

The Adoption of Electronic Procurement and Readiness Assessment in Central Ethiopia Regional State

Hanna Moges Dereje, Getnet Assefa Habete



Abstract: *Electronic procurement is a digitalized means of procurement processes. This study aims to assess its applicability in the central Ethiopia regional state by studying the hindrance factors and the opportunity that can come for the construction sector of the region. A descriptive and explorative study approach has been performed. Qualitative data from public procurement administrators, IT professionals, and construction stakeholders were collected through interviews. -P nor eGP has not been introduced to the region yet. Also to use it factors such as the knowledge gap, lack of infrastructure provisions, and collaboration works with fear of losing competitiveness were probable hindrances. On the other hand, resource-saving, increasing transparency, and accuracy of bid evaluation were found as main probable opportunities. Incorporating practitioners, and combining system development with an adaptability test can provide useful input for further. Timely support from the federal government, capacity-building programs, facility and infrastructure development, and government enforcing mechanisms were found as necessary matters to implement the e-P system for the construction sector. This research is the first study in the area with this topic and also it is a very new topic as a country in general. Hence, in a way, it introduced the system for the public construction procurement of the region and stakeholders. The findings contribute as a source to the public body for the launch of the eGP Ethiopia in the region, and a lead for private developers. Additionally, it implements the very nature of the research which is multidisciplinary by incorporating IT professionals.*

Keywords: Construction Sector, e-procurement, Region, Procurement

I. INTRODUCTION

Countries are considerably dependent on the growth and development of their physical infrastructures. Hence, the linkage of the construction industry to both the economic and social sectors of a country is very significant [1]. The construction projects pass through various complex stages, starting with the primary stage of bidding in which a project is awarded to a contractor [2]. Awarding a project to a suitable contractor is not an easy process [3]. argues that the

successful completion of a construction project is directly impacted by the selection of a suitable constructor or consultant. For that, contractors need to participate, from time to time, in competitive bidding or tendering processes in the procurement system. To facilitate public procurement operations governments often allot the major share of the state budget. As per the Organization for Economic Cooperation and Development report ([4] quoted in [5]) on average in developing countries, public procurement accounts for up to 5% of GDP and 20% of public expenditures. This huge budget allotment makes procurement the heart of government operations. Despite the role of procurement in the growth of a country's economy, several challenges and loopholes hinder its performance [6]. As well [7] stated a report done by the World Bank asserting the national procurement system as one of the major areas where the greatest amount of financial corruption resides. The fact that the current Ethiopian construction procurement process is paper-based is the root cause ([8]; [9]; [6]). Additionally, difficulty in getting clarification and collection of bid documents, involvement of much paperwork, money, and time were the frequent challenges in traditional tendering methods in the Ethiopian construction sector [8].

Fortunately, procurement has the potential to create synergies between innovation, market growth, and environmental protection [10]. Through the advancement as well as growth in the usage of IT, transferring to e-purchasing has become in trend. With that electronic procurement (e-p or e-procurement) was introduced. According to [11] The term "e-procurement" refers not only to the automation of the procurement process: according to ([12] quoted in [11]), e-procurement describes "the integration of digital technologies in the replacement or redesign of paper-based procedures throughout the procurement process," suggesting at its transformational capacity to enhance the public procurement process as a whole or to renovate specific stages of procurement. The effectiveness of a contractual relationship is typically dictated by how well the initial procurement process has been completed and whether the written agreement fully reflects the intentions of the contracting parties. E-procurement can be an effective way of managing this process, particularly where there are complex, multi-tier works, service, and supply chains. Electronic procurement benefits both the client and the tenderer. As per [13] it made the process far simpler and less cumbersome, reducing tendering costs, better tracking of important tender times (i.e. opening, closing, etc.), and collation of tender queries in one place.

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*Correspondence Author(s)

Hanna Moges Dereje*, Department of Construction Technology and Management, College of Engineering and Technology, Wachemo University, Hossana, Ethiopia. Email: hanna.moges@yahoo.com. ORCID ID: 0000-0002-7391-4992

Getnet Assefa Habete, Department of Information Systems, College of Engineering and Technology, Wachemo University, Hossana, Ethiopia. Email: getnetassefa16@gmail.com

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Basically what the paper-based procurement and tendering practice lacks electronic procurement provides.

Despite the benefits of electronic procurement, the adoption has not been easy. Still isn't especially for developing countries like Ethiopia. This has been agreed upon by ([14], setting discussion points specifically for developing countries' challenges when it comes to e-procurement usage; lack of infrastructure (reliable internet access, electricity, and hardware), legal and regulatory issues (i.e. some countries may not have laws or regulations that recognize or enforce electronic contracts, signatures, or payments, or that protect the privacy and security of data and transactions), organizational and cultural factors (resistance to change, lack of skills and knowledge, and lack of trust and transparency), and technical and operational issues (i.e. the performance or functionality of e-procurement systems, or the quality or satisfaction of the e-procurement process) ([15], [16]) In addition to this, a study by [17] emphasizes concern over security and data protection, unequal access to IT infrastructure, inadequate knowledge of e-procurement systems, and the cost of software ([18] quoted in [19]). In Ethiopia similar challenges have been observed; man-power retention, inconsistent and disruptive infrastructure, integration with the legacy system, top management, and employees' commitment and attitude, supplier integration, fear of system security, weak and inconsistent support, poor performance monitoring and evaluation practices were some of the major challenges identified ([9]; [20]; [8]). Additionally, lack of system integration, lack of training/capacity-building programs, and challenge in shifting the mindset of users were found to be major barriers to the implementation of e-procurement in Ethiopian road construction [6].

Regardless of the barriers many countries including some developing countries took their procurement and tendering process to the era of electronic giving solutions for the hurdles at the government level, and also in private (selected developing countries' practices will be reviewed in the next section detail). Even though many countries by now have experience with electronic procurement, Ethiopia has launched the first public government electronic procurement by the end of 2022, and it's in the pilot stage ([21]; [22]). Despite its federal-level launch, the regional area of the country hasn't seen the day of light yet regarding e-p [21].

Therefore, what is it that the public regional agency working on adopting electronic procurement, as well as their readiness to embark on it? And what would be an enhancing mechanism for the region for better adoption of electronic procurement in the construction sector? This study will answer this not just for the regional procurement authorities but also for the federal government courtesy of the electronic government procurement (eGP) system, also as an initiation for the private construction sectors to digitalize their procurement process.

