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Smart Contract Tools for Addressing the Menace of Payment Challenges to Contractors on Construction Projects

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INTRODUCTION

- Payment process in Ghana's construction industry is most often unduly ineffective and lengthy,
 - Due complex stakeholder interaction and approval process.
- Governments of many other countries attempted to address the payment-related issues in the construction industry, through
 - legislation,
 - novel types of payment agreements,
 - conventional information technology solutions, and
 - supply chain management best practices.

INTRODUCTION CONTINUED

- Payment challenges remain one of the major issues to address in the construction industry;
 - Ghana is not an exception.
- Applications of **blockchain technology**, a reliable and distributed data storage system, and
- **Smart contract** are becoming more popular as remedies for challenging inter-organizational processes.

SMART CONTRACTS

- Cryptographer Nick Szabo first proposed the idea of a "smart contract" as a computerized transaction mechanism in 1994 (Hamledari & Fischer, 2021).
- A self-executing contract or set of rules between two or more parties known as a "smart contract" exists on a distributed, decentralized blockchain network and contains the details of the agreement directly encoded into lines of code (Dixit, et al 2022; Nanayakkara, et al., 2019)
- Smart contracts are executable codes that operate on top of blockchain technology.

SIGNIFICANCE OF SMART CONTRACTS

- Without the aid of a reliable third party, smart contracts enable, execute, and enforce agreements between unreliable parties (Khan, et al, 2021).
- Network automation and the capacity to convert paper contracts into digital ones were made possible by smart contracts (Khan, et al, 2021).

MOTIVATION



- Smart contracts reduce paperwork and are dependable, efficient, and effective at upholding commitments made between untrustworthy parties.
- Smart contracts enable a digital transaction to be integrated into the system and then automatically sent to the contract parties.

ISSUES IN THE CONSTRUCTION INDUSTRY

- Payment delays
- Cost overrun
- Long payment cycle
- Partial payments
- Non-payments
- Cash flow difficulties
- High cost of finance
- Payment disputes

Causes of Payment Challenges - Construction Industry

- Payment culture of the industry (work first and get paid later)
- Time overrun of projects caused by poor planning
- The attitude of the payer (dishonest/unethical conduct)
- Structure of the industry (Presence of many commercial parties)

Effects of Payment Challenges - Construction Industry

- 1.6% of income is lost in the construction industry due to payment delays.
- Payment delays results in over-pricing against the risk of delay.
- A loss to a client that equals 0.05% of the contract sum when the interest rate is 5% is created from just a one-week payment delay.
- project abandonments, disputes, low quality, and high cost of final products.
- In summary there are cost and schedule overruns, cashflow challenges, and company failure.

Research

- Construction professionals in Ghana participated in a survey to determine the severity of these challenges and the ability of smart contracts to provide solution
- The majority (61.2%) had undertaken more than 10 projects and (62.6%) had more than 5 years of working experience.
- All respondents were involved in payments issues under various contracts.

Severity of the Various Payment Challenges

Payment Challenges	Total Observation	Mean	RII	Rank
Payment delays	75	3.95	0.79	1st
Long payment cycle	75	3.73	0.75	2nd
Non-payments	75	3.65	0.73	3rd
High cost of finance	75	3.63	0.73	4th
Cost overrun	75	3.63	0.73	5th
Partial payments	75	3.51	0.70	6th
Cash flow difficulties	75	3.36	0.67	7th
Payment disputes	75	3.35	0.67	8th
Payment hold	75	3.28	0.66	9th
Insecure payments	75	3.20	0.64	10th
Retention	75	2.99	0.60	11th

Cronbach's alpha = 0.886

Causes of Payment Challenges in the Construction Industry

Causes of Payment Challenges	Total Observation	Mean	RII	Rank
Payment culture of the industry (work first and get paid later)	75	4.08	0.82	1st
Time overrun of projects caused by poor planning	75	3.99	0.80	2nd
The attitude of the payer (dishonest/unethical conduct)	75	3.96	0.79	3rd
Work done exceeding allocated budget	75	3.95	0.79	4th
Disputes over the quality of work	75	3.89	0.78	5th
Easy entry of players with little/no capital backing	75	3.87	0.77	6th
Rework of errors during construction	75	3.84	0.77	7th
Over-reliance on client/payer	75	3.80	0.76	8th
Entrance with low capital	75	3.77	0.75	9th
Lack of knowledge and experience in the field	75	3.76	0.75	10th
Structure of the industry (Involvement of many commercial parties)	75	3.75	0.75	11th
Requirement and design changes	75	3.75	0.75	12th

Causes of Payment Challenges in the Construction Industry

Disputes regarding payment claims	75	3.73	0.75	13th
Delay in certification	75	3.73	0.75	14th
Complications from contractual conditions	75	3.72	0.74	15th
Improper supervision and financial control	75	3.71	0.74	16th
The standard form of contracts used (right to payment and non-payment)	75	3.55	0.71	17th
Project delays because of supply chain issues	75	3.49	0.70	18th
Lack of trust among members	75	3.48	0.70	19th
Legislative procedures (Contract Act)	75	3.33	0.67	20th

Cronbach's alpha = 0.922

Potential for Smart Contract to Resolve Payment Challenges

- Majority (69.3%) of the respondents were of the view that increased trust and reduced human influence in contract processes were properties of smart contracts that can help eliminate some causes of payment challenges.

Potential for Smart Contract to Resolve Payment Challenges

When introduced to the overall concept and process of smart contracts, approximately three out of four participants (72.0%) alluded to the fact that smart contracts can help eliminate many payment challenges in the Ghanaian construction industry.

Potential efficiency of Smart Contract to Resolve the Identified Payment Challenges

Payment Challenges	Total Observation	Mean	RII	Rank
Long payment cycle	75	3.92	0.78	1st
Payment delays	75	3.91	0.78	2nd
Non-payments	75	3.88	0.78	3rd
Insecure payments	75	3.88	0.78	4th
Payment disputes	75	3.77	0.75	5th
Payment holds	75	3.76	0.75	6th
Cash flow difficulties	75	3.68	0.74	7th
Partial payments	75	3.68	0.74	8th
High cost of finance	75	3.67	0.73	9th
Retention	75	3.67	0.73	10th
Cost overrun	75	3.59	0.72	11th

Cronbach's alpha = 0.933

CONCLUSION

- Key decentralized properties of smart contracts technology such as
 - immutability,
 - integrity, transparency,
 - accountability, and efficiency
- can help resolve payment challenges associated with the construction industry.

CONCLUSION

- The critical obstacles or major causes of payment challenges such as
 - ‘Industry’s payment culture’,
 - ‘inadequate planning,
 - and payer's attitude (dishonest/unethical behavior)
- Among others can be effectively reduced using smart contract technology.

CONCLUSION CONT'D

- Smart contracts
 - speed up the approval and payment process,
 - reduce the number of payments that are held back, and
 - create a private payment environment.
- It is therefore relevant that the technology is embraced in order to resolve the challenges.

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Thank You