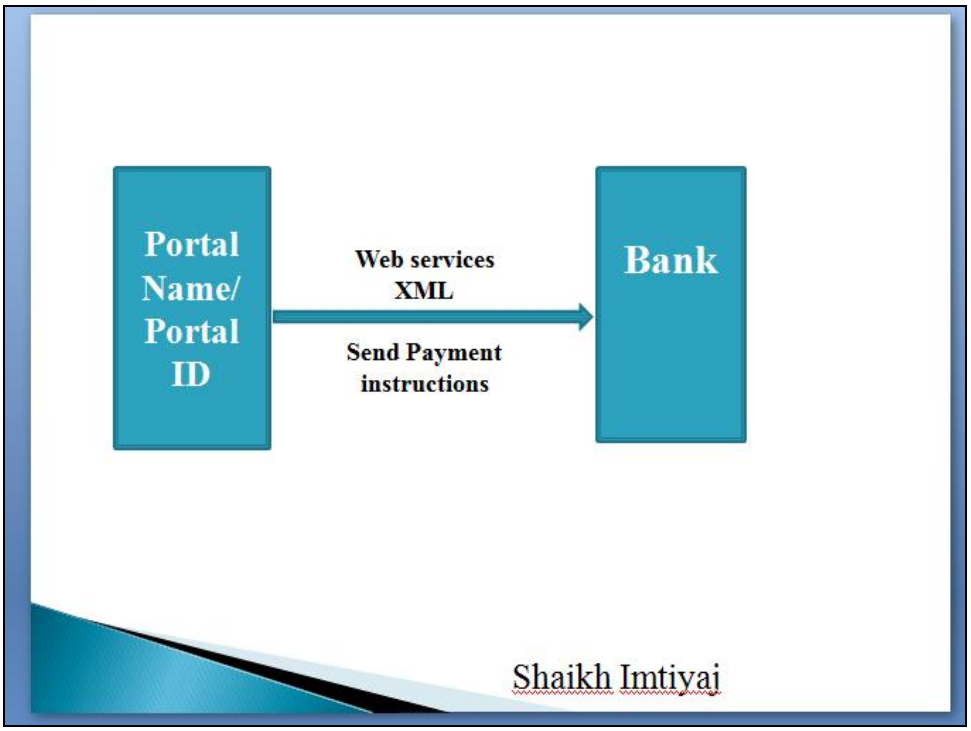

Figure 11: Process 5

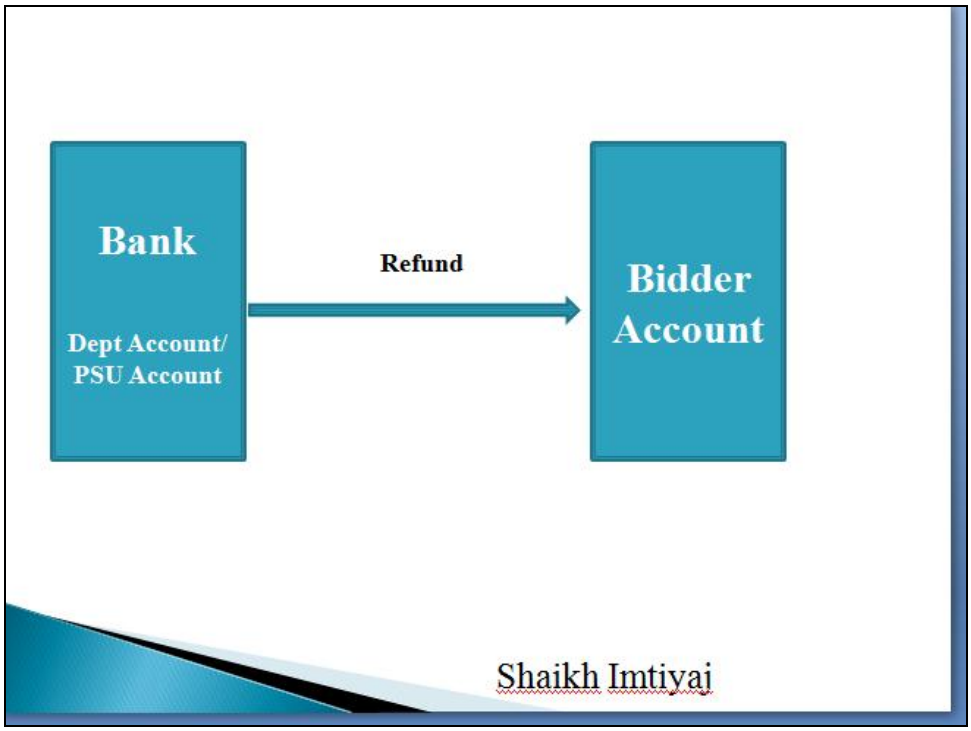

Figure 12: Process 6

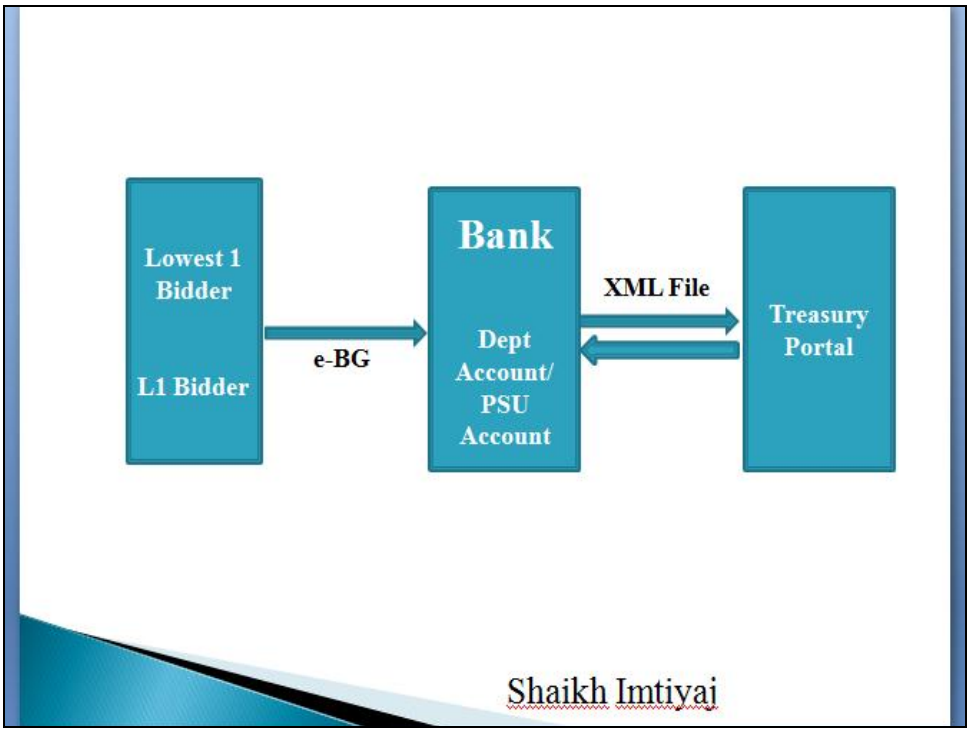

Figure 13: Process 7

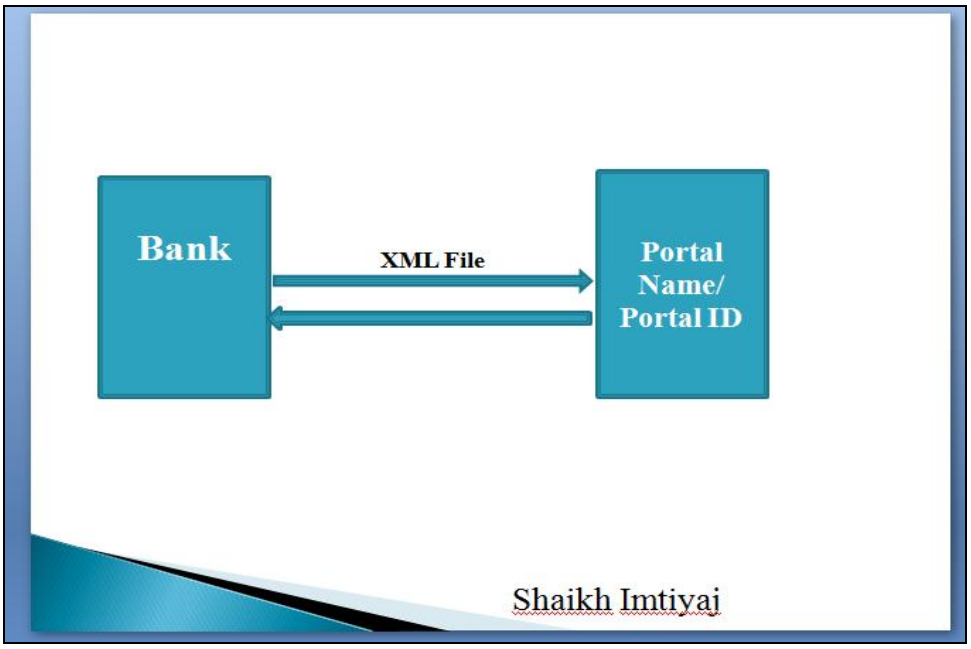

Figure 14: Process 8

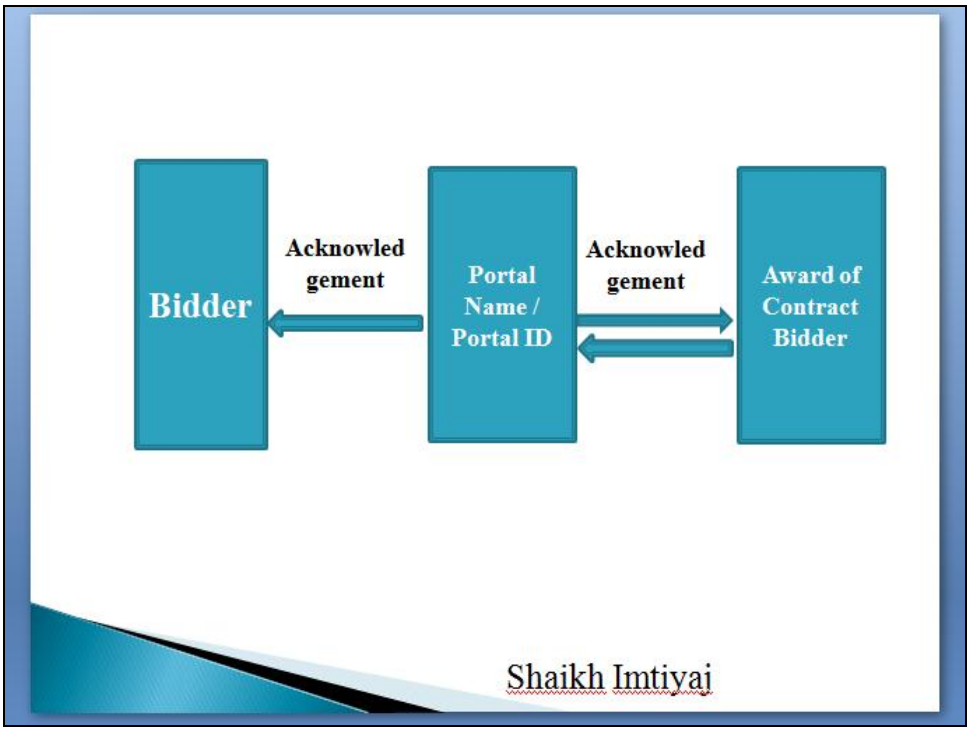

Figure 15: Process 9

V. Risk in e-Procurement

Digital Signature Certificates (DSC) can be presented electronically to prove the identity, to access information or services on the Internet or to sign certain documents digitally. DSC provides Authorization, Authentication, Privacy, Non repudiation and Integrity.

IT Act 2000 in Government of India gives legal validity to electronic transactions that are digitally signed. A DSC provides high level of security for online transactions. You can use certificates to encrypt information such that only the intended recipient can read it. You can digitally