II. LITERATURE REVIEW

The government of Ethiopia is working to have a dynamic, efficient, and competitive local construction industry that fosters economic growth and international competitiveness [23]. Also, technological intervention in the sector has been seen in the interest of the government, especially in recent years. The major area where technology has been making a huge impact in the construction project is procurement. As it is known construction procurement mainly has a life cycle of fact gathering, supplier interaction, background assessment, negotiation, fulfillment, consumption, preservation, dumping, renewal, and tender notification [24].

The effectiveness of a contractual relationship is typically dictated by how well these processes have been completed and whether the written agreement fully reflects the intentions of the contracting parties. Electronic procurement is one means of achieving this goal. E-procurement can be an effective way of managing this process, particularly where there are complex, multi-tier supply chains [25] such as construction projects. World Bank refers it to as 'e-Procurement, which is the procurement of goods, works and services through internet-based information technologies is emerging worldwide with the potential to reform processes, promote competition, promote integrity in public procurement, enhance transparency, and accountability, also believed to be a driver of procurement reform' [26]. Which is a high-impact service that is highly desirable. Other than the endless benefits it has, which are discussed in the introduction part, in the study of [11] the second finding was e-procurement is seen as an effective enabler for including horizontal policy goals, such as environmental considerations, in the public procurement function for the operation mode.

A. E-procurement Process and the Necessities to Use It for the Construction Sector

e-Procurement may be affected by the business-to-business, business-to-consumer, or business-to-government purchase of works, services, and goods [24]. But it has a similar workflow in different construction projects. [27] presented, the information interchange between the customer and the contractors must be carried out in a safe environment through the Internet to guarantee that authentic offers are made and accepted as well as to win the trust of contractors. Hence, e-procurement must be capable of handling the full life cycle of the procurement and tendering process for contractors [27]. The functionality and process aspects of current e-p systems are similar and attempt, at most points, to mirror the legal requirements of a paper tendering system ([28] (see Figure 1.)). As a result, the principal and the tenderers are the major parties in a tendering process, but in the event of an electronic procurement system, a reliable third party may need to be included [29].

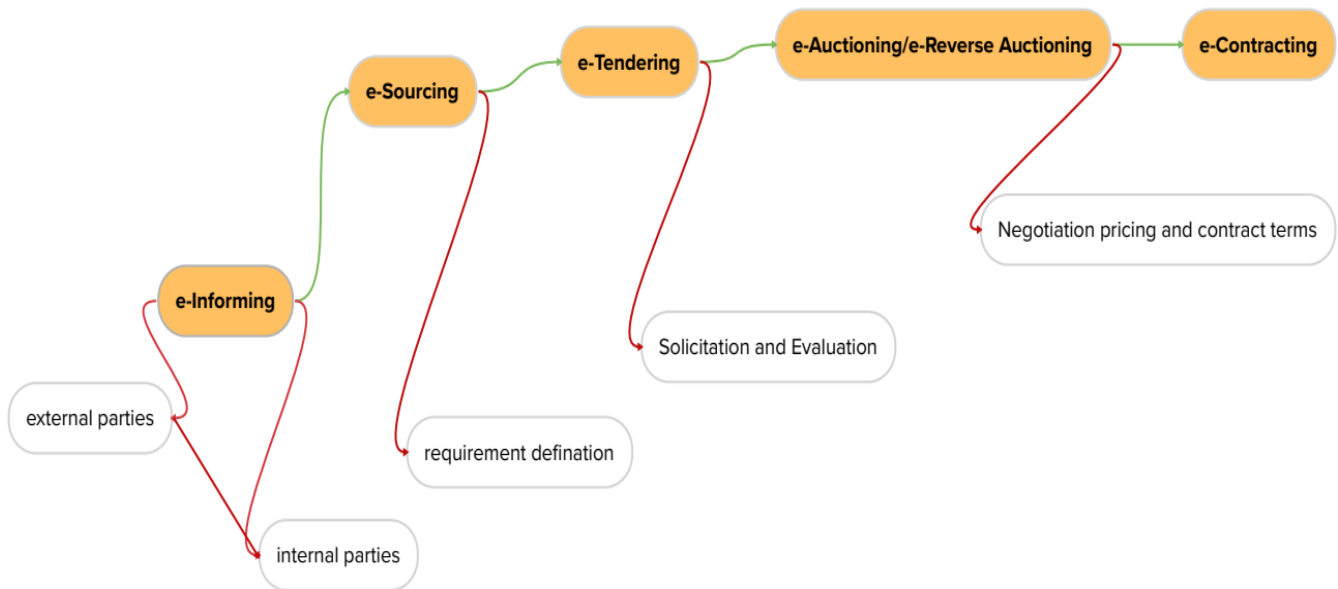


Fig. 1. Electronic Procurement Process (Source: [33])

Additionally, [27] presented the process of e-procurement which starts with the preparation of tender documents then the tender will publish on the website, afterward the contractor views the tender and registers online, the contractor purchases the tender key, and upon successful payment, the tender key will be emailed to the contractor, contractor downloads tender documents and forms, completed tender documents will be uploaded, and finally, after the closing date, the owner will download the bids and view them through tender bids analysis.

Modern online tools and electronic platforms are commonly used to support electronic procurement, which may support some or all of the main processes [28]. But acquiring that is not easy, especially for developing countries. A study by [30] suggested necessities such as awareness of the e-procurement tools and technologies and the benefits that are accrued from using it; ICT infrastructure provision [31]; and adequate internet infrastructure [32]; managerial changes (management strategy that builds awareness and ownership amongst procurement person, professional procurement development and retraining at manager and officer level,) [26], also security properties and authentication mechanisms [33].

B. Practice of e-Procurement in the Construction sector of Ethiopia

In Ethiopia even though there were few websites and online platforms to notify [8] and two public offices (MCIT(Ministry Communication and Information Technology) and Bahir Dar University (BDU) which have developed in-house e-procurement platforms [20]; The government of Ethiopia has initiated several steps to reform public financial management to assure good governance particularly value-for-money, transparency, and accountability in public procurement [21]. The Government has realized the challenges in public financial management and has taken up initiations for the introduction of e-procurement systems strengthening the Public Financial Management systems since good governance in the public procurement sector plays a significant role in the success of the public expenditure management about 65%-70% of the Government of

Ethiopia’s (GoE) annual budget is expended through procurement [20]. Consequently, aiming to reduce these factors and procurement transaction costs, Ethiopia launched the first electronic procurement in the form of eGP (electronic government procurement) a year and a half ago [22]. As stated by [21] the electronic procurement system was first piloted with selected nine public offices (i.e. the Ministry of Finance, the Ministry of Innovation and Technology, the Ministry of Revenue, the Ethiopian Roads Authority, the Ethiopian Pharmaceutical Agency, the Public Procurement and Disposal Service, Addis Ababa University, Addis Ababa University of Science and Technology, and the Public Procurement and Property Administration Agency).

