International Journal of Computations, Information and Manufacturing

Volume.1, Issue.1, 2021

Editors-in-Chief
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EDITORIAL

We are in The "International Journal of Computations, Information and Manufacturing" (IJCIM) proud to announce the publication of the first issue in the volume one of 2021 year. IJCIM is an international forum for scientists and engineers involved in all aspects of computer science and manufacturing technologies to publish high quality, refereed papers.

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IJCIM appreciates all the support that it is receiving from its members as well as from its readers.

Dr. Haitham M. Alzoubi and Dr. Taher M. Ghazal
Editors-in-Chief

Blockchain Convergence: Analysis of Issues Affecting IoT, AI and Blockchain

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Abstract

The purpose of this study is to appraise the integration or convergence issues influencing the mutual functioning of blockchain, AI, and IoT. The study argued that the recent developments in the field of IoT and blockchain prediction have involved the integration of innumerable classification schemes to establish a hybrid model. The introduction of the hybrid technique relies on the prediction performance that strives to override the limitations of any available architectural scheme. This study offers a comprehensive exploratory appraisal of the issues influencing the successful integration of IoT and blockchain in regards to functionality and effectiveness of security, trust, and flawless communication issues. The exploratory research methodology was used in analyzing the issues affecting the integration of blockchain, artificial intelligence (AI), and the internet of things (IoT). The findings indicated that the integration challenges influencing the effective operations of blockchain, AI, and IoT as a single system involve security, scalability, accountability, and trust of communications. The study recommends that successful and effective integration will enhance the development of new business models as well as the digital transformation of market corporations. Accordingly, new approaches to convergence should ensure that executives address the new technology demands to obtain significant gains in efficiency.

Keywords: Internet of Things, common operating picture, artificial intelligence, Blockchain

1. INTRODUCTION

New developments in the integration frameworks between IoT and blockchain in different fields have sparked debates concerning the actual framework that should be adopted by firms desiring to benefit from the convergence of the two technologies [1]. As one of the principal concepts guiding new prospects of industrial revolution, the Internet of Things (IoT) has achieved immeasurable milestones[2]. Globally, the projected growth of IoT was about $170 billion in 2017 and is expected to be about $560 billion by end of the financial year 2022 [3]. Although countless professionals have indicated that IoT is the new industrial revolution, key challenges have affected the performance of IoT, starting from the ancient days in which there was the lack of a protected ecosystem covering all the construction blocks of IoT design as well as the scalability issues affecting the entire system. The number of devices operating in any IoT system has been one of the primary issues affecting the performance of IoT since its introduction[4].

It is commendable that the IoT has enhanced a common operating picture (COP) handling many applications and aspects of modern day life [5]. Blockchain, in this regard, has enhanced the effectiveness of COP because it has advanced the operations of wireless network and sensor devices that could not otherwise communicate via the conventional IoT network [6], [7]. Blockchain, artificial intelligence (AI), and IoT are the principal technologies that have driven the next phase of digital transformation [8]. It is projected that these technologies will enable for the creation of new business models, including autonomous agents, digital version of IoT, receiving or sending money via blockchain technology, and autonomous decision-making as independent agents of economy [6].

The IoT has enabled a complex connection of things or objects, powered by sensing, communication units, and processing, to identify physical events, interact with their environments, and exchange data[9]. The objective of such interactions is to monitor processes or make decisions concerning events requiring human interventions [10]. Perhaps the most renowned inspirations related to the rise of IoT systems was the need to foster the real-time information collection as well as the need to offer remote and automatic control mechanisms that have replaced current conventional control and monitoring systems across industries [10], [11]. The integration between IoT, AI, and blockchain will introduce a new system architecture that will control and advance most of the ineffective procedures associated with the welfare of humankind.

2. THEORETICAL FRAMEWORK

The theoretical framework adopted in this study considered the limitations of the existing shreds of research on the most effective convergence architecture for AI, blockchain, and IoT. The current research, in this regard, utilizes generalized philosophies and theories concerning the effectiveness of convergence between the three aspects of modern industrialization, including blockchain, AI, and IoT [12]. The theories considered in this depends on the fact that the distributive ledger aspect of blockchain is one of the solutions for the existing security and privacy challenges.

2.1 INDUSTRY DESCRIPTION

The general industry guiding the integration of IoT, AI, and blockchain has produced innumerable scales of information requiring power, network connectivity, storage, and processing. The objective of convergence, in this regard, is to transform available data into meaningful services and information. Along with concerns such as network scalability and reliable connectivity, data privacy and cybersecurity are issues of critical importance regarding the networks serving IoT and related systems [13]. The current industry involves centralized designs that have widely been used to connect, authorize, and authenticate different IoT network nodes.

2.2 LITERATURE REVIEW

The integration and performance issues affecting convergence of blockchain with the IoT has been addressed by many scholars. One of the main concerns of the issues affecting the seamless integration involve the fact that integrating these technologies focused on the prediction performance by filling the gap of limited literatures on the previous classification or convergence techniques [14]. In modern world, artificial intelligence, IoT, and blockchain technologies have been acknowledged as innovations that can promote the existing business processes, disrupt entire market economies, and establish new business models. For instance,

blockchain can enhance business process efficiency, security, transparency, and trust because of its decentralized, distributed, and shared ledger [15].

Issues affecting convergence or integration between AI blockchain, and IoT has often been neglected based on many factors. For example, these three technologies are often used separately and selectively based on the demands of a specific firm. These innovations, however, should be implemented collectively now and in the future [16]. One potential integration platform between these technologies is the use of IoT to provide and solicit data, with blockchain offering the setup rules of engagement and infrastructure while the AI maximizing the rules and process optimization [17], [18].

Information process integration for security, trust, and seamless flow is one of the principal objectives of connection IoT, AI, and blockchain. There are many solutions for addressing the vulnerabilities and threats affecting the operations of IoT. IoT has played a crucial role in the daily organization level by ensuring the ease of working in diverse enterprises [19]. Accordingly, the threat level existing in IoT deviecs is relatively high, indicating that the assessment and integration demands of the different models must be guaranteed to ensure orientation [19]. Because IoT security is critical commensurate with the activities of hackers and malicious users, it is arguable the current architectures are often prone to attacks.

Convergence between AI, blockchain, and IoT has also been discussed by several shreds of literature. It is outlined that the use of AI, along with the abilities of IoT has enhanced treatments targeting patients suffering from Hepatitis C, a blood-borne infection that is often asymptomatic in the initial phases [20]. The progression of hepatitis C throughout the final phases often complicates the treatment and diagnosis process. Accordingly, a system based on AI and machine learning algorithms can assist healthcare providers in offering effective diagnoses in the early stages [21], [22]. Based on the effectiveness of the blockchain in ensuring seamless, secure, and confirmed flow of information, it is arguable that the convergence of AI, blockchain, and IoT can significantly enhance the services given to patients suffering from hepatitis C.

2.3 Problem Statement, Research Gap, Research Contribution

Many pieces of research have tackled the issues, capabilities, benefits, and challenges facing the integration of AI, blockchain, and IoT [23], [24]. The existing studies, however, have only

focused on particular areas, including health, finance, and agriculture, with finance being at the forefront of most emerging studies [25], [26]. Despite the evident success of the convergence of blockchain with IoT in some of these fields, the analysis of converging AI, blockchain, and IoT has not been addressed in most of the existing bodies of literature [27]. Accordingly, this study strives to determine the opportunities and challenges of integrating these three technologies using the best architectural model to enhance the accountability and accuracy of offering a broad range of services [28].

