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Digital Transformation and Smart Property Contracts Registration in Egypt Using Blockchain Technology

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Abstract—In recent times, an increasing fascination with cryptographic-based blockchain technology has emerged. Blockchain is a decentralized, distributed database functioning as a comprehensive ledger for storing, timestamping, and encrypting data. Comprising interconnected blocks, this technology is openly accessible and immutable. Smart Property Contract registration are self-executing contracts that are subject to the terms of the agreement between the seller and the buyer. The contract defines the pre-programmed contractual rules so that they are executed when the input data meets the mentioned conditions between the two parties. Smart Property Contract Registration are written in one of the programming languages such as AssemblyScript, JavaScript, and Solidity. Blockchain technology and Smart Property Contract Registration can play a vital role in Property and smart cities in the future. The core aim of this thesis is to design a proposed model for registering Smart Property Contract Registration in Egyptian Egyptian Property Registry Office and solve the traditional registration problem of slow registration and high cost and insecure. The proposed model was proposed and implemented on the NEAR platform. Egyptian Property registration system was built using programming code for Smart Property Contract Registration written in a high-level language such as AssemblyScript and HTML, JS, and React Js programming code, and also present research uses a questionnaire study to ensure the validity of the proposed model. We conducted a questionnaire by asking a set of questions to those interested in the subject of blockchain and Smart Property Contract Registrations. The result showed that the adoption of blockchain technology in Egypt will be beneficial in terms of easy access to Property transactions in a quick time, reliability, and cost reduction.

Keywords- Smart Property Contract Registrations, Blockchain, Property, Ethereum Platform, NEAR Platform.

I. INTRODUCTION

The interest in blockchain technologies and Smart Property Contract Registrations is growing up every day [1]. Smart Property Contract Registrations have enabled new types of interactions like Property Registration [2]. Property registration process in Egypt is still unstable with traditional contracts. In Egypt and many other countries throughout the world, registering Property is a rather drawn-out process and the procedure of unit registration also involves a lot of intermediaries [3]. Unit registration is validated without following the lengthy process of unit associated with the unit properties and without any dispute in unit ownership. When all authorities are on a single platform, blockchain technology will provide transparency, high security, and a dispersed environment. [4]. The main goal of this study is to propose a formal model for validating the law compliance of Smart Property Contract Registrations and to determine potential responsibilities. The suggested model expedites the registration of units and makes it simpler for buyers, sellers, and government registrars to transfer ownership of units from a seller to a new buyer. The model is implemented by creating a distributed system that store all the transactions made during the process of unit buying. The solution we are attempting to develop is built on Near Platform, which will store every transaction done throughout the transfer of unit ownership process.

II. BACKGROUND

We will briefly introduce and explain some fundamental ideas in blockchain technology, encryption, and related ideas like Smart Property Contract Registrations in this part. Blockchain technology is the newest technology in the recent decade, and the concepts of blockchain and bitcoin were proposed in 2008 by someone Satoshi Nakamoto [5]. Blockchain is an immutable ledger that makes it easier to record transactions and track assets in a corporate network. Blockchain is a sort of decentralized database [6]. Blockchain records transaction histories as digital data that is time-stamped, hash-valued from previous blocks, and connected to the following

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block [7]. An asset may be tangible, such as a car, home, currency, or unit, or ethereal, such as copyrights, intellectual property, or a registered trademark. On a blockchain network, anything of value can be recorded and sold, reducing costs and risk for all parties, and radically enhancing the security of transactions in banking, supply chain, and other transaction networks. [8]. This technology can assist in resolving numerous business and industrial issues, such as trust, transparency, security, and data processing dependability [9].

A. Blockchain Network Types

There are three types of blockchain like public, private blockchain, and federated, or consortium blockchain. In a public blockchain, anyone can join the network at any time, verify the transaction, and take part in the consensus-building process without revealing their identity beside send and read transactions of each other [10]. Start validating blocks and transmitting transactions to networks to give users rewards for doing so and to remove restrictions from a public blockchain. Consider bitcoin and Ethereum [11]. In consortium or Federated Blockchain, everyone is read and writes the transactions will be verified by a certain set of nodes, and have faster and provide higher scalability and transaction privacy [11]. This kind of blockchain, which offers the benefits of a public ledger run by a group rather than a single company, might be referred to as partially private or partially decentralized. For example, R3, Cord [12]. A private blockchain is a private network for companies or banks, except one, has the permission to do so and has strict authority management on data access, and it has a group of nodes that have prior knowledge of one another but do not trust one another. For example, Monax, Multichain [11].