Among the nine public offices, only one entity directly relates to construction projects. With its distinct features and challenges how much emphasis has been given to the sector is questionable, also the versatile resources (good, service, works) add to that. Because as agreed by [6] factors related to management, organization, environment, and technology may hinder the implementation of the system. Additionally, A study [8] shows that e-notification is a misnomer for e-tendering; contractors are still frequently using newspapers as means of tender information and the use of web portals is quite meager; difficulty in getting clarification and collection of bid documents, involvement of much paperwork, money and time are the frequent challenges in traditional tendering method. The study findings concluded that most contractors were willing to adopt, but technology and people factors made the foreseeable future of e-procurement/e-tendering limited to e-notification for the sector.

Though currently, the eGP Ethiopia platform has rolled out additional public offices (estimated 74); 1080 tenders published; 138 contracts awarded; and 8,000 suppliers registered ([22]; [34]), it is disclosed that there is still laxity and lag because of partial system, lack of awareness and professionals [34].

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Still thriving to include every public procurement process, the regional are launch also postponed to the future (in the coming 5 years time), which will be accomplished when the agency makes sure the system stability is improved and has ample capacity in terms of providing support for offices that will be included in the system, which is according to the deputy director general of PPPA [21].

III. METHODOLOGY

A. Study Design and Approach

The flow of the research can be explained by the nature of descriptive and exploratory research with a qualitative synthesis of the subjective opinions of selected samples. These have been considered to better define an opinion, or attitude held by participants on the subject, and to understand more details about existing problems and organizational stand were vital for this study to draw a way forward with electronic procurement for the sector. Aside from that structured interviews were addressed to bidders to assess the stand of construction organizations with e-P.

B. Data Collection and Sampling

Data has been collected through interviews and structured interviews, using purposive and snowball population sampling methods. These methods are considered to select the best respondents and to address those who are hard to reach with the recommendation of already recruited participants. As well, the knowledge area of this study needs specific experience in procurement and contract administration; it was a bit challenging to find a high response rate. Plus, the fact that procurement system of an organization is considered to be a confidential matter for organizations most were doubtful to participate. Therefore, sampling was based on the following criteria: experience in the legal construction procurement process, participants' professional background, and their major business in the study area.

C. Study Population

The major participants of the study were public officials who were at the procurement administration and contract management level, and IT experts whose businesses were based in the region. Also, construction contractors and engineers (i.e. construction bidders). They were purposively

selected based on their construction procurement experience at the admin level with knowledge and experience saturation (i.e. higher officials), business licenses being in the region (i.e. for constructors and engineers), and experts in system development and related fields which were for IT professionals. As a result, six IT professionals, three higher procurement and contract public officials, and twenty-one eligible contractors and engineers were the participants. The fact that the selected participants were those whose main business is in the region plays a major role in receiving a limited response.

D. Data Instrument Validity Check

To test the validity of the instrument used, content analysis in conjunction with face validity was conducted with eight experts in the area of construction and procurement/tendering, and research. The test was carried out until it was ensured clarity, completeness, and applicability were confirmed. There were nearly a total of twenty-eight questions in the instruments (excluding the sub-questions such as factor rating). The result was obtained by the value of each item divided by the number of experts (n=8). According to [35], for six to eight experts, the acceptable CVI value is at least 0.83. Table-I shows the detailed outcome of the content validity test. The result of I-CVI was 0.955. Hence, as per [35], the result showed the item of the instruments was relevant enough to be processed.

E. Data Analysis

The data received from the structured interviews with contractors and engineers was managed and coded using Microsoft gadgets. Thematic and content analysis were used to analyze the data and incorporate feedback obtained from the interview. The interviews which were held with higher officials and IT professionals' transcripts were computed using QDA software NVivo 12 (pro/plus). Frequencies, relative importance index, word frequency, project maps, text query, frameworks, succinct /iterating, condensation, mapping, coding, etc. were also the data analysis and presentation techniques the study adopted with the help of the program.

Table- I: Content Analysis Result

	Exper t 1	Exper t 2	Exper t 3	Exper t 4	Exper t 5	Exper t 6	Exper t 7	Exper t 8	Expert in Agreement	I-CVI	Universal Agreement
Q1	1	1	1	1	1	1	1	1	8	1	1
Q2	1	1	1	1	1	1	1	1	8	1	1
Q3	1	1	1	1	1	1	1	0	7	0.875	0
Q4	1	1	1	1	1	1	1	1	8	1	1
Q5	1	1	1	1	1	1	1	1	8	1	1
Q6	1	1	1	1	1	1	1	1	8	1	1
Q7	1	1	1	1	1	1	1	1	8	1	1
Q8	0	1	1	1	1	1	1	1	7	0.875	0
Q9	1	1	1	1	1	1	1	1	8	1	1

Q10	1	1	1	1	1	1	1	1	8	1	1
Q11	0	1	1	1	1	1	1	1	7	0.875	0
Q12	1	1	1	1	1	1	1	1	8	1	1
Q13	1	1	1	1	1	1	1	1	8	1	1
Q14	1	1	1	1	1	1	1	1	8	1	1
Q15	1	1	1	1	1	1	1	1	8	1	1
Q16	1	1	1	1	1	0	1	1	7	0.875	0
Q17	1	1	1	1	1	1	1	1	8	1	1
Q18	1	1	1	1	1	1	1	1	8	1	1
Q19	1	1	1	1	0	1	1	1	7	0.875	0
Q20	1	1	1	1	1	1	1	1	8	1	1
Q21	1	1	1	1	1	1	1	1	8	1	1
Q22	0	1	1	1	1	1	1	1	7	0.875	0
Q23	1	1	1	1	1	0	1	1	7	0.875	0
Q24	1	1	1	1	1	1	1	1	8	1	1
Q25	1	1	1	1	1	1	1	1	8	1	1
Q26	0	1	1	1	1	1	1	1	7	0.875	0
Q27	0	1	1	1	1	1	1	1	7	0.875	0
Q28	0	1	1	1	1	1	1	1	7	0.875	0
	0.786	1	1	1	0.964	0.928	1	0.964			
									S-CVI/Ave	0.955	
									S-CVI/UA		0.642

IV. RESULT AND DISCUSSION

Starting with assessing the ability of respondents through studying their position, years of experience, company involvement, etc.; the study made sure to incorporate those capable of the core knowledge of the study. Table-II presents the demography of the participants except for higher public and private procurement officials. Because the higher official selection was purposely based on their position, year of experience, and level of expertise. They all have more than

ten years of experience in the position and related work. Currently, they are in a higher management-level position. Construction experts (95.2%) had an education level of undergraduate and above, and most of them (19%) were responsible for contract administration. Additionally, programmers and information technologists were the leading respondents' specialty among the IT experts with a total of 66.6%. This was promising to get a reliable response.