3. RESEARCH MODEL AND HYPOTHESES

The analytical approach was considered as the best research design for this research. An analytical mechanism denotes the application of appraisals to decipher an issue down to its specific elements appropriate for finding a solution. Generally, the analytical approach is also referred to as formal analysis [29]. The primary challenge linked with the analytic approach, however, is that the existing tools are limited to the specific problems they can identify and solve [30]. The approach adopted in this study is founded on the fact that the issues influencing integration between IoT, blockchain, and AI include the common elements such as efficiency, trust, accuracy, and scalability [31], [23]. Commensurate, the research design or model hypothesizes that integrating the three technologies can produce significant outcomes for organizations over time [32].

3.1 METHODOLOGY AND RESEARCH DESIGN

The adopted methodology was the quantitative research design. The selected research method focused on the performance of organizations that have implemented the AI, blockchain, and IoT in delivering services to public. Quantitative research was important for this study because it is crucial to identifying trends and averages to predict or evaluate causal associations that generalizes outcomes to a broader population in the end [33]. This research method was adopted as an experimental and correlational research technique because it formally examines the predictions or hypotheses based on statistics.

Based on the required data to perform a comprehensive quantitative analysis of the data on convergence issues affecting the integration of blockchain, Ai, and IoT, trust issues was the

major element involved in the process. Trust is one of the primary concerns that has affected the integration of blockchain with IoT and AI [34]. The quantitative approach, in this regard, involved the different procedural steps appropriate to the existing study. Principally, the advantage of using a quantitative research method is that the design is necessary regarding the use of factual data needed to address research questions [34], [35].

In the process of determining the most appropriate quantitative method for the study, the study relied on the proportion supporting the assisted perception, which concerned the distribution of respondents according to age, residence, household income, and marital status, among others [36]. Additionally, the study data focused on the number of companies that have performed based on issues such as level of education and understanding of key issues guiding data use and the need for historical evidence.

3.2 POPULATION/SAMPLE/UNIT OF ANALYSIS

The sampling, population, and unit of analysis was regarded as one of the fundamental elements of the study. In this research, it was considered that the companies that have implemented some of the suggested frameworks have understood some of the most influential elements, including, among others, the challenges, benefits, and opportunities associated with any of the emerging issues [29]. Regarding the study and associated measures, it is arguable that the study determined the efficiency of the suggested approach because of the urgent need to foster the transaction rate occurring through blockchain transactions [30], [37].

According to the exploratory design of the suggested framework, this study considered the fact that the efficiency of any applicable approach should follow the contribution of the following specific elements: transaction efficiency (described as the study equation –(1)), n (number of business transactions happening through the integrated AI, IoT, and blockchain platforms), communications trust via trust (t), and the nature of security associated with the transactions (s). It is noteworthy that this model relies on the findings and design of the study conducted by Ghazal et al., in which the analysis relied on the equation outlined below

$$Effectivity\ of\ performance = s+n+t(n) \qquad (1)$$

The inclusion of n depends on the fact that the data used in the appraisal relied on the procedural developments of blockchain in the development of convergence metrics between AI, blockchain, and IoT [38]. In one of the papers published by the individuals supporting the convergence of blockchain, AI, and IoT, Ghazal et al. argue that the computation of the immediate communication trust focuses on enhancing the trust of consumers concerning the most detailed model of the blockchain.

4. ANALYZING DATA

Equation 1 presented above outlines all the variables that have been used in presenting all the data aspects in this study. Accordingly, once this process improves, it is arguable that the integrated architecture covering convergence of IoT, AI, and blockchain will outline a comprehensive sequence of tests to determine the accuracy of handling the challenges influencing the existing block chain models [39]. In this study, the immediate test concerned the computation of trust transaction that majorly focused on the capacity of companies to improve the level of trust in the suggested blockchain models. It is arguable that this aspect was obtained via seeking the attitudes of the different users concerning their ability and capacities to obtain the outlined requirements.

The data model, commensurate with the qualitative analysis study has many inferences. Firstly, the level of consumer/customer trust is determined by adding the scale of successful transactions (St) to the number of unsuccessful transactions (Zt). The outcome of this figure is divided by tt (the aggregate or total transactions). In this regard, (2) provides the actual number of transactions associated with any type of transaction.

$$T \text{ or transactions trust} = (St+Zt)/tt \qquad (2)$$

Based on the equation above, it is difficult to determine the security of the transactions that can happen without allowing or understanding of the detected threats. In this regard, it is arguable that the threat numbers is computed by dividing ts (solved threats) with the overall risks or threats identified in the entire convergence system.

The number of secure transactions following the convergence of AI, IoT, and blockchain (S) is denoted by Equation 3:

S = (td –ts)/td. Which reflects the number of transactions as

N = transaction days (dt)/average daily transaction (adt); that is:

N =9dt/adt

4.1. DISCUSSION OF THE RESULTSS

It is arguable that one of the many challenges affecting effective integration of AI, IoT, and blockchain is the existence of heterogeneous alternative outlining the variety of IoT devices and applications that needs to integrate AI and blockchain with IoT tech founded on their requirements and demands [40]. Generally, these alternatives are only founded on particular use cases that cannot suit a broad range of devices and applications in this specific sector.

As a result, new studies should advocate for the development of a set of standards and protocols that can support the essential and basic needs of all IoT devices and applications rather than introducing applications/devices that can only operate via IoT networks. The combined potential of AI, IoT, and blockchain is immeasurable. Based on existing kinds of studies, it is arguable that the amalgamation of AI, IoT, and blockchain technology can unlock several new business architectures for the accrual of funds from IoT devices and applications [41]. The results presented in the formulas and considerations outlined above resonates with the fact that the security of transactions have the accuracy that reflect the percentages produced by the following formulas. When comparing the models, it is appropriate that the architecture controlling the design of the tables indicate centralization as about 100% of the model. These results indicate that either of the algorithms applicable in the development of a perfect architecture can help address all the concerns of blockchain, AI, and IoT convergence in both the short and long-terms.

5. CONCLUSIONS AND RECOMMENDATIONS

The objective of this study was to assess the most recent and adopted architectures of blockchain. The analysis involved comparing the most popular, recent, and interesting consensus algorithms as well as evaluating the integration between IoT, AI, and blockchain via illustrating the existing field researches. The paper also offered a comprehensive overview of the distruptive studies on the topic that current authors have continued to investigate. The

findings indicated that the convergence between AI, blockchain, and IoT can enhance the adequacy of computational level as well as efficiency in optimizing the energy consumption of connected devices. AI, IoT, and blockchain are technologies that will continue to be integrated in myriad dimensions. This paper contends that the integration of these innovative models will occur because services, products, and business models will benefit from the diversity of these technologies. Generally, these business models can be widely adopted by any independent agent, including cameras, trucks, machines, cars, and numerous sensors.