B. Blockchain Characteristics

Blockchain has many features that it is very attractive for solving many issues. Decentralized is the core characteristic of blockchain is that it no longer relies on centralized nodes to record, store, and update data; instead, it may be recorded, saved, and updated in a distributed manner [4]. Any records that will be retained and cannot be altered unless a single person has control of more than 51% of the nodes simultaneously are said to be immutable [13]. The majority of blockchain systems allow for open source development, public record checking, and the creation of any application using blockchain technology [14]. A transparent blockchain system is a data record that is transparent to each node. Autonomy of every node on the blockchain system may safely transfer or update data due to the consensus basis [15]. Anonymity blockchain technology solved the problem of trust between nodes. Therefore, data transfers and even transactions can be anonymous if only the blockchain address of the recipient is known [14]. Blockchain security is superior because there is no single point of failure that could bring down the entire network. This makes the mechanism resistant to attempts to alter a transaction. Enhanced capacity thousands of cooperating devices can increase the capacity of an entire network [4].

C. Blockchain Security

Due to the level of security that blockchain technology offers, its use has been growing recently. Additionally, blockchain provides a novel method for storing data and carrying out transactions [16]. As blockchain uses distributed databases, tampering with data is much tougher. A group consensus protocol is used to validate transactions on the blockchain, which is spread among millions of computers and can boost security in a variety of fields. The data are encrypted in accordance with a rule [7]. Since blockchain technology has advanced so quickly, Smart Property Contract Registrations have gained popularity in the aspects of environmental security.

D. Blockchain Consensus Algorithm

The consensus algorithm is a sets-based protocol for reaching an agreement dynamically, and a consensus emphasizes that the entire set could benefit by reaching a consensus. The consensus algorithm seeks to guarantee the existence of a single transaction history and the absence of any incorrect or contradicting transactions within that history [16]. A proof-based consensus algorithm, such as PoW or PoS, works on the fundamental tenet that, among the many nodes joining the network, the node that provides adequate proof will be granted the authority to append a new block to the chain and get the reward. This is shown as follows: Evidence of Work POW which used to confirm transactions and add new blocks to the chain. In order for all nodes to agree on the newly added block, miners must compete with one another to solve a challenging puzzle in order to earn the right to do so. This allows them to complete transactions on the network and earn rewards. A significant amount of electrical power and resources will be used when calculating (PoW), also known as "mining" [17]. According to the Proof of Stake, (PoS) concept, a person's ability to mine or verify block transactions depends on the number of coins they currently possess. This implies that a miner has higher mining power the more Bitcoins they own. There is no need for expensive CPU resources for Proof of Stake [18]. Proof of Authority (PoA) is a consensus process that generates blocks utilizing reputable and trusted validators, giving a network computing power and enabling comparably faster transactions [17].

III. RELATED WORK

With the heavy reliance that is growing every day on blockchain and Smart Property Contract Registrations, Smart Property Contract Registrations are one of the most crucial characteristics of a modern economy, both currently and in recent years.

[19] P rovided Smart Property Contract Registration-based solutions to address new opportunities and challenges while enhancing security and information management. Based on blockchain technology, the authors created a model for Smart Property Contract Registrations that is a programming language class with fields and functions that users may interact with by sending transactions to their "address" in the blockchain. According to the findings of the study, developers must be able to incorporate the internet of things (IoT) into their ,systems and processes as well as provide innovative sustainable services. Since the IoT is expected to exist in a variety of "domains" and "contexts" over the course of its lifetime, it will open up possibilities for innovative new ,applications that will merge the real world with the virtual one

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producing vast amounts of data [20]. Created adecentralized application based on blockchain technology for exchanging Internet of Things sensor data, and they showed how different problems were solved throughout the development process. Their findings demonstrated that blockchain technology enables users to conduct peer-to-peer transactions on the Ethereum blockchain using cryptocurrencies and come up with strategies tomaximize the value of data produced by Internet of Things sensor [21]. Introduced a blockchain-based proof of delivery architecture for digital assets. The authors designed, implemented, and rigorously tested a framework with multiple mechanisms and algorithms to automate payment, resolve disputes, and set penalties to incentivize participants. The findings demonstrated that blockchain and Ethereum Smart Property Contract Registrations provide immutable and traceable contracts, meet key security requirements, and are secure against common attacks such as Man in the Middle and replay attacks [2]. Proposed a detailed design for a Smart Property Contract Registration and then examined a use case involving the rental of commercial and residential buildings. Analysis, design, and implementation were used to build blockchain technology use cases. During analysis, the authors collected and reviewed blockchain application specs. Identified parties, entities, functions, and linkages. The authors used Solidity to programme the Smart Property Contract Registration. According to study findings, the blockchain allows unit lords and tenants to create a secure, distributed, and shared decentralised ledger of all assets and transactions.