Table- II: Demographics of Respondents

Data Source	Demographic Variable	Category	Frequency	Percentage
Construction Contractors and Engineers	Education	Below Undergraduate	1	4.8
		Undergraduate	10	47.6
		Above Undergraduate	10	47.6
	Current Position of work in construction	General manager	3	14.3
		project manager	2	9.5
		Construction Engineer	1	4.8
		Sustainability and Tech Consultant	1	4.8
		Office engineer	3	14.3
		Resident Engineer	2	9.5
		Supervisor	2	9.5
		Site engineer	3	14.3
		Contract Administrator	4	19.0
	Work Experience in the position	1-3 years	1	4.8
		4-6 years	13	61.9
		7-10 years	6	28.6
		More than 10 years	1	4.8
Number of projects involved	less than 5 projects	8	38.1	
	5 to 10 projects	8	38.1	
	More than 10 projects	5	23.8	
IT professionals	Specialization	Programmer	2	33.3
		Information Technologist	2	33.3
		Application Developer	1	16.7
		IT Academician	1	16.7
	Work Experience in the area	Up to 5 years	1	16.7
		6-8 years	4	66.7
		more than 8 years	1	16.7

A. Current Construction Procurement and Tendering Practice

Assessing this was important to have insight into the practice of current procurement in the sector and evaluate the challenges the construction stakeholders face. This will forward the need for e-procurement. Table-III presents stakeholders' responses for specific involvement; stages that consume the most resources; and the cost of bid preparation

and submission in current construction procurement and tendering processes. In the survey process, there was an allowance for the respondents to select more than one choice because considering their involvement might not be only in one stage.

Table- III: Current Procurement and Tendering Practice

Question	Response	Frequency	Percentage
Involvement in Construction Procurement and Tendering (Selecting more than One Part was Allowed)	Preparation of tender document	1	4.8
	Getting/purchasing/ the Tender document	8	38.1
	Analyzing the Tender	12	57.1
	Filling out the requested information on the bid	14	66.7
	Sending or delivering the bid	1	4.8
	Evaluating the tender offer	1	4.8
	Deciding on the best offer	4	19.0
	Awarding the competitive bid response	1	4.8
	Managing the whole procurement and tendering process	1	4.8
The Most Resource-Consuming Part of Procurement and Tendering in the Construction Sector (Selecting More than one Part was Allowed)	Getting/purchasing/ the Tender document	2	9.5
	Analyzing the Tender	13	61.9
	Filling out the requested information on the bid	9	42.9
	Deciding on the best offer	7	33.3
	Sending or delivering the bid	1	4.8
Average Money Spent Per Bid in the Process of Bidding/Tendering Only for Paperwork	500-1000 ETB (Up to 20 USD)	1	4.8
	1000-2000 ETB (Up to 40 USD)	5	23.8
	2000- 3000 ETB (Up to 60 USD)	6	28.6
	Above 3000 ETB (Above 60 USD)	9	42.9

Overall, for bidders of construction projects ‘filling out the requested information on the bid’ was the major task. Which is highly paper-intensive and time-consuming. Making mistakes can mean the difference between having a winning bid proposal and missing out on a coveted project [36]. According to [37] preparing or analyzing the contract documents was the leading responsibility, which was the second when it came to the bidders of the central Ethiopia region. When it comes to resource resource-consuming stage, analyzing the tender document was found to be the consuming one, as well as the finding [37] (i.e. only for a resource of time).

The finding took a different lens when assessing the expenditure of money per bid. Despite the cost of (staff, transportation, etc.) for handling of bid and the non-refundable bid processing fee, bidders spent more than 60 USD to submit a responsive bid. This includes facilities like printing and materials like paper. Which is quite expensive. One reason is most materials that are necessary

for this are imported and shortage of foreign exchange in the country [38]. To make this more difficult, a construction contractor to survive in this competitive business needs to compete on more than one bid. Also, the success rate is tight to compensate for the win. According to recent studies [39], a hit ratio of around 5:1 is considered successful. This was confirmed by higher public and procurement officers when they shared their thoughts about the main challenges in current /paper-based procurement and tendering through the interview; mentioning the high level of resource consumption (both in time and money) (see Table-IV). Studies set this as the main push factor for e-procurement ([40], [41]). Similar to the response of the bidders bid response assessment process was selected to be the stage that this challenge incurs. Since agreed it requires effort and persistence [42], time, and good eye of staff with a high level of professionalism [39]. They added evaluating the submitted bid stage for time consumption and preparing sound tender documents related to cost.

Table- IV: Public Procuring Entity Challenges in the Current Procurement and Tendering Process

Challenges	Respondents Briefing	The Specific Stage for Resource Consumption
High level of resource consumption	Both time and money consumption starting with paper, equipment, staff hiring	Bid response assessment process
Spending a lot of time in the procurement and tendering process	Each step needs care and a high level of cautiousness and accuracy	Evaluation of the submitted bid
Putting a substantial amount of budget into the process	Cost of bid document, staff payment, part-time hiring when there is an additional requirement	Preparing sound tender document

B. The Perception and Practice of E-Procurement

This is the core objective of the study. Which is to assess the need for e-procurement and the perception towards it. As presented, the government of Ethiopia launched a public

procurement platform recently at the federal level. Therefore the study assessed the region’s exposure to the platform and point of view about electronic procurement.