sign information to provide assurance to the recipient that it has not been altered in transit, and enable verification that you actually sent the message.



Figure 16: Digital Signature Certificates- Smart Card/ eToken

Functions of DSC:

1. Signing
2. Encryption/ Decryption

Classes of Digital Signature Certificate (DSC):

Depending upon requirement of assurance level and usage of DSC, the type of classes are follows:

Class-1 Certificate: provides minimum level of assurance. Intended for personal use. It does no strongly authenticate identity and is therefore not applicable for commercial use.

Class-2 Certificate: provides higher level of assurance confirming the details submitted in the DSC Request Form, including photograph and documentary proof in respect of at least one of the identification details.

Class-3 Certificate: provides highest level of assurances, as verification process is very stringent and applicant has to present himself/herself before the CA.

Validity of Digital Signatures: One year validity & two year validity. These are renewable.

VI. Algorithm

DSC is based on MD5 algorithm from Cryptography. MD5 is Message Digest algorithm, which takes as input a message of arbitrary length and produces as output a 128-bit "message digest" of the input. MD5 is more secure than MD4. Now we are studding on different versions of Secure Hash Algorithm (SHA) in different case sudy.

VII. Conclusion and Future Work

This study focuses a humble effort towards nobel goal of developing the easy and secure way of details information of Tender Fee and e-BG (Electronic Bank Guarantee) for a particular Tender ID in the Database for the Country and provide the payment instruction for each concerned beneficiary details in their Bank, for the Nation Development.