[22] C reated a blockchain application to speed up Dutch office block transactions since it was hard to identify property attributes and data quality was low. Stakeholders were questioned. Interview findings are utilized to create a blockchain solution and verify the model. Their findings demonstrated that the blockchain solution improves the transaction process for office buildings in the Nether-units and the understanding of specific assets.[23] Suggested an an elastic, low-cost data carrier architecture for Smart Property Contract Registrations in a blockchain-enabled IoT environment requiring communication with external off-chain data without subscribing to any filter at the Ethereum node. Mission Manager, Task Publisher, and Worker make up the data carrier architecture for a Smart Property Contract Registration to interface with surface data sources in a blockchain-enabled IoT context. Mission Manager consists of front and back; Task Publisher will collect transactions on the Ethereum node, filter unconcerned transactions, decode, and send a generated task for publishing for every pending block; and Worker will retrieve data consistent with Task Publisher's task and encode data with the application binary interface. The proposed data carrier system was more effective, flexible, and economical [24]. Designed decentralized storage system Interplanetary File System and the Ethereum service and presented the system architecture and design details for Ethereum Smart Property Contract Registrations, including entity relations, sequence diagrams, and algorithms used to control participant transactions. In recent years, fake footage images, audios, and videos have been disseminated, potentially altering reality and weakening trust. The suggested blockchain-based system and generic architecture verified digital assets

including movies, audio, and photos According to[25]. South Africa's important estate transaction process is ineffective and causes more problems due to growing dependence on third parties and manual processes, which increase transaction costs and delay property transactions. The researchers used two models: the first shows the current South African property transaction process, and the second shows how to use blockchain technology. Land with blockchain minimises transaction time, prices, and third parties. Their findings showed that using land with blockchain improves efficiency, reduces costs and third parties, and speeds up transactions.

[26]. Discussed digitizing land registration and the need for blockchain instead of traditional storage technologies. The authors implemented a buyer-seller protocol on Ethereum using Smart Property Contract Registrations, blockchain technology, and the Solidity programming language to store documents in IPFS (Inter-Planetary File System) and present a user interface instead of a command-line application. Their findings demonstrated that the Ethereum platform where sellers and purchasers exchange land provides data immutability and may beutilized to track land history .

[27]. Presented a method for tokenizing PropertyA ssets by utilizing Ethereum, thereby making the process secure and efficient. Tokens are issued initially via a security token offering and Smart Property Contract Registrations. Their findings showed that tokenizing assets issuing a blockchain token, such as a security token, that digitally represents a real tradable asset ,provides many benefits, including liquidity faster and cheaper transactions, transparency, and accessibility.

[19] Created a framework and registration to decentralize internet of things application data in smart cities and to highlight the problems, dangers, and potential of implementing blockchain in data-intensive situations. Smart Property Contract Registrations can be designed and implemented to achieve different data management policies, which is critical in complex inter organizational environments in the public sector .

The authorsanalyzing the risks and challenges of IoT data management, including privacy and data security issues. IoT data, in particular, enables the smart city concept by collecting, storing, integratinganalyzing and mining large amounts of , data and securely and efficiently managing data from sensors, cameras, and other devices to create a range of intelligent applications[28]. Presented a blockchain-based authentication approach for safe Property and unit transactions for registration data that is transparent, and does not need a specialized trust management mechanism. Each user may request unit record information and get digital signatures from the registry, which builds confidence. Researchers found that an open catalogue of unit registration information would solve the unit register system's authentication issues [29]. Proposed a blockchain based property transaction platform The . outcomes showed that the seller can directly release information about the Property sale, which is obtained from the registration department system database, ensuring the accuracy and comprehensiveness of the information viewed by the purchaser through the platform. Because of the blockchain's decentralization buyers and sellers can directly trade, ensuring , the contract's traceability and irreversibility [30]. Examined the security concerns related to blockchain-based transactions

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in 5G mobile networks and provided a method for policy formulation and authentication of financial transactions based on Smart Property Contract Registrations in next-generation mobile networks in order to safeguard customer data. The researchers also created a formal model, FPM-RBAC, and examined security policy guidelines for Smart Property Contract Registrations in 5G networks. Their findings ,demonstrated the relevance of using cryptocurrency apps mobile digital payments, blockchain applications, and Smart Property Contract Registrations in 5G networks for financial transactions [31]. Suggested a Smart Property Registration based private blockchain forProperty transactions The authors . noted registration Property issues like high transaction fees, a lack of transparency, fraud, and the middleman's undue influence and commissions. The property industry is ready to :benefit from blockchain. The authors' system has four layers user interface, control, service, and data, which is a blockchain that serves as the system's database. Their findings showed that ,immutability of the block-chain ledger and transactions personal digital keys for contract parties, and digital payment can provide a safe space for the Property business.