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Assessment of Smart Home Assistants as an IoT

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Abstract

A smart home personal assistant technology is an intrinsic system, which incorporates many elements such as users, Smart Home Personal Assistants (SPA) devices, cloud, skill provider and other responsive devices. Even though Smart Home Personal Assistants give a robust security and privacy options, the devices face many weaknesses, which make the system vulnerable and can be comprised by adversaries, who can capitalize on limitations to gain access to delicate information and privacy of users. In this research, the aim is to assess how invention and innovation of security and SPA can be harnessed by users to interrelate with the system. Subsequently, this write-up will address both the problems related to the system and attempt to bring in solutions, which makes the technology more adaptable and versatile to all users. Initial studies show that some of the weakness underlying the technology include the open-nature of the voice channel, complexity of the architecture, software implications, and the utility of the technology to less proficient users. As a result, the study anticipates at solving the voice squatting attack, using the SPA intelligent assistant, incorporating a filer to filter the ultrasonic attack and noise as well as trying to assess the efficacy of the elements developed against the voice squatting attacks. The study found out that there is a need to mitigate the attacks on the blockchain technology and Natural Language Processors (NLP) to assure protection of SPA from attacks.

Keywords: Internet of Things, Smart Home Personal Assistants, Natural Language Processors

1. INTRODUCTION

The influx of computers and computing was encountered with weaknesses in decoding meanings and understanding the objectives of the users. In that regard, there was a need to introduce peripheral input devices, for instance, keyboards, jockey sticks, touch monitors, and mouse, among others. As a result, there were implausible successes via the invention of versatile human-computer interfaces, for instance, the development of voice technology [1]. For that reason, using voice technology system has been confirmed to be the most effective and open communicative tool, which has expressively made an archetype shift in changing the method through which users relate with their devices [2]. Precisely, the most outstanding Internet of Things (IoT) is the Smart Home Personal Assistants (SPA) [3]. In essence, SPA technology uses intelligence in decoding and decrypting instructions, processing and evaluating them [4]. It also processes the needed task or couple of tasks. SPA as an IoT, has the advantage of eliminating hand-eye operations from the users by helping them to do diverse tasks using voice commands, thus allowing them shift their energies to other tasks [3].

Outwardly, SPA offers a quicker interaction as well as being more natural than the use of peripheral devices. Essentially, research outlines that SPA technology is dynamically gaining ascendency in homes and they estimate that more than 10% of the populace globally own these devices [1].

It is imperative to note that SPA has the ability to be embodied and customized to anchor human-machine interface. Precisely, blockchain technology and Natural Language Processors (NLP) devices in SPA presently are used in applications, which allow acquisition of goods and services, question applications, stream music, set timers, relay messages, anchor security, and facilitate making of calls, among others [5] and [6].

Essentially, SPA is a dynamically developing technology, which provides new ways through which users relate with the new innovations. Subsequently, SPA technology uses modular elements such as wake-word detection, speech-to-text, and intent-parser to generate user-interface [5]. As SPA technology is dynamically gaining popularity, it is important to recognize the threats and risks associated with the technology. It is equally important to devise ways to mitigate and enhance its utility [7]. Accordingly, this study will outline these risks later; nonetheless, it shall first assess some critical elements, which make the technology more high-end [5]. The study is structured to give an introduction to blockchain and NLP in SPA

technology and the architecture of components as well as interfaces. The next and subsequent sections provides a wide range of security and privacy issues and attacks in SPA apart from outlining an overview of attacks and mitigations [8]. The last sections will discuss the Z.

2. THEORETICAL FRAMEWORK

The Architecture and Operations of NLP in SPA

Theoretical framework of blockchain and NLP in SPA is based on its architecture and operations. In spite of the architecture for SPA being intricate as well as possessing explicit characteristics, all its systems have analogous functions and share conjoint features. Particularly, the elementary architecture of blockchain and NLP in SPA comprises of elements, which include cloud-based processing and exchangeable interaction features with other systems including, the voice-based intelligent personal agent and smart speaker (as will be discussed later) [9]. Imperatively, SPA is an internet-based technology that utilizes updates, which flourish with new internet services. The elements and architecture of blockchain and NLP explicates specific crucial elements in SPA architecture [10]. Remarkably, all parts of the component is a potential attack point for adversaries (as it will be discussed later in this write-up). In a bid to realize the complexity of the architecture of SPA, one will never miss to analyze the importance of the advancement in blockchain and NLP technology [11].

Pithily, NLP allows SPA to handle huge series of commands and responses simultaneously as well as allowing the advancement of machine Language, ML [11]. Primarily, ML is the best knowledge and usage of human language, which increase the computing supremacy and accessibility of datasets that train speech engines.

It is important to note that in processing, blockchain and Natural Language Processors performs audio sampling, feature abstraction, and speech recognition which transmutes a request into text. It is noteworthy that human language entails ambiguous words, contractions, similes, jargon, and others; therefore, it takes implausible assessment and couple of minutes for blockchain and NLP to decipher the accurate output [12] and [13]. Concisely, when the needed signal has been deciphered and cognized, an acoustic echo cancellation comes in place to negate noise from the receiver signal to ensure that only the needed and intended signal remains in the system [6], [14], and [15].

In this case, utilizes the system automatically senses and assesses the user's speech in terms pitch, amplitude, tone, and frequency, from which it extracts pattern and sends it to classifiers using machine language [12]. The extraction framework include Mel Frequency Cepstral Coefficient (MFCC) which apes human auditory system since it is constructed into audile prototype using ML such as Hidden Markov Model (HMM) to augment and correct the sound signal [1] and [16]. Essentially, HMM relates all pairs of the waveform with preceding and subsequent waveforms, and against a lexis of waveforms to decrypt the user's speech [17]. It also follows that after the SPA cloud has interpreted the user's language, it uses NLU (Natural Language Understanding), to comprehend the intent using discrete to discrete mapping (DDM) using statistical or ML models to make conventions about the intent [15]. Precisely, when the NLP system has a wider pool of data in disposal, the better the accuracy and correctness of the prediction [18]. In that case, the intent will then be processed, skill will be generated, and response will be sent to the natural language generation (NLG), where it is transformed into natural language representation [18]. Lastly, the response is communicated back to the user and played by the smart speaker.

As will be discussed in the subsequent sections in the next study, the components of blockchain and NLP in SPA will include morphological and lexical analysis, syntactical analysis, semantic analysis, discourse integration, and pragmatic analysis [18] and [19]. Ultimately, pragmatic analysis outlines the overall communicative and social content and its effects on interpretation.

2.1 INDUSTRY DESCRIPTION

Blockchain and NLP in SPA is developing home based security. Essentially, research outlines that SPA technology is dynamically gaining ascendency in homes and they estimate that more than 10% of the populace globally own these devices [1] and [20]. Concisely, the number is continually puffing up because the technology differs from the traditional voice-actuated devices, which only use built-in commands and responses [21]. In contrast from the ancient voice-actuated devices, SPA utilizes internet-based services, thus take the advantage of blockchain technology and Natural Language Processors (NLP), which are made to handle several series of commands, responses, as well as questions[22].

2.2 LITERATURE REVIEW

As earlier clarified that the use NPL framework is an open source smart home assistant (OSPA) though is gaining fame; nonetheless, it faces several attacks and risks. As a result, the objective of the study is to assess these weaknesses, aiming at adding filters and calibrating modules to alleviate attacks and risks [17]. Earlier studies show that NPL can be assessed on the efficacy of SPA and NPL filter modules created to fight against attacks and validate how the near future blockchain and NLP systems can be anchored to mitigate attacks [23]. That makes sense when the literature review of the study will focus on voice squatting attack and also filtering [24] and [25]. It will also feature the weak authentication, blockchain and NLP, user awareness, SPA security and privacy issues, the framework of SPA, blockchain and NLP weaknesses on security, peripheral security threats, and internal security problems [21]. Hence, the study utilized prevalent studies to generate new methodologies, and bring forth a theoretical argument on how to shape and anchor the prevailing knowledge with novel data and new ways in a bid to ease SPA from threats and attacks.