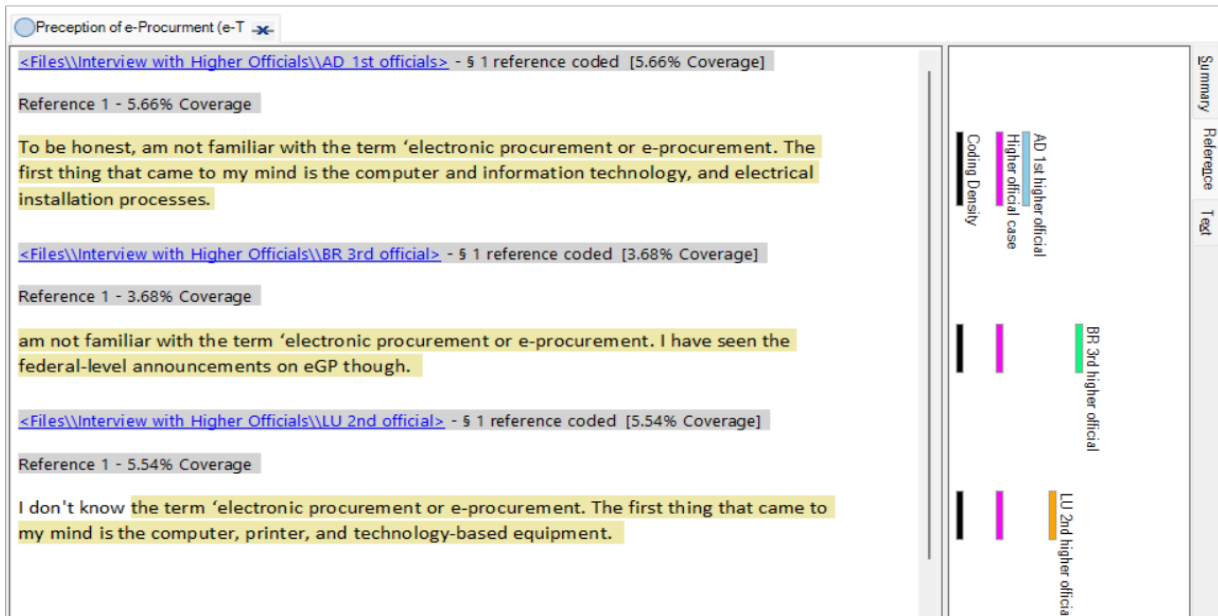


Fig. 2. Text Transcript with Code Strip of Perception of e-Procurement/e-Tender

Unfortunately, none of the officials were familiar with it. And only one of them noticed it from the Ethiopian broadcasting network and social media. Project-wise they never experienced it or got acquainted with any kind of platform concerning e-Procurement/e-Tendering. The direct interview transcript with the code strip is displayed in Fig. 2. from the NVivo 12 screenshot. They have been requested to discuss their reasoning for not even being introduced to eGP Ethiopia. Some verbatim of the interview transcript is presented as follows:

‘No, our organization hasn’t been aware by the federal level of the system of procurement and tendering, because we didn’t receive any direction from the federal level of the country as regional or zone construction bureau.’

An awareness mechanism for electronic procurement is necessary as [43] study agrees if construction stakeholders do not understand the benefits associated with automating procurement processes there will be a lack of confidence and

security in executing this new technology.

As the other informant put it, ‘No, we haven’t known about the e-procurement or e-tender, at the organizational level. But as an individual, I have seen the advertisement and news about it on social media too.’

Therefore, a brief explanation and knowledge sharing were conducted. The researchers took the time to do that before the detailed discussion on e-procurement. This allows the introduction of the system and explanation of the idea, the knowledge, and the misconceptions behind it. By doing so, willingness was assessed, and it was found that the participants were willing to usage with reasoning (see Fig. 3.). Especially with the attribute of time-saving that can come with it. This attribute was many previous researchers ([44], [45], [46]) finding concerning e-procurement and some put it as increasing transactional speed ([47], [48]).

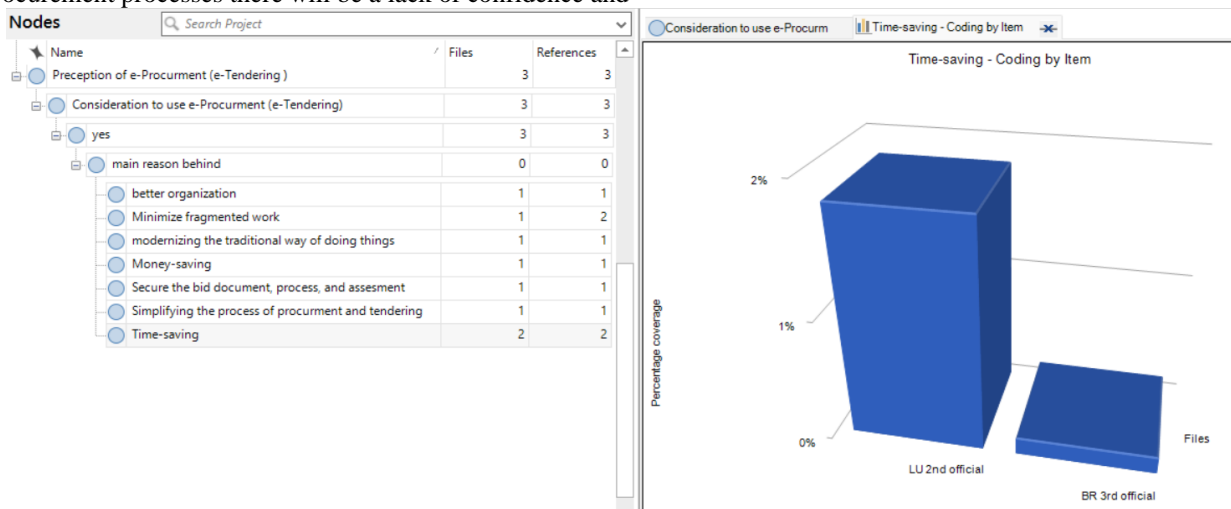


Fig. 3. Transcript Coding for the Reason Behind the Attitude for e-P/e-T

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Additionally, the bidders were addressed with ‘yes’, ‘maybe’, and ‘no’ questions to assess their willingness to use if they have the opportunity to use the electronic procurement platform.

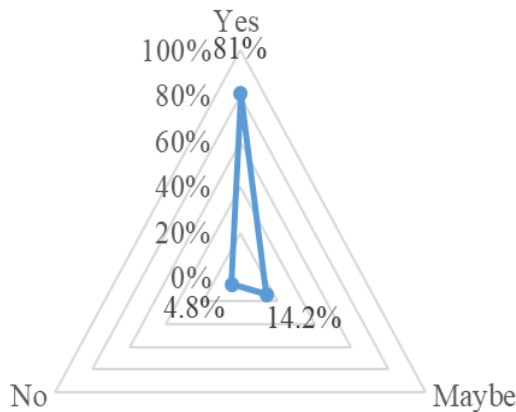


Fig. 4. Construction Bidders’ Willingness to Use E-Procurement

Fig. 4. presents that among the twenty-one respondents, 81% of them were willing to use the system if available.