IV. PROPERTY SECTOR IN EGYPT

The Property industry in Egypt is one of the most lucrative industries, with returns increasing annually Smart Property Contract Registration ,s have enabled new types of interactions such as the registration of Property, which is still unstable with traditional contracts. Registration of Property in Egypt and elsewhere is slow, difficult, and reliant on a number of intermediaries. With blockchain's involvement in Property registration, we can quickly validate ownership ofProperty assets without a lengthy process and without any dispute when all ,authorities are on a single blockchain platform with transparency .high security, a distributed environment, and a distributed ledger This study proposes a formal method for ensuring compliance with smart contract laws and determining liability. Developing a distributed system that maintains transactions securely in order to expediteProperty asset registration and simplify asset transfers for purchasers, sellers, and government registrars. Traditional Contract Registration in Egypt is conducted through several procedures and require different documents, which are:

1. Fill out the Property registration application form and attach the required documents related to each form.
2. A copy of the national identity (ID) card of the seller and buyer.
3. Data indicating the original identity of each party.
4. The legal basis for the application for registration (original sales contract for the unit).
5. A cadastral report from (the Military Survey Department, the Ministry of Planning, the Central Agency for Public Mobilization and Statistics, or any other cadastral office whose work is approved by these authorities).
6. A building permit for the Property subject of the application, if it was established after July 1, 1992, or any document stating that it was established before that date.

The steps that must be followed to complete the registration in the Egyptian Property Registry Office:

1. The citizen goes to the Property registry office in which the Property to be registered is held.
2. Registering the data on the form prepared within the Property Registration Office, according to the specific case of the property, and its value is 100 pounds.
3. Submitting the original required documents, which are the sale contract, whether final or preliminary or evidence of possession for a period of 15 years, in addition to submitting an accompanying receipt.
4. A digital cadastral statement from any of the 5 bodies approved by the law.
5. Paying fees that start from 500 pounds, and the maximum limit for Property registration fees is 3900 pounds.
6. The applicant acknowledges the validity of all data and documents submitted.
7. Examination of the application and it will be completed within 30 days.
8. Considering the objection from the concerned parties to the registration within 7 days.
9. Approval or rejection of registration.

V. METHODOLOGY FOR REGISTERING SMART PROPERTY CONTRACT REGISTRATIONS IN EGYPT

Property registration in Egypt, as in many other parts of the globe, is a tedious, expensive, and exhausting process. There are multiple intermediaries involved in the registration of Property assets. Developing a system that not only accelerates the Property asset registration process but also makes it easier for purchasers, vendors, and government registrars to transfer ownership of Property assets from the previous owner to the new owner. Creating a distributed system that stores all transactions made during the process of buying Property assets and exploring the possibilities and problems solved by using a blockchain-based system for Property asset ownership transfer that stores all transactions made during the process of buying Property assets.

This paper presents a model for purchasing and selling Property assets as well as templates for Smart Property Contract Registrations for users. The proposed model makes the Property asset registration procedure more robust and reduces instances of fraud. Validation of Property assets is possible when using the proposed model because immutable transactions are stored in the public ledger. It is crucial to have accurate records that identify the current owner and provide proof that he is indeed the owner, as well as protect the owner's rights and prevent sale fraud. Resolve disputes and verify that ownership has been transferred accurately. The proposed model was constructed to achieve smart unit registration with the Egyptian Property Registry Office. The basic researchmethodology is based on the following steps: first, identifying the basic preliminary steps necessary to implement the proposedmodel :second , explaining the steps followed and proposed by researchers to register Smart Property Contract Registrations, which is the stage of making a prototype for the proposedmodel :third ,

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implementing the proposed preliminarymodel and testing it by researchers, fourth: e valuate the prototype of the proposed system.

A. *Preliminary steps for implementiong the proposed model*

Prior to the implementation of a smart system for registering Property units, the land, structures, and units must be subdivided and a clear strategy for Property proprietors must be developed. Therefore, the researchers proposed three preliminary steps prior to implementing the proposed model, as described in this section.

Phase one: unit classification and division
We have divided the unit and classified it based on whether it ,is a residential unit, an industrial unit, or an agricultural unit ,and given the code to Egypt as well as each Governorate region, and type of unit for easy registration on blockchain Table 1 presents an example of units' classification and units 'codes.

Phase two: Assignment of units
The buyer applies to the ministry of housing and urban communities to purchase a unit plot, and the competent authority examines the required documents, assigns the unit's location, and determines the unit's value. The buyer then pays the unit's value.

Phase three: Obtaining a building permit (District)
The buyer of the unit submits the documents indicating ownership of the unit, such as the ownership contract and the owner's national ID card, and the location of the unit in order to obtain a building permit for an apartment building from the governorate (District) of the unit site and submit a statement explaining the possibility of building on the unit, as well as submitting the engineering drawings of the building and payment. The buyer pays the necessary financial fees for these procedures, and after reviewing the documents, the district extracts from the Planning Department a statement of the site's validity and the construction requirements, as well as a building permit specifying the number of floors and units allowed to be constructed.