In a similar research, voice squatting became a threat and risk trajectory for Voice-Users-Interfaces (VUIs) that exploits on word sentence structure, which have the same sound but dissimilar word spelling and subsequently recording errors on the information [23]. It is of essence that researchers argued and outlined that voice squatting is an attack in a situation that the enemy utilizes the way through which a skill is invoked by means of a malicious and forged skill with analogous “pronounced name or phrased name” to capture the voice command envisioned for a different skill [4]. In that essence, via a voice concealed attack, the malicious skill mimics the SPA framework or the genuine skill to steal the user’s data and in other ways spy on the conversation [26] and [27]. Greatly to note that there are dual skills that appertains SPA framework; native and third-party skills. Both the skills are inclusive of home control skill, accounting and finance skill, communal skills, security and fitness, and sporting skill, among others [28] and [29]. Initial reports show that SPA will acquire the user’s choices, records, and facts, for instance, etymology, conduct, behavior, words, and searches using search engine optimization and machine learning techniques to make them more proficient and shrewder with time[30]. Succinctly, the choices and information, among others, are the ones that are vulnerable to attacks from enemies [31]. According to a new research, attacks as depicted by Amazon Echo's Alexa, comprises of adversary who registers a deceitful and non-genuine third party application with a voice keyword that mimics the user’s real application [32]. Truthfully,

when the user demands for the real and legitimate application, the deceitful app opens. Initial and traditional devices recognized the speech accuracy and functionality, however, it experienced regular misconception rendering it the most ineffective system [33] and [34]. It is important to note that, this type of squatting is rightfully dangerous, because it runs in the background in couples of time without being detected [35]. Also, such background squatting can be utilized to capture the user's information and private indulgence without permission [36]. Such information and privacy info can easily be used by the adversaries to broadcast wrong prompts for users to divulge personally identifiable information (PII).

2.3 PROBLEM STATEMENT & RESEARCH GAP & RESEARCH CONTRIBUTION

Primarily, earlier studies show that voice squatting attack could be encountered during computer's change and deciphering procedure connected to the skill name. Accordingly, the susceptibility in SPA as IoT emanates from the misconstruction pertaining blockchain and NLP and initial transition due to enunciation, tone, and homophone [9][37]. In an instance, born and bone can be misconstrued incorrectly by blockchain and NLP unit. If a user wants to invoke skill named 'YY born' but NLP module misinterpret it as 'YY bone' skill, an adversary skill, SPA will invoke skill incorrectly and leak user's delicate information or give wrongful feedbacks [38]. In traditional invocation, there is another voice squatting attack that takes advantage of corresponding skill appellation length [39]. Essentially, when a user has an idiomatic use of speech such as use 'thank you' for polite or use 'please again', an adversary can register skills based on this model [40] and [41]. For example, a savvy SPA enemy can record a skill named 'calm please' to mimic the skill 'come'. In essence, when the user calls for calm skill by saying 'please be calm', SPA will return skill 'come please' instead of 'calm' because SPAs tend to invoke skill that fit best. Consequently, skill with longer fit name will be invoked and the enemy skill is waked up in this situation causing revilement of information.

Many initial studies failed to cognizes that blockchain and NLP uses voice structure draws responses from contextual patterns [42]. In that spirit, to achieve a concise and precise response from any machine SPA and NLP, considerable data needs to be given to the system for it to learn and decode from experiences; through this the system will provide a vector via which it can decipher from many datasets, utilize deep learning algorithms, and use surrounding words to give an accurate response [38]. Therefore, this study ascertains the use of blockchain and

NLP in SPA (IoT) to generate a systemic writing system utilized for an expressive language as the ultimate approach for text pre-processing; writing being logographic system, which uses symbols to represent a word [43]. Of importance, ultimately, is the use of alphabetic symbol approach that utilizes distinct symbols from the alphabets to denote a sound.

3. RESEARCH MODEL & HYPOTHESES

Therefore, using mixed research methodology, the study found out that there is a need to mitigate the attacks on the blockchain technology and NLP to assure protection of SPA from attacks. Hypotheses for this research was for the system to address security and privacy issues at the end of the study.

3.1 METHODOLOGY & RESEARCH DESIGN

The research mainly used mixed research methodology as well as utilizing literature review and earlier technologies to develop more robust system. It also utilizes weakness of the existing technologies to address the problem in a more versatile way. The main aim of the study was to address weaknesses in security and privacy in SPA system.

The research therefore assumed the following format

1) Identification of the weakness in SPA technology by interacting with the users.

2) Developing a major blockchain and NLP using machine language.

3) Introduction of filers to filters so as to cancel noise which could be used by adversaries

4) The extraction framework include Mel Frequency Cepstral Coefficient (MFCC) which apes human auditory system since it is constructed into audile prototype using ML such as Hidden Markov Model (HMM) to augment and correct the sound signal

5) Final basing the system architecture in internet network.

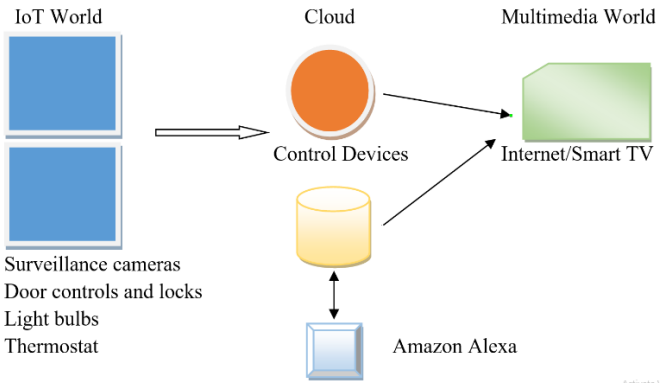

Fig. 1. Conceptual Model

Fig. 2.

3.2 Population & Sample & Unit of Analysis

The research considered user sample unit to assess the infiltration rate of security and privacy. It, therefore, took samples of SPA users' complaints to assess the weakness in the technology. More than 20 users were used as the sample space and unit of analysis. All the twenty users had either complaints security and privacy infiltrate or challenges in using the technology. The effectiveness of the technology was weighted using percentages on privacy, security and challenges in using SPA technology as following;

Where security = n

Privacy = p

Challenges = c

Effectiveness of SPA = n + p + c

The effectiveness was calculated with an assumption that the same relative weight of up to 100%. Thus the sum of the three variables forms the average weight. Essentially, the selected users were required to give details on the three variables; privacy, security and challenges in using SPA technology, which gave to give the relative weight.

4. ANALYZING DATA

The equation for effectiveness = n + p + c was used in the analysis of the data. Validation and reliability of blockchain and NLP in SPA was subjected to a couple of test to enhance accuracy.

Privacy was captured through questionnaire which was filled by the twenty users either online or manually.

The user privacy = (number of complaints in privacy (pt) + number of satisfied users (st)) divide by sample space (ss)

$$(p) = (pt + st)/ss$$

On the other hand, security Issues (n) = number of security complaint (sc) – number of satisfied users (st) divide by sample space (ss)

$$S= (sc – st)/ss$$

Number of challenges (c) = number of challenges complaint (cc) – number of satisfied users (st) divide by sample space (ss)

$$C = (cc – st)/ss.$$

4.1 DISCUSSION OF THE RESULTS

The result of the research study emanated from three variables; privacy, security and challenges in using SPA technology, which gave to give the relative weight. In this case, relative weight and formula above was used to give accurate, valid and reliable results as follows;

It was found that blockchain and NLP in SPA was found to have high infiltration rate with security and privacy issues being higher at up to 88% and 90% respectively, while challenges in the use of technology was lower at 25%.