Three of the respondents on the other hand were indifferent about it, which was 14.2%. One respondent which means 4.8% decided not to use it. This shows electronic procurement for the region’s construction sector has become a matter of availability.

▪ The Probable Barriers to Using Electronic Procurement

However, with every innovative concept comes a set of challenges that need to be addressed. As well, the future use of e-procurement in regional areas like the study area won’t be conceived without probable challenges. Presents in Figure 5, the lack of trained staff and shortage of infrastructures (i.e. shared with construction bidders with 84% as the first challenge (see Table 5.)) were the leading challenges for higher officials as procuring entities (, as well as in the study of ([6], [49]). Also, [50] found the availability of ICT infrastructures to be one of the top three critical factors for electronic procurement adoption in Pakistan public organizations

Nodes						Search Project
Name	Files	References	Created By	Created On	Modified By	
Probable Barriers or Challenges		0	0	LCR	2/27/2023 11:04 PM	LCR
Change resistance culture		1	1	LCR	2/27/2023 11:05 PM	LCR
Complicated work-flow		1	1	LCR	2/27/2023 11:06 PM	LCR
Corrupted individuals		1	1	LCR	2/27/2023 11:06 PM	LCR
Fragmented work		1	1	LCR	2/27/2023 11:07 PM	LCR
Lack of Technology in regional areas		1	1	LCR	2/27/2023 11:10 PM	LCR
Lack of trained Staff		2	2	LCR	2/27/2023 11:08 PM	LCR
Losing Competitiveness		2	2	LCR	2/27/2023 11:13 PM	LCR
Political situation of the country		1	1	LCR	2/27/2023 11:09 PM	LCR
Shortage of infrastructure		2	2	LCR	2/27/2023 11:12 PM	LCR
Submitting high price bid		1	1	LCR	2/27/2023 11:14 PM	LCR

Fig. 5. Matrices Coding for Node Probable Barriers or Challenges

Additionally, new insight into ‘losing competitiveness’ has been seen to be a shortcoming by the officials. This has been further discussed and explained by the interviewees concerning those who get to use electronic procurement might take advantage of it in giving high bid prices since most of the bidders (in public and private projects) still use paper-based procurement. Hence, 66.67% of the respondents

were afraid that in using an e-procurement there would be a loss of eligible bidders for construction projects just because they might not be familiar with or have a shortage of the necessary facilities for electronic procurement. Even though many researchers didn’t find this through their study, the insight of [51] finds ‘decreased competition’ a shortcoming of e-procurement.

Table- V. Factors Affecting E-Procurement

Challenges to using Electronic Procurement					
Challenges	Sum	Mean	Std. dev	RII	Rank
Legislation	62	2.81	0.90	0.70	9
Government procurement system	71	3.23	0.75	0.80	3
Region’s construction culture	72	3.27	0.70	0.81	2



Upper management support like PPA	69	3.13	0.77	0.78	6
Lack of information technology infrastructure	74	3.36	0.85	0.84	1
Costly information technology systems	70	3.18	0.80	0.80	4
Lack of technical expertise	69	3.13	0.83	0.78	6
Security of transactions	70	3.18	0.66	0.80	4
Interoperability (consistency) concerns	65	2.95	0.84	0.73	8
No realized business benefit	56	2.55	0.96	0.63	10

Specifically, for construction bidders the categories in Table V. have been made based on ([52], [53];[37]); and construction culture and government procurement system were the following challenges which had high selection rate. Earlier studies and insights [14] showed that especially developing countries face these challenges. Additionally, the fact that the construction sector is change-resistant is found to be a hindering culture of the sector for better furtherance of the work process and adoption of technology. Among many, a risk-averse culture, lack of understanding of new technology, and short-term focus were the reasons behind this barrier ([54], [32]).

▪ **Opportunities that Come with Electronic Procurement /Electronic Tender**

The probable impact of e-procurement was assessed to lead to the opportunities that come with it for the region's construction sector. The selected impact was based on the previous studies ([37]; [53]). This has been addressed by descriptive statistical analysis since the question was on a Likert scale. Table VI shows the positive perceived value of e-procurement in the bid process were 'accuracy', 'bid submission period', and 'decision-making processes in that order, as per bidder response. However, according to [37] decision-making process was the leading value.

Table- VI. Impact of Electronic Procurement

Impact of Electronic Procurement					
Factors	Sum	Mean	std. dev	RII	Rank
Communication	72	3.27273	0.7025	0.82	4
Transparency	72	3.27273	0.82703	0.82	4
Decision-making process	73	3.31818	0.77989	0.83	3
Accuracy	77	3.5	0.59761	0.88	1
Project understanding	66	3	0.61721	0.75	7
Bid submission period	75	3.40909	0.66613	0.85	2
Bidders' Responsiveness	71	3.22727	0.68534	0.81	6

Fig. 6. presents the response of public procuring entity representatives, and it is found time-saving, cost-saving,

increasing transparency, and decreasing bias and manipulation were found to be the leading opportunities.