TABLE 1: AN EXAMPLE OF UNITS' CLASSIFICATION AND UNITS' CODES.

COUNTRY CODE	GOVERNORATEs CODE	REGION CODE	TYPE OF LAND CODE	STREET CODE	BUILDING CODE	FLOOR CODE	EXAMPLE (TXN HASH) OR UNIT CODE
EGYPT 002	CAIRO 02	NASR 01	RESIDENTIAL R	ABAS AL AQAD S000001	BUILDING B0001	F001-A04	002-02-01-R-S000001-B0001-F001-A04
EGYPT 002	ALEXANDRIA 03	EL NAHDA 04	AGRICULTURAL A	EL AMERIA S000125	VILLA V0010	F01-A02	002-03-04-A-S000125-V0010-F01-A02
EGYPT 002	EL MANSORA 15	TOREAL 11	COMMERCIAL C	EL GALAA S000200	SHOP S0060	F002-A03	002-15-11-C-S000200-S0060-F002-A03

B. *A Proposed Model for Registration of Smart Property Contract Registrations in Egyptian Property Registry Office*

This research presents a model for purchasing and selling units and a template for designing Smart Property Contract Registrations for users. The proposed blockchain-based unit record registration and administration process is detailed and illustrated in Figure1 Implementation of the proposed model for the following entity (Property Registration and Documentation Authority) is described in detail below.

Step 1: Purchasing an Apartment
We go to register the flat after purchasing it from a Property developer, Housing and Development Bank, etc.
Step 2: Registering in the Documentation Authority
Both the vendor and buyer must provide the Property Registration and Authentication Authority with proof of flat ownership, including the original sales contract and a valid government-issued identification card.
Step 3: Paying Registration Fees
Pay financial and tax fees imposed upon Apartment.
Step 4: Reviewing and validating Documents
All apartment-related government agencies, such as the Governorate (District) and Ministry of Housing, Utilities, and

Urban Communities, validate all documents submitted by the vendor and buyer.
Step 5: Registering a New Intelligent Contract
After data encryption and the addition of a new block, Smart Property Contract Registrations record new contract data on blockchain technology and add a new block.
Step 6: Assigning Property Identifier (TXN Hash)
The certificates (property ID) of ownership are generated and registered on the blockchain, the buyer is given a property identity (ID) that includes all unit details, and Txn Hash issues a transaction number or takes the (property ID) card.

Smart Property Contract Registrations implement the sale and generate a digital agreement using sale details, the sale price, the agent's name, the buyer's name, etc., and preserve the records in blockchain. Access contracts are available for legal consumers. Our model is composed of Smart Property Contract Registrations and is implemented on the NEAR platform, making the system secure.
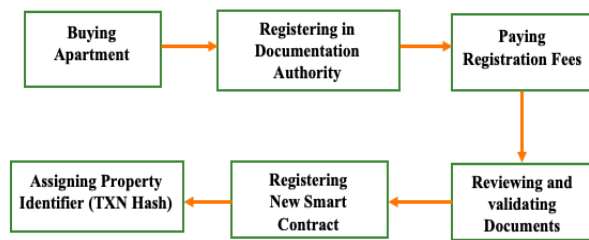
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Figure 1. Proposed model for Property Registration

C.   Implementation of the proposed model

In the implementation phase, the Egyptian Property registration system was built using programming code for Smart Property Contract Registrations written in a high-level language which is Assembly Script as a back-end to the application (Web3). Front end is written in HTML, JS, and React Js programming code on the NEAR platform. There are numerous blockchain platforms for implementing Smart Property Contract Registrations, their key characteristics are highlighted in this section. Ethereum Platform is the world's first Smart Property Contract Registration platform, having been introduced in 2013. It provides a blockchain that is genuinely decentralized and comparable to the Bitcoin blockchain network. It facilitates genuine decentralization by facilitating Smart Property Contract Registrations. Its primary weaknesses include weak processing times and higher transaction processing costs compared to other platforms [32]. NEAR Platform is a secure, scalable, quick, and inexpensive blockchain network. It was introduced by Alexander Skidanov and Ilya Polosukhin in 2020. It can execute up to 100,000 transactions per second and is regarded as one of the most inexpensive transaction platforms. NEAR Protocol is the next-generation proof-of-stake blockchain protocol with a highly pragmatic approach, scalability, and minimal operating costs. The architects of NEAR have rejected the notion of using centralized high-end software for transaction processing NEAR .org. Hyperledger Fabric Platform [33]. Is one of the platforms developed by the Hyperledger consortium, which was founded in 2015 by the Linux Foundation, IBM, Morgan, Cisco, and Intel, and launched in 2016 to host Smart Property Contract Registrations. One of its primary objectives is to develop enterprise-grade frameworks and codebases for distributed ledgers. More than 185 enterprises collaborate with Hyperledger across finance, banking, the Internet of Things, supply chain, and manufacturing. [34]. Solanais Platform [34].