It can assessed, that the use of filers and filters can only solve the problems of the three variables. The challenges, security and privacy issues are attributed to architectural issues,

which are main features that contributes to the differences in the weighted percentages. As a result, it is changing the architecture by introducing filers to filters and introducing acoustic and noise cancellation buzzers through HMM, will solve the weaknesses in blockchain and NLP in SPA.

5. CONCLUSION AND RECOMMENDATION

Conclusively, confirms that SPA as an IoT is a more adaptable and versatile technology to users and it is dynamically gaining popularity across the globe. The architecture of the technology is unwavering the best, however, it has traditional technologies failed to address some pertinent issues on security and privacy of users. The weaknesses included the open-nature of the voice channel, complexity of the architecture, software implications, and the utility of the technology to less proficient users, among others. It can be depicted from the write-up that the use of blockchain and NLP in SPA can address these weaknesses. From the mixed research methodology, the study found out that there is a need to mitigate the attacks on the blockchain and NLP to assure protection of SPA from attacks. It can be deduced succinctly that acoustic echo cancellation in signal transmission negates noise from transmission, which in turn reduces the vulnerability of SPA. In that regard, it can be firmly affirmed that the use of SPA becomes the best solution in home base smart personal systems. It can also be deduced that weaknesses and threats in SPA can be addressed through the use of interaction interfaces that impede adversaries from gaining access to users' personal information.

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Challenges Facing the Application of IoT in Medicine and Healthcare

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Abstract

Among all the functions of the Internet of Things, healthcare applications are the most important. The internet of Things has played a vital role in the sharing of various medical resources making it an essential factor in the field of medicine. Without the applications, it may become challenging for the medical practice to achieve some objectives. Today, information is shared freely across different networks, making it easy for practitioners and institutions to work with the available resources and deliver on the medical needs of the society. IoT has made it possible to offer smart and effective healthcare services to people. The application of smart sensors is one of the factors that has contributed to effective management of healthcare needs in the society. Wearable devices can be used to track different issues within the body. Some can be embedded to monitor different functions of the body to ensure there is effectiveness in the way medical services are delivered to such patients. The information collected in such manner, can be analyzed, aggregated and mined to do the early prediction of diseases. Processing algorithms play a vital role in helping practitioners in developing personalized treatment, which makes healthcare more economical. Apart from analyzing the effectiveness of IoT in healthcare, challenges will be discussed in this study and how they impact medicine.

Keywords—Internet of Things, Machine Learning, smart devices

1. INTRODUCTION

The world population is increasing tremendously. An improved quality of life has led to the development of highly effective means through which various aspects of the environment which encourage the improvement of the life of people in the world. However, there are limited resources in various sectors and technology has come in to ensure effectiveness is achieved in these sectors to ensure the little resources are helpful in the society. The increasing population,

especially in the urban regions has led to the build-up of astounding pressure on the available resources [1]. The medical sector is one of the areas that has felt the pressure due to increased demand of the medical services. Despite the increasing expansion of healthcare facilities, the population still has a great impact on how the facilities work and the quality of services they offer to the public [2]. The massive pressure has triggered the development and application of various technological solutions necessary in ensuring effectiveness is restored in the medical and healthcare sector[3].

There is a rise in medically challenged people in the society. Remote medical services is increasingly becoming part of our lives where patients can be attended in their remote locations. A rise in interest in wearable medical devises has been witnessed in the recent past [4]. People are increasingly becoming aware of their health and how they can handle different issues effectively for them to achieve their medical goals meant to develop an effective means through which they can handle issues regarding their healthcare needs [5] The advanced technology of wearable devices is essential in the collection of data, management, and monitoring of the body functions [6] The application of technology in this field is irresistible since there is a need to develop a sustainable healthcare sector.

The Internet of Things (IoT) offers a rising technology that is essential in ensuring more affordable, low-cost healthcare services are available for patients [7]. The smart devices can either be worn or embedded in the body and they play a vital role in sending signals about the nature of the body and effects of various conditions [8]. The devices enable seamless networking between the patients, medical devices and physicians. The sensors will record signals in a continuous manner, they are then correlated with the essential physiological parameters and communicated over the wireless network. The data collected is stored, analyzed and used against the existing health records that have been taken before [9]. Physicians are able to conduct more advanced prognosis and encourage early treatment interventions meant to ensure the patient receives the most effective medical services early enough to mitigate the risk of adverse outcomes [10] The machines are essential in the sense that even when the doctor is not available, they help in predicting the health issues that a patient may be having[11]. Through effective machine learning techniques, the devices have been equipped with abilities that can be used to enhance the delivery of medical services by giving suggestions for the medication that should be administered [12].

The nature of this progressive technology is that, it will have impact on everyone in monitoring health and cutting down on the healthcare expenses that people may be having. This paper develops the technological and economic views for the comfort of patients and delve more into the challenges that face the application of IoT in the medical field [13]. This is one of the ways through which solutions to the challenges can be sought. Understanding the nature of IoT and its impact on the medical sector is essential. Deep analysis of the challenges this important aspect faces in the field of medicine and healthcare is also important because it helps in defining some of the issues in healthcare which can easily be resolved through the engagement of effective technologies [14].

2. BACKGROUND

The Internet of Things has been developing over time and its importance has been realized in different sectors[15], [16], [17]. The medical and healthcare sector is also one of the beneficiaries of these technological developments [18]. This is an important aspect of the technology that should be utilized in the delivery of effective healthcare services in the society [19]. The healthcare sector is facing different challenges that require the application of technology to enable it to work effectively [20]. Developing accurate technologies for the purposes of healthcare improvement has faced challenges because there are many needs that have to be satisfied[21]. Developing an IT-based solution for all these needs can be challenging. However, there are milestones that have been achieved by the application of IoT technologies in the healthcare systems [22].

The IoT and machine learning technologies have been developed and have been on the rise across different industries [23]. The medical industry is benefiting greatly from these technologies because there are solutions that have been developed over time which have an important aspect of delivering organizations from different challenges that they face [24]. However, the implementation of these technologies in the healthcare sector has come with many challenges which solutions have to be sought for them to be managed effectively [25]. IoT has made it possible to offer smart and effective healthcare services to people. The application of smart sensors is one of the factors that has contributed to effective management of healthcare needs in the society. Wearable devices can be used to track different issues within the body. Some can be embedded to monitor different functions of the body to ensure there is

effectiveness in the way medical services are delivered to such patients [26]. The information collected in such manner, can be analyzed, aggregated and mined to do the early prediction of diseases. Processing algorithms play a vital role in helping practitioners in developing personalized treatment, which makes healthcare more economical [27].

Challenges in implementing IoT in the healthcare sector are evident. Faulty networks and misinterpretation of some of the data and information from the devices can be detrimental to the effective use of the IoT devices [28]. Understanding the challenges is necessary in developing the most effective means through which they can be managed for effectiveness to be achieved in the use of these devices and technologies [29]. Faulty engagements of the technologies can be harmful to the patients because that will lead to the application of ineffective treatment interventions [30].