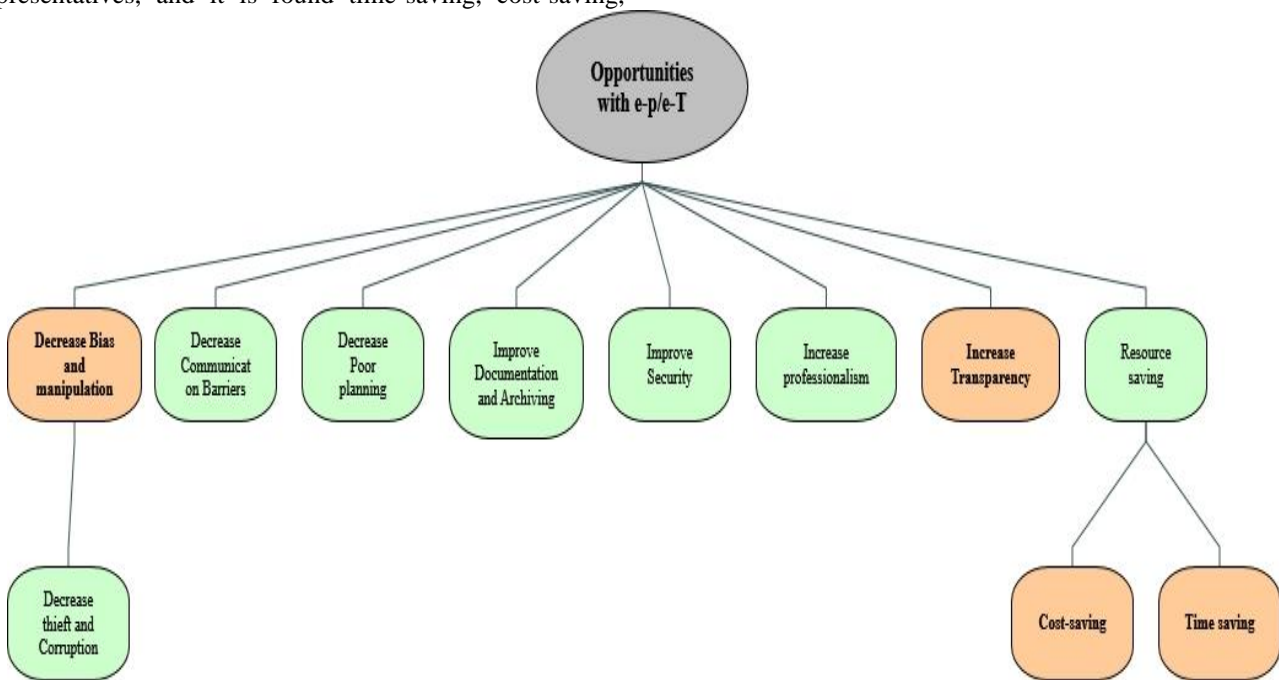


Fig. 6 Opportunities of e-P Node Model: Relationship Among Nodes

'Time-saving' has already been discussed in the previous sessions, but when it comes to cost-saving the participants further discussed it as follows:

'The amount of money we budget for the construction bid and procurement practice is high. Most of the budget has been spent on human resources and material consumption (like paper). Using the e-p system will benefit the whole process by saving money while protecting the environment too.'

Another participant succinate, '...Saving the money that has been deployed on those areas would make a significant change.'

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This is agreed by ([30]; [8]), and the researcher [55] further associated ‘cost-saving’ with a reduction in material and equipment needs, just-in-time procurement (avoiding staff and space cost), and warehouse purchasing.

‘High Transparency’ of information compared to the traditional procurement and tendering practice from electronic procurement was the major implication and result of earlier studies ([56], [57]), which is true when it comes to public procuring entity participants of this study too. It has been argued by [58] because the introduction of electronic procurement has been pointed out as a source of reduced

human preference among public officials that typically creates opportunities for corruption and bias, and for good procurement practices and principles.

C. Enhancing Mechanism of e-Procurement Practice in the Construction Sector

Overall, the comparing diagram for higher officials' and IT experts' perceptions of enhancing mechanisms for implementation of e-procurement node has been displayed in Fig. 7.

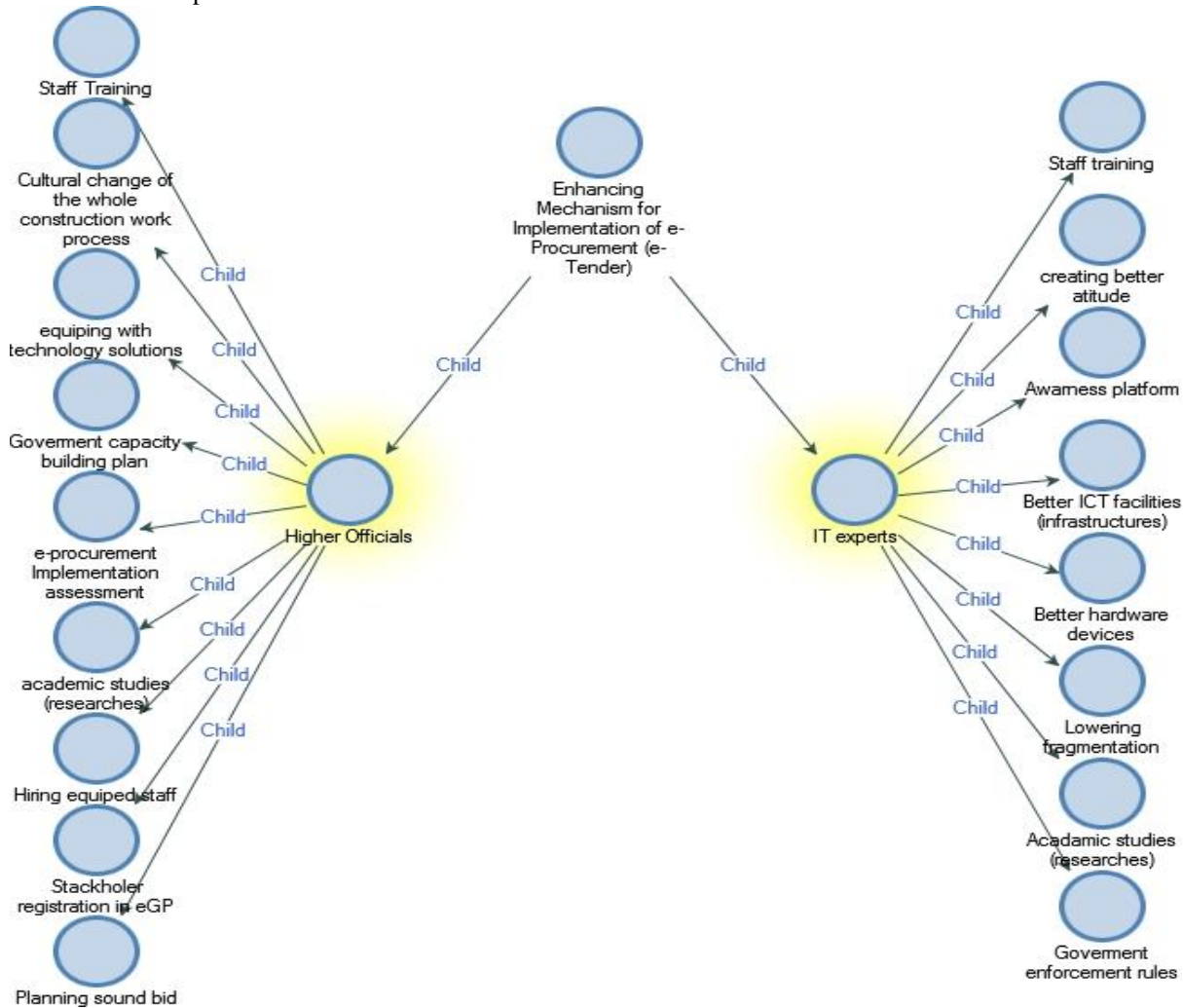


Fig. 7. Comparing Diagram for Node 'Enhancing Mechanism for Implementation of E-Procurement'