Is an open-source blockchain developed in 2017 by top-tier software architects from Intel, Dropbox, and Qualcomm.

Similar to other Smart Property Contract Registration platforms of the next iteration, Solana seeks to address scalability issues. In fact, Solana has achieved a record-breaking 3,240 transactions per second. Solana's innovative combination of Proof of History (PoH) and Proof of Stake (PoS) consensus mechanisms is primarily responsible for the network's exceptionally high throughput [35]. Cardano Platform [34]. Is a Smart Property Contract Registration network with a layered architecture that offers scalability and security features. Cardano is a third generation blockchain that seeks to bring scalability and interoperability to blockchain networks. Cardano is distinguished from other Smart Property Contract Registration platforms by one intriguing characteristic.
The increasing interest in blockchain has led to the definition of several platforms easing their implementation and application, in particular in the execution of Smart Property Contract Registrations [36].

We selected the NEAR platform to implement Smart Property Contract Registrations to register Property in Egypt written in the AssemblyScript programming language due to its usability, private network, low transaction costs, and high speed. With NEAR platform's numerous benefits and advantages over its more well-known competitors, it is almost always the superior option for enterprise application development.
The proposed model was reviewed and compared to models that work with different platforms for Smart Property Contract Registrations in order to collect information related evaluation of the model like. Transaction per second (TPS) and Average transaction fee.
Transactions per second (TPS) is defined as, the time taken by a transaction to get added to blockchain. The average block time for Ethereum about 27 TPS [32]., [32]., and NEAR about 100,000 TPS, and transactions per second on NEAR platform is much less NEAR .org, Hyperledger Fabric about 3,500 TPS [34]., [33]., Solana about 3,240 TPS [34]., and Cardano about 250 TPS [34].
Average transaction fees for Ethereum about $ 0.7962 [32]., [32]., and NEAR about $ 0.0001, and average transaction fees on NEAR platform is much less NEAR .org, Hyperledger Fabric about No transaction fees [34]., [33]., Solana about $ 0.00025 [34]., and Cardano about $ 0.4 [34].. Table 2 summarizes the main differences between blockchain platforms.

TABLE 2: SUMMARY OF THE MAIN DIFFERENCES BETWEEN BLOCKCHAIN PLATFORMS.

Description	Ethereum	NEAR	Hyperledger Fabric	Solana	Cardano
Used Language	Solidity	Assembly Script, Rust	Javascript, Go	C, Rust	Plutus
Foundation	Ethereum developers	NEAR foundation	Linux foundation	Solana foundation	Cardano foundation

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Ledger type	Permissionless	Permissioned	Permissioned	Permissionless	Public
Cryptocurrency	ETH	NEAR	No Token	SOL	ADA
Coin market cap 10/2023	$ 1,08	$ 2.21	Not Applicable	$ 35.09	$ 0.48
Consensus algorithm	Proof of work (PoW)	proof of stake (PoS)	Crash Fault Tolerance (CFT)	proof of stake (PoS-PoH)	proof of stake(PoS)
Open Sourse	Yes	Yes	Yes	Yes	Yes
Using	Easy to use	Easy to use	Easy to use	Easy to use	Easy to use
Transactions per second (TPS)	27 / TPS	100,000 / TPS	3,500 / TPS	3,240 / TPS	250 / TPS
Average transaction fees	$ 0.7962	$ 0.0001	No transaction fees	$ 0.00025	$ 0.4
Network Type	Public Network	Public and Private Network	Private Network	Public Network	Public Network
Market Capital	$ 225,052,960	$ 1,756,564	$ 1,148,790	$ 8,532,436	$ 13,652,673
Date released	2013	2020	2016	2017	2013

Required input screens are determined at design phase and implemented starting from login, registering buyer and seller information, payment of fees, review documents, and validation, and creating a new Smart Property Contract Registration. The following is a summary of the sequences of the primary model characteristics:

- *Log in (Connect Wallet):* The user Opens the application and writes the employee's password to start using the system.
- *Add a new Citizen:* The employee enters the data of a new owner citizen. After user's log in they can add citizens - property owners- to the system by entering the citizen information and sending a transaction to blockchain through the interface.
- *Add Property:* The employee enters the Property unit data and uploads a file containing the ownership contract and a copy of the buyer's card, can add properties and link them with their owner by entering the property information and the citizen id and sending

a transaction to blockchain through the interface. Archival nodes store full blockchain data and build an archive of historical states.