3. INDUSTRY DESCRIPTION

The medical and healthcare industry is growing and expanding services as the world's population also grows [31]. The sector is characterized by many milestones as well as challenges. It is always in need of solutions to solve the healthcare issues that face the society on a daily basis. As the world population grows, so is the demand for healthcare services. The medical and healthcare sector has not been in a position to fully satisfy the needs of people in various societies. However, there are technological solutions that have been developed to ensure there is effectiveness in the delivery of various services [32].

The healthcare sector has embraced technology as one of the ways through which sustainable development can be achieved in the sector. The Internet of Things and machine learning have come in handy to save the industry from the massive pressure that is experienced at different levels of delivering healthcare services in the society [33]. This is an essential factor to consider and develop an effective means through which the technology can be applied in the society and achieve the most desirable results of managing the healthcare needs of the society. The healthcare sector has to develop effectively through having an effective means through which the technology can be incorporated to improve the nature of interactions that patients and practitioners have in this field. Incorporating IoT in the medical field is necessary in understanding various developments in the sector [34].

There are differences in the healthcare sector when comparing the developed and the developing world. The developing world experiences more challenges compared to the developed world in the sense that there is a need to develop strategies to be applied in the management of issues relating to the healthcare needs of the society [35]. In the developing world, accessing and affording healthcare services is challenging and that has an effect on how different issues are managed at this level. Quality of healthcare services is also essential and developing an effective means through which the quality can be improved by reducing the workload and the pressure on the local facilities is essential in delivering an effective means through which the issues can be managed effectively [36]. Developing through technology is necessary in ensuring the society has access to affordable and quality medical services because it is through this development that the quality of life of individuals will be improved. The reduced workload on the facilities is vital in the management of healthcare in the society.

4. LITERATURE REVIEW

A. Challenges of IoT in Healthcare

Health monitoring systems have been developed in the recent days. This has been a great development in the field of medicine where there are important aspects of the healthcare systems that have come into play and are aiding the delivery of timely and effective healthcare services. P2P and IoT technologies have been incorporated into the medical system to keep most patients in control. The incorporation led to the development of the smart box [37]. Web real time communication was enhanced in the wearable devices so that real time transmission of data would be achieved. This is one of the ways in which a patient could be controlled through the systems and achieve one of the most effective means through which treatment could be administered. The applications relating to the use of the IoT devices played a vital role in the management of various issues which may have affected the patients.

Portable devices were introduced in the market and this enhanced the mobility of patients. A few drawbacks and security threats were a major factor in this development. The security threats are critical in the delivery of an effective means through which the devices and systems are supposed to work. Security is important especially when a device is known to be of a high value [38]. The patient has to be careful with such a device because it can attract people who may want to take it away due to its value. The devices have been developed with a lot of IoT and

machine learning technologies which play a vital role in the management of different conditions that patients may portray [39]. This can attract those who may want to steal and resell these devices making it a great challenge for the users.

Prediction challenges are also evident in the system where there are different data sets that can be interpreted differently making it difficult to achieve some goals that have been set. This is an important aspect of the IoT and machine learning technologies [40]. Users are supposed to be trained on how to predict and interpret various data collected by the devices. Inaccurate interpretation of data can lead to faulty analysis and result in the poor delivery of healthcare services in the sector. The sensors can be faulty at times and there is a need to have an effective way of confirming the data that is received from the sensors. A high level of accuracy needs to be embraced in the sector to ensure there is effectiveness in how the data is collected and the sensors deliver accurate information. This is an essential factor in managing different issues effectively in the healthcare sector and having an effective means of handling the issue is vital in managing different issues as they arise in the process of understanding the nature of data that is collected from the sensors [41].

Information security is the other challenge that can affect the effectiveness of utilizing IoT in the healthcare sector. All internet based networks and solutions are exposed to these challenges which can affect the effective delivery of services. It is important to have information security systems in place to protect the device users from possible attacks which may result in alteration of the data that is transmitted from the devices [42]. The information security challenge can be managed through having an effective strategy in place to manage different issues as they arise in the healthcare sector. Information security is vital for all devices that share a network that is internet based [43]). IoT is internet-based and there is a need to understand that the systems are vulnerable and face the risk of information security threats. However, there are measures and strategies that can be employed to ensure effectiveness is achieved in the delivery of medical services based on the IoT systems.

B. System Architecture

The IoT system has four protocol areas which have different functions and can be used for different purposes for the technology to work effectively. The first is the one that has devices embedded with sensors. It is the physical layer. The second is the network layer that is meant to transmit signals form the sensors to the cloudlets. The cloudlets send this signal to the

middleware layer that has to store the signal. Finally, in the application layer, analytics and diagnosis process are performed. There are a series of steps that deliver the system's work appropriately.

Data collection and transmission – Patients are given wearable devices which have sensors which have a role of collecting data from the body. The sensors have the ability to measure Electrocardiography (ECG), Temperature, Electromyography (EMG) muscle activity, respiratory rate, and sweating and blood glucose level. These are essential factors to be considered in the process of analyzing various body effects that need treatment [44].

Cloudlet Processing – This is an important process where data can be processed and stored. Mobile phones can be used to assist in the storage of the data. The cloud is also well enhanced to handle some of these issues and it can also be used to store data collected from the devices [45].

Analytics and Prediction – This is the final stage of using data from the devices. Machine learning algorithms are applied in correlating the sensors' parameters and clinical data. Challenges may arise at this point because in the medical field, new measurement tools are often introduced which may not match the required analytical systems that are in place for specific devices. The data from IoT warble sensors are spanned using different visualization methodologies for the effective prediction. Visualization tools are then utilized to give the details and interpretations of the data from sensors [46].

5. CONCLUSION AND SUGGESTIONS

The importance of remote health monitoring systems was discussed in this study. Many academic and professional researches have been conducted and the effectiveness of the remote IoT-based solutions have been found to be highly effective in the sustainable development of the healthcare sector. The internet of Things has played a vital role in the sharing of various medical resources making it an essential factor in the field of medicine. Without the applications, it may become challenging for the medical practice to achieve some objectives. Future studies are supposed to cover various issues that affect the delivery of effective services for the purposes of having an effective IoT-based healthcare system. Remote management of patients is becoming a common phenomenon and it is important to have a highly effective means through

which the issues on healthcare can be managed effectively for the delivery of an effective means of managing the patients without having the challenges highlighted by this study.

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The Impact of Block Chain and Smart Inventory System on Supply Chain Performance at Retail Industry

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Abstract

Blockchain is a trending topic and would be the most significant issue for all industries, manufacturing or services. This study aims to investigate the Impact of Block Chain and Smart Inventory System on Supply Chain Performance at Retail Industry in the UAE. A quantitative research was adapted, and a survey was designed and rolled out by email to all participants. A 202 valid questionnaires were used in the statistical process in order to find out the impact of blockchain technology and smart inventory on supply chain performance in retail industry. The hypotheses testing confirmed the direct impact of blockchain technology on supply chain performance side by side with the mediator role of smart inventory in the indirect impact. The results revealed that blockchain is becoming the real time need of the retail industry and has improved the efficiency of the retail industry.

Key Words: Blockchain, Smart inventory, Supply chain performance, Retail industry

1. Introduction

Most likely, we heard a significant term in business industry blockchain but we did not pay attention to it. Block chain is a buzzword that is using in information technology in order to use in business modules. This technology is going to be a most important functioning procedure of business industries. In coming recent years, block chain will be most significant use of all industries like business, health and other financial sectors. Block chain is a database functioning program (Chang, Katehakis, Melamed & Jim, 2018) that is connected with multiple sets of the

computers at the same time. It is an ongoing process of data recording and its blocks procedures. Each block contains its specific programming of the data and connect with other blocks and creating the chain of the blocks. The database of the entire program is not only managing one group, the entire process is connected with all departments and networks and every department can interlinked with whole database. Previous all blocks are safely preserved and new blocks are added in database for information. The block chain helps to create documents and files without any faking transaction and information.