In this research paper the study, design, process flow of e-BG is presented. The implementation of online tendering system is increasing day by day among different departments and PSUs for its superior level of security, transparency, strong authentication of digital signature certificate and time stamping technique. e-Procurement provides the healthy competition among bidders and real time bidding over the internet yielding cost saving to the public exchequer which reduces the tender related crimes is certainly a significant achievement on the way to a better and honest Nation’s development.

To enhance the power of security and better implementation further research is in progress. This study focuses on different opportunities of G2B initiatives in India. The basic objective of research is to provide a model for better implementation of e-Governance application.

REFERENCES

[1] Shaikh Imtiyaj, Dr N C Pal, N R Biswal, T P Ray, Dr A K Hota "A Research Study on Online Payment Process System of Workers for e-Governance initiatives: e-Procurement-A Great Scientific Knowledge for Nation Development", IOSR Journal of Computer Engineering(IOSR-JCE) e-ISSN:2278-0661,p-ISSN:2278-8727,Volume 22,Issue 5,Ser.II (Sep-Oct. 2020), PP 01-11

[2] Shaikh Imtiyaj, Er Prabhat Kumar Pal,N R Biswal, T P Ray, Dr A K Hota "A Research Study on Importance of Online Database Management System of Bidders for e-Governance initiatives: e-Procurement-A Great Concept for Nation Development", IOSR Journal of Computer Engineering(IOSR-JCE) e-ISSN:2278-0661,p-ISSN:2278-8727,Volume 22,Issue 4,Ser.I (Jul-Aug. 2020), PP 08-15

[3] Shaikh Imtiyaj, Er Ratan Kumar Agrawal, Dr A K Hota "Study of Online Banking Solution for e-Governance initiatives: e-Procurement-A Scientific Knowledge", IOSR Journal of Computer Engineering(IOSR-JCE) e-ISSN:2278-0661,p-ISSN:2278-8727,Volume 19,Issue 2,Ver.I V(Mar-Apr. 2017), PP 55-61

[4] Shaikh Imtiyaj, Er Govinda Chandra Mangual, Dr A K Hota "Study of e-Governance initiatives:e-Procurement a Business Reform for Odisha's Development", IOSR Journal of Computer Engineering(IOSR-JCE) e-ISSN:2278-0661,p-ISSN:2278-8727,Volume 18,Issue 6,Ver. I(Nov-Dec. 2016), PP 44-53

[5] Shaikh Imtiyaj, Er Govinda Chandra Mangual, "An Indepth Understanding of e-Governance initiatives: e-Procurement –A Great Success in Odisha", IOSR Journal of Computer Engineering(IOSR-JCE) e-ISSN:2278-0661,p-ISSN:2278-8727,Volume 18,Issue 4,Ver. V(Jul-Aug. 2016), PP 144-147

[6]Shaikh Imtiyaj, N.R Biswal, T.P Ray, Dr A.K Hota, "An Indepth Understanding of e-Procurement : A Case Study Approach", IOSR Journal of Computer Engineering(IOSR-JCE) e-ISSN:2278-0661,p-ISSN:2278-8727,Volume 17,Issue 6,Ver. V(Nov-Dec. 2015), PP 20-24

[7] Shaikh Imtiyaj, N.R Biswal, T.P Ray, Dr A.K Hota , "Digital Signature Certificate: A blessing for e-Governance Application in Human Development", International Journal of Advanced Research in Science, Engineering and Technology,Vol. 2, Issue 1 , pp 350-355,January 2015

[8] William S.," Cryptography and Network Security, Principles and Practice", Prentice Hall of India, 2005.

[9] Dhiren R. Patel ,"Information Security Theory and Practice" , 2008 Edition

[10] Atul Kahate, "Cryptography and Network Security", Second Edition

[11] Cryptography Engineering: Design Principles and Practical Applications by Niels Ferguson, Bruce Schneier, Tadayoshi Kohno

[12]Atul Kahate, "Introduction to Database Management System",

[13] www.eprocure.gov.in/eprocure/app, last visited 08th Oct 2026

[14] https://tendersodisha.gov.in/nicgep/app , last visited 08th Oct 2026

[15] "Digital Signature," available at: http:// http://nicca.nic.in , last visited 08th Oct 2026

[15] "e-Governance," available at http:// india.gov.in , last visited 08th Oct 2026

[16] "e-Procurement", available at http://demoeproc.nic.in , last visited 08th Oct 2026

[17] smartcitybhubaneswar.gov.in/aboutbhubaneswar, last visited 07th Oct 2026

[18] google.co.in last visited 09th Oct 2020

[19] https://www.nesl.co.in last visited 09th Oct 2020

[20] http://www.odisha.gov.in/portal/ViewDetails.asp, last visited 09th Oct 2020