- Pay Fees: This is a Manual step outside of the application.
- Documents review and validation: After verifying login (Validator nodes) to the website, they can see a list of all unverified property information and review their documents by clicking the "View Docs" before verifying them through a verification transaction sent to blockchain by the interface.
- Transfer of ownership to another: The ownership of the property can be transferred from one person to another.
- Displaying Property Sequences: We can determine the unit's ownership history and the number of previous purchases.
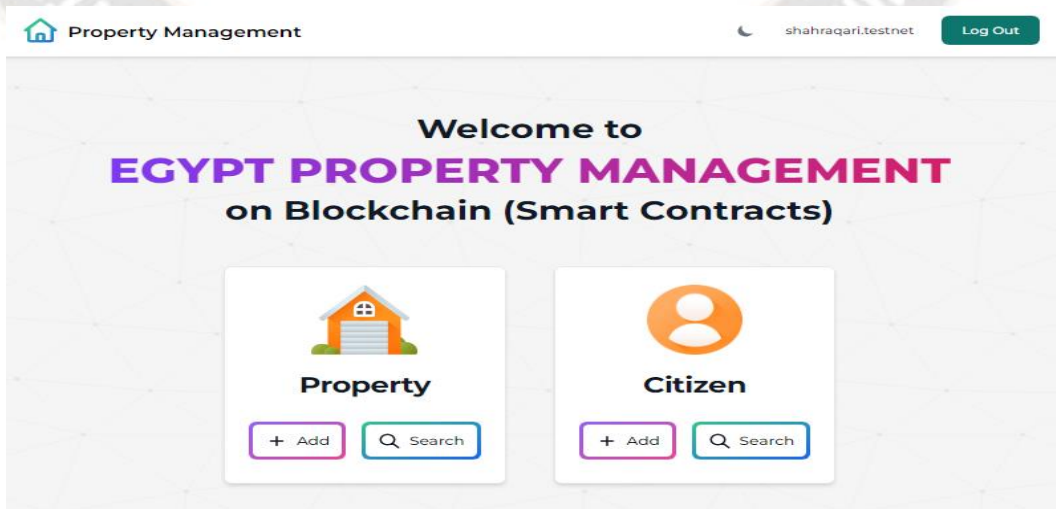

Figure 2.   The interface of proposed model implementation (Displayng Property Sequence)

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D.   Evaluation of the proposed model

According to the implemented prototype, property ownership can be transferred to the primary beneficiary in a much more transparent way using Smart Property Contract Registrations in Property transactions in just a matter of seconds. Because of the contract execution on a decentralized platform, transactions between willing parties may be audited. Transaction auditing would aid in the prevention of any future issues that may arise between the parties involved. A survey was conducted to evaluate the implemented prototype of the proposed model. The purpose of this surveys is to identify the possibility of registering Smart Property Contract Registrations on blockchain instead of traditional registration of Property registries in Egypt. The survey aims to measure the influence of various factors on the adoption of Smart Property Contract Registrations with blockchain technology in the Property transactions system in Egypt. Factors include availability accessibility of Property transactions data, verification of transactions, comprehensibility of the transaction, data accuracy, and reliability, cost reduction through the exclusion of intermediaries, and overall cost reduction. Selecting research sample was based on several of the concepts and principles, and those who are interested in the topic of blockchain, Smart Property Contract Registrations, and information technology specialists, interested in buying and selling Property, Property registration employees, and others. The prototype of proposed model was explained and implemented for each of the research samples and initially tested to ensure the validity of the implementation of the proposed model in practice. The number of sample individuals interested in the subject of study reached (127) individuals. The summary of demographic profile of respondents is shown in table 3.

TABLE 3: SUMMARY OF DEMOGRAPHIC PROFILE OF RESPONDENTS

Variable	Category	Frequency	Percentage (%)
Gender	Male	84	66%
	Female	43	34%
Age	51 to 60	21	17%
	41 to 50	42	33%
	31 to 40	27	21%
	20 to 30	37	29%
Specialty	Information Technology Specialists	37	29%
	Interested in buying and selling	29	23%
	Employees	31	24%
	Others	30	24%