In the modern world of business, the smart inventory management system in business operations is one of the smartest way of considering the objects that enhances the business efficiency and provide the detail information of the products and their availability before its finishing the stock (Zelbst, Green, Sower, & Bond, 2019). It is the procedure of smart integrating process of inventory and providing analytical approach of the management capability in which business industries create the relationship between available stock and remove stock. In the competitive environment it has become mandatory to have smart inventory management system to meet the demands in timely manner.

Supply chain management performance is the way how activities are designed to meet the end users requirements. It is all about the availability of the product to the safe delivery (Abdel-Basseta, Manogaranb & Mohamed, 2018). The assessment of performance of supply chain is based on the parameters like inventory turnover rate, timings of shipment and cash to cash cycle time etc. these indicators help the organizations to build and manage effective supply chain management system which is not only cost effective but smart enough to keep track of all activities.

In the retail industry it has become very important to have efficient system of supply chain to avoid delay in the shipment while meeting the demands of the customers. through the effective system of block chain advancement has made the retail industry more challenging and competitive because this is the resort where smart inventory system works better. In this report we have discussed the efficient use inventory management through smart inventory and block chain which has impact on overall performance of supply chain.

2. Theoretical Framework

2.1 Block Chain

Due to advancement in technology the operational nature of businesses also become advanced. Record maintaining and retrieving data has become very efficient and blockchain has made this task more easiest. Blockchain is the open distribution of ledge system where the transactions are recorded for the reference of future concerns (Hald, & Kinra, 2019). The recording of transaction is relatively permanent which has made verification trust worthy. In the retail industry on the daily basis hundreds of transactions are done and it has become very difficult to have them record simply in the computer because of the storage and also constraints specific to retrieve. Through the use of blockchain technology it has become relatively easy and easy to verified. This has improved the efficiency level of the overall supply chain because it has expedite the delivery time which is the basic requirement of the customers.

2.2 Smart Inventory

Inventory management is the challenging task for any organization because predicting demand can be tricky. It is also varied industry by industry. In the retail industry where there are many types of goods including convenience, shopping and luxury goods so the demand also varies which is all depend upon the purchasing power of the customers. in this regard smart inventory system is the need of time. Smart inventory system has the ability to keep track of inventory level, scalability with the provision of security and backups. In the retail industry smart inventory system is required for example through the concept of smart shelves real time inventory management has become possible (Liu, Wang, Lin, Xie & Zhang, 2020). Remote monitoring has become possible which helps the retailers to track the inventory level to refill shelves and meet the demands in real time.

2.3 Supply Chain Performance

Supply chain performance is highly dependent upon the block chain and smart inventory system (Sohel & Bin Osman, 2018). It is possible because through the advance implementation of technology it has become possible for the retailers to have transactions which should have the

ability of retrieving and can easily be verified to avoid errors. Smart inventory on the other hand helped the retailers to manage the inventory because if inventory is not managed adequately the firm will not be able to meet demands effectively. This shows that the performance of supply chain is not helping company to attain competitive edge in the market.

2.4 Operational Definitions

Blockchain

In the operational terms, blockchain is one type of distributed ledger which has the ability to maintain the transactional records on permanent basis (Cole, Stevenson, & Aitken, 2019). The blockchain is managed by the peer to peer networking and function as a decentralized database. Block chain process have several advantages in which it helps to create the transparent working conditions along with data security, transparency in transaction methods, and it is surely helps to industries to work on big levels. Block chain has surely benefitted in business operations especially it has competitive advantages against those companies who rely on Bitcoin trading tool or technology that is known for number of scam and mishaps in business transactions. Block chain clearly defined the situation of the real or fake. Firstly, the term block chain in business industries was introduced in 1978 in research papers and then published in newspaper. But initially it was declared as unsafe method of business transactions but later, business practitioners realized its importance especially for their trading transactions. The block chain system helps to make the access to data in secure methods. It is an independent and secure procedure of business operations that provide transparency in its processes. Block chain process have several advantages in which it helps to create the transparent working conditions along with data security, transparency in transaction methods, and it is surely helps to industries to work on big levels. Block chain has surely benefitted in business operations especially it has competitive advantages against those companies who relay on Bitcoin trading tool or technology that is known for number of scam and mishaps in business transactions. Block chain clearly defined the situation of the real or fake.

Smart Inventory

The operational definition of smart inventory can be defined as an inventory system which is highly innovative and base don high end technology to manage and control the flow of inventory

and accommodate to meet the demands of the customers (Liu, Wang, Lin, Xie & Zhang, 2020). It is always backed by powerful software where the aim is to improve the inefficiencies and sync the inventory across the channels to maximize the profit and reduce the cost.

Supply Chain Performance

The operational definition of supply chain performance states that it is the set of activities which are highly customer centric and the aim is to make the product availability possible through timely delivery (Wu,Yue, Jin, & Yen, 2016). The performance is always judged by the parameters of customer satisfaction which is only possible when they get the product on promised date and time.

2.5 Literature Review

Chang, Katehakis, Melamed & Jim (2018) stated that blockchain technology has made the existence of smart inventory system possible. Blockchain technology will be the most important functioning procedure of business industries. In coming recent years, block chain will be most significant use of all industries like business, health and other financial sectors. Block chain is a database functioning program that is connected with multiple sets of the computers at the same time. It is an ongoing process of data recording and its blocks procedures. Each block contains its specific programming of the data and connect with other blocks and creating the chain of the blocks. The database of the entire program is not only managing one group, the entire process is connected with all departments and networks and every department can interlinked with whole database. Previous all blocks are safely preserved and new blocks are added in database for information. The block chain helps to create documents and files without any faking transaction and information.

Abdel-Basseta, Manogaranb & Mohamed (2018) evaluated Blockchain helps improving the performance of supply chain management. Block chain is a useful and secure process of getting information in specific business details in which only concerned persons or departments can approach to database who have access of special cryptographic key to add information for new record in specific chains. The system is highly manipulated with secure features in which only one person can operate transaction with specific key and guaranteed with cryptography is used for copy of the record of the block chain in computers. In simple terms, block chain is a medical seeking

record system in which each block is connected to other blocks and stating the entire details of date, day and time of the happenings of the business measures and its entered information. The block chain process helps to business providers for detail and secure information process through management of the data base and providing specific required details according to need of the business holders and the customers. the system specified the errors and making the best possible solution of the errors on time on immediate basis.

Sohel, & Bin Osman (2018) evaluated smart inventory system has improved the performance level of supply chain management. Inventory managing is one of the important business tools that is helps to manage entire business inventories in one unit. Without inventory management, businesses cannot do their functions properly and they cannot manage their huge data without it. In order to manage inventories of business products is a difficult procedure in those days when technology and data collection procedure were not as much able to handle the queries. Today, there are several smart procedures are introduced in market that helps to business industries to track their procurement and inventories and managing their huge supply chain of industries in more progressive direction. The smart inventory management system in business operations is one of the smartest way of considering the objects that enhances the business efficiency and provide the detail information of the products and their availability before its finishing the stock. It is the procedure of smart integrating process of inventory and providing analytical approach of the management capability in which business industries create the relationship between available stock and remove stock. There are few smart tracking inventory systems are practicing in business markets, such as:

1. Inventory Tracking: it is the primary method of tracking and managing the inventories and monitoring the stock availability before its finishing. The inventory tracking system through smart inventory management procedures helps to business to locate their inventories in sufficient ways through tracking the filling record and your existing receipts. The smart system quickly retains the all information of the inventories with only one single of click.
2. Security and Backups: we can not get business security features without knowing the inventory management system procedures of security and its backups information. The smart and latest inventory management system in business industry helps to create high secure features alert

to the businesses in order to create backups of the data for emergency purposes through double check and save database.