Among the two interview groups government capacity building plan, awareness platform, equipping with technological solutions, and staff training were the recurrently suggested improving the mechanism for electronic procurement implementation in the regional sector. When it comes to government capacity building programs and staff training, FPPA has been training the staff on the federal level before it was officially launched, and as per the researcher’s interview result many pieces of training were identified (a total of 9 modules) were prepared [6]. Also, almost all modules have been trained to FPPA staff and other pilot procuring entities and virtual training has been

given to procurement and property management directorate staff. Unfortunately based on the findings it is hard to say this for this regional area of the country. [59] put this as a crucial matter for professional development and strengthening the construction business in an electronic procurement implementation plan.

The other factor that gained the most frequent suggestion by IT experts was awareness platform; 50% percentage with three references (among the six IT participants (Fig. 8.)). Because unclear competitive advantage was one of the hindering factors to the adoption of technologies [60].

Nodes						
Name	Files	References	Created By	Created On	Modified By	
Enhancing Mechanism for Implementation of e-Procurement (e-Tender)	0	0	LCR	2/28/2023 6:43 AM	LCR	
Higher Officials	0	0	LCR	2/28/2023 6:44 AM	LCR	
academic studies (researches)		2	LCR	2/28/2023 6:52 AM	LCR	
Cultural change of the whole construction work process		1	LCR	2/28/2023 6:47 AM	LCR	
e-procurement Implementation assessment		1	LCR	2/28/2023 6:50 AM	LCR	
equipping with technology solutions		2	LCR	2/28/2023 6:48 AM	LCR	
Government capacity building plan		3	LCR	2/28/2023 6:48 AM	LCR	
Hiring equiped staff		2	LCR	2/28/2023 6:53 AM	LCR	
Planning sound bid		1	LCR	2/28/2023 6:55 AM	LCR	
Stackholer registration in eGP		1	LCR	2/28/2023 6:54 AM	LCR	
Staff Training		1	LCR	2/28/2023 6:46 AM	LCR	
IT experts	0	0	LCR	2/28/2023 6:45 AM	LCR	
Academic studies (researches)		1	LCR	2/28/2023 7:05 AM	LCR	
Awarness platform		3	LCR	2/28/2023 7:00 AM	LCR	
Better hardware devices		1	LCR	2/28/2023 7:02 AM	LCR	
Better ICT facilities (infrastructures)		1	LCR	2/28/2023 7:01 AM	LCR	
creating better atitude		1	LCR	2/28/2023 6:59 AM	LCR	
Government enforcement rules		1	LCR	2/28/2023 7:07 AM	LCR	
Lowering fragmentation		1	LCR	2/28/2023 7:04 AM	LCR	
Staff training		2	LCR	2/28/2023 6:58 AM	LCR	

Fig. 8. Node Matrices Code for ‘Enhancing Mechanism for Implementation Of E-P

As one of the IT experts said;

‘I barely knew the detailed process of construction work let alone the construction procurement stage. Seminars should be prepared for us and fellow experts in a particular area for us to see the gap in the construction sector and come up with technology solutions.’

The other participant emphasized;

‘... knowledge-sharing platforms for both sectors are necessary. The solution only comes in collaborative work. I doubt the construction stakeholders come to IT experts for the problems they face, why should they? Without knowing what can be done through ICT interventions?’

Even though it has few similarities with staff training, the respondents were considering seminar forms or industrial linkage forums which will make the two sectors closely work together so that one can be aware of the gaps and solutions. Simple but profound acts like this sought to make a difference tremendously in these sectors which can collaborate to address challenges.

V. CONCLUSION

The purpose of this research was to study the adoption level and readiness for electronic procurement. In the midst of that assessing the hindering challenges and the opportunities that can come with it for the Central Ethiopia Regional state was also part of it. Even though the government of Ethiopia is on the path to digitalizing public procurement with ‘eGP’ unfortunately regional areas like the central Ethiopia region are still using the traditional method of the procurement process for its construction projects. Also, the study reveals that the public construction sector has nil practice of electronic procurement while facing a high level

of resource consumption in time and budget in the current procurement process.

Also, it is noted that there is a knowledge gap in the public procuring agency towards e-procurement and the sector stakeholders didn’t receive any awareness from the federal government about e-P or eGP. Therefore, brainstorming and sharing the basic knowledge behind the system was part of the research task. Yet, it is found that almost a total willingness to use the system for attributes of enhancing accuracy, efficient bid submission, better decision-making process, and increasing transparency; probable barriers such as lack of trained staff, shortage of infrastructures, and country’s construction culture. Additionally, a unique finding of ‘losing competitiveness’ was another hindering factor. It is feared that those who are experienced with the system will give a higher bid price than others with the traditional procurement process.

Nevertheless, regional and federal government intervention is thought necessary for staff training and timely capacity-building programs, developing better ICT facilities (infrastructures), and creating an awareness platform between the construction and IT sector so that the current procurement and tendering practice benefit from electronic procurement. Furthermore including actual practitioners, widening the research area, and developing a system with an adaptability test can provide more to the sector and stakeholders.

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AUTHORS PROFILE



Hanna Moges Dereje received her B.Sc. degree in Construction Technology and Management from Addis Ababa University, Ethiopia. Also, she had her M.Sc. degree in on same area. She currently works as a faculty member of Engineering and Technology in the Construction Technology and Management Department at Wachemo University, Ethiopia. Who is now interested in the area of sustainable construction project and management research and also published a few in the area of contractors' competitiveness.



Getnet Assefa Habete received his B.S.C. Degree from Bahirdar University, Ethiopia in Information Systems and his MSc. Degree from Punjabi University, Patiala India. He is currently a college member of engineering and technology, in the Information Systems department at Wachemo University, Ethiopia. He has been part of many system development-based researches and community projects for the past few years and now he is incorporating that with actual industry-based works in Ethiopia.

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