According to the survey results, 96% of the respondents agreed that it is easy to access data and track ownership when using Smart Property Contract Registrations, 92% of them agreed that the use of Smart Property Contract Registrations improves security and privacy for interested parties, 84% agreed that Smart Property Contract Registrations eliminate the need for a third party that acts as an intermediary between the seller and the buyer, and 93% agreed that blockchain helps in reducing tax evasion when used with Smart Property Contract Registrations as shown in Figure 3.
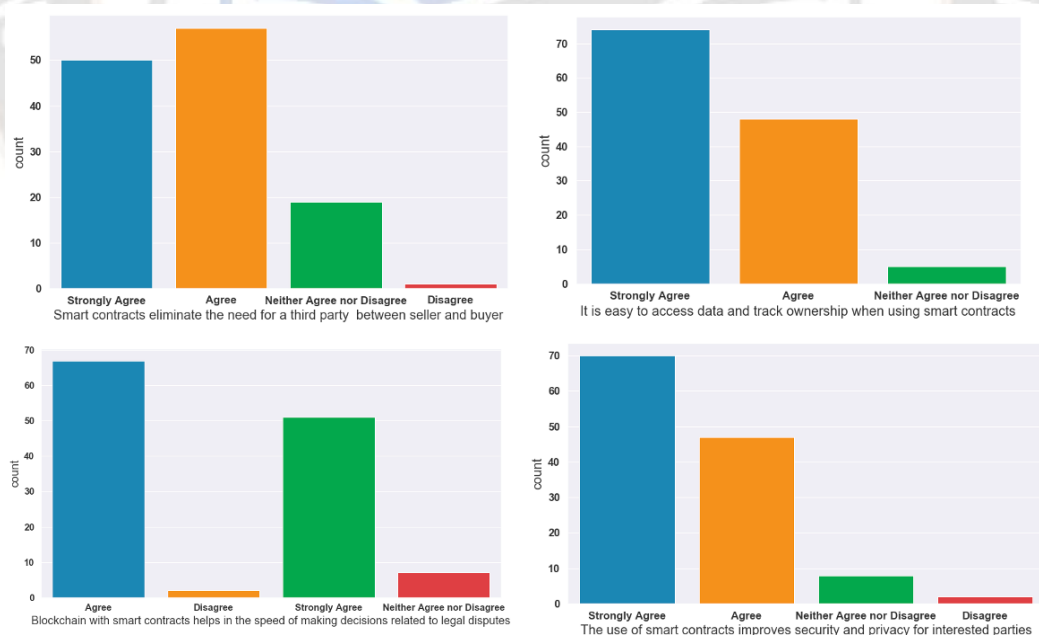

Figure 3.   Output of survey analysis results

Although, 90% of the respondents indicated that Smart Property Contract Registrations help to regulate the Property market,

89% of them agreed that blockchain helps in reducing tax evasion when used with Smart Property Contract Registrations, 79% noticed that there are changes in how to register land

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electronically instead of traditional registration, and 17 % agreed that the traditional contract registration process is completed slowly and take a long time. The result of the questionnaire showed that the adoption of blockchain technology with the use of Smart Property Contract Registrations in Property registration in Egypt will be beneficial in terms of easy access to Property transactions in a quick time, easy verification of transactions, reliability, and cost reduction.

VI. CONCLUSION

This study's primary objective is to develop a formal model for validating the legal compliance of Smart Property Contract Registrations and to identify potential liabilities. We discussed the shift towards registering traditional contracts with the Egyptian Property Registry Office and the need to use blockchain instead of traditional storage technologies. We have also provided a description of the proposed model and its functional implementation. We provided an overview of blockchain technology as a novel Property industry technology. This investigation was conducted to ascertain the impact and implementation of Smart Property Contract Registrations in Egypt. The proposed model is implemented by developing a distributed system that stores all unit-purchasing-related transactions. The solution we are endeavoring to create is based on the Near Platform, which will record every transaction performed during the transfer of unit ownership. The proposed model expedites the registration of units and simplifies the transfer of ownership of units from a vendor to a buyer for purchasers, sellers, and government registrars. In this context, blockchain enables the development of a paperless layer for all city transactions, in a secure manner, for optimal asset management in smart cities. The Smart Property Contract Registration provides a secure, distributed, and shared decentralized ledger of all buyer-seller assets and transactions with this endeavor. As a consequence of blockchain technology, Property transactions will be more efficient, secure, and affordable. Blockchain is one of the most significant financial innovations that has the potential to revolutionize the Property market in Egypt.

This study identified a number of opportunities for blockchain in Property, as well as Smart Property Contract Registrations:

- Using Smart Property Contract Registrations, transactions can be independently validated and validated automatically.
- Once the unit transfer task is complete, the information is promptly updated and preserved on the block-chain platform; this is the operating system's most secure and tamper-proof mode.
- Immutable Record Keeping Blockchain data is immutable and therefore cannot be arbitrarily altered.
- The history of previous ownership transfers is utilized to verify the current legal proprietor of the unit.
- Smart Property Contract Registrations revolutionize Property transactions by facilitating reduced costs, greater accessibility, and faster processing times.
- Real-time monitoring and status updates make information regarding accessibility and velocity readily available to all parties within a single system.
- Transparency and information are simultaneously

available to all parties via a single, agreed-upon data version.
- Property Market Regulation Prevents Fraud and Difficult Tax Evasion.
- Blockchain technology will evolve into a system capable of minimizing human error and enabling the optimization of Property market transactions.

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