3. Scalability: for inventory management system, all businesses are required the specific room or space to secure their inventories in proper way. The smart inventory management system provides the huge database space in their system in which business industries not only manage their inventories, they also record huge data information of the inventories in more adjustable and sustainable growth.

Kim, & Shin (2019) explained the impact of Block chain and smart inventory has improved the supply chain performance. Supply chain management and its performance measures in retail business industry is one of the business functioning process that create the linkages between the internal and external information and business relations through transparent and stable supply chain process. In retail business industry the role of supply chain management and its performing criteria is quite important. Number of companies are performing their business operations through digital supply chain process in order to meet global requirements and enhancing their supply chain performance in retail industry. The aim of the digital supply chain and enhancing its performance to determine the improvement of the business and managing the relationship of internal and external outcomes. In past times the entire business functioning process is totally different. They were managing their logistics, transportation, procurement separately. But currently, the global business industry establishes the huge and relevant sector the supply chain management in which all operational areas of the businesses logistics, transportation, procurement and ordering and delivery are emerged. The innovation in supply chain management performance through advance techniques and digitalization, the operations of the business strategies get potential and huge benefits.

3 Research Problem

Retailing industry is one of the business and financial sectors where business activities perform their functioning through selling and purchasing of the goods and finally customers get their oriented items. The retail is the final link of the supply chain performance. retail industry is one of the fastest growing business industries that is only possible with effective and efficient supply chain management performance. the fastest and dynamic retail industry only possible when

several efficient supply chain players comes in retail market that provide objectives on time through proper and sufficient period of time. The supply chain management performance in retail industry helps to grow the country's GDP rate high and create the position of the market in retail global business industry. The effective and manageable supply chain and its effective performance in business operations is one of the key procedures that is working as a back bone of the businesses. The advance digital method of supply chain management helps to industries to track their entire logistics record and connectivity with its business stakeholders in efficient ways. The effective supply chain management performance creates the significant growth of the retail industry and making possibility of the affordable prices for customer's demand. The efficient supply chain management performance offering various opportunities to business stakeholders and quickness in business response in retail business industry.

3.1 Research Model

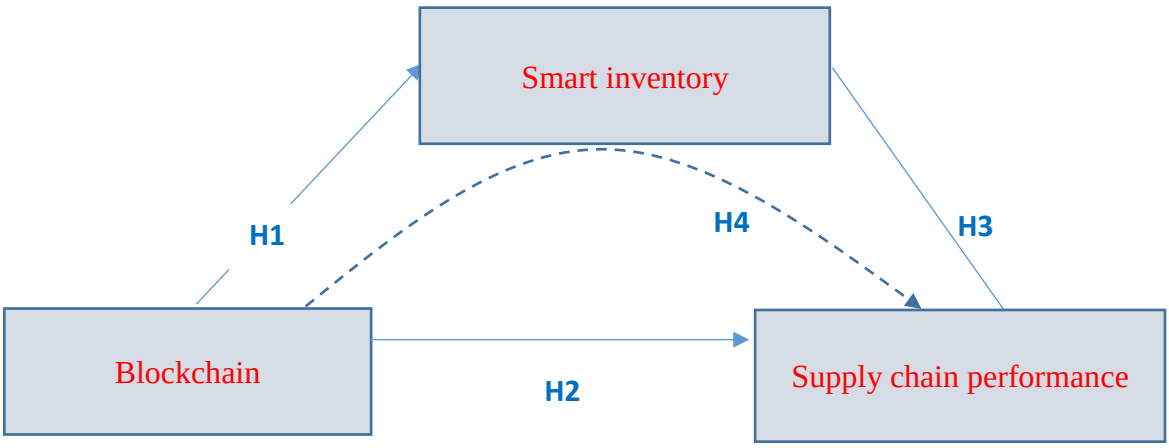

Figure 1: Source from author

3.2 Research Hypothesis

H1: There is positive relationship between blockchain and smart inventory at retail industry

H2: There is positive relationship between smart industry and supply chain performance at retail industry

H3: There is positive relationship between Blockchain and supply chain performance at retail industry

H4: There is positive relationship among Blockchain and smart inventory and the supply chain performance at retail industry.

3.3 Research Methodology

The proposed research methodology for this report and compilation is quantitative research design. Quantitative research design is the use of quantitative analysis to test the hypothesis. The main advantage of using quantitative analysis is that it helps in quantifying the data which is easy to validate. The reliability analysis helps the researcher to generalize the results and complex decisions can better be made.

3.4 Population and Sample

The population of the study is the overall retail industry of the UAE. The unit of analysis is LuLu Hyper market which has started its operations in 2000 from Abu Dhabi and within short span of time the group has been known by the UAE and GCC because of its wide range product availability and shelf placement. The company has added the home delivery system in its valued services which has increased the customer base and strong also. The sample size for the study was 202 and nonrandom convenient sampling size was used for the data collection. We found more convenient and easy to conduct because of this busy routine and pandemic situation also.

3.5 Data Collection Method

There are many ways of data collection in the research. We used mixed approach for the data collection.

For the secondary data source we used published articles and reviewed and extracted information and discussed under the head of literature review. Primary data was collected through self-administrative questionnaire survey design. It is primary source of data collection and highly popular among the research domain.

4. Data Analysis

Statistical tools used to test the validity of the study's model, are the Path analysis, ANOVA, Regression, Correlation analysis as well as descriptive analysis, in order to test the proposed relationship of Blockchain with Smart Inventory and its relationship to Supply chain performance.

4.1 Validity and Reliability

To examine Internal Consistency and as shown in table 1 the results of Cronbach's Alpha reliability showed that questionnaire items are closely related, since all values of Alpha are "high". To achieve content validity, a number of business management professors and some specialists were asked to review the questionnaire, and the questionnaire was amended in light of their suggestions.

Table 1: Cronbach's Alpha reliability for study's variables

Study Variables	Cronbach's Alpha
Blockchain	0.793
Smart Inventory	0.807
SUPPLY CHAIN PERFORMANCE	0.814

4.2 Descriptive Analysis

Descriptive analysis was used to describe the variables of study, and to show the perception of the respondents toward study variables and dimensions, and then rank the importance of variables regarding their perception. Table 2 shows that the "Blockchain" variable ranked to be the variable with highest importance with mean as 3.81 and Std. as 1.21, could be because they follow the formal structure. Then, the next variable in the level of importance is "Smart Inventory", with mean equal to 3.72 and Std. equal to 1.06, maybe because the excessive focus on the quality control. Then last variable is "Supply Chain Performance", with mean; 3.61, and Std. 1.19.

Table 2: Descriptive analysis for Blockchain, Smart Inventory & Supply Chain Performance

Construct	M	Std.	Sig rank	Sig level*
Blockchain	3.81	1.21	1	High
Smart Inventory	3.72	1.06	2	High
Supply Chain Performance	3.61	1.19	3	High

* 1-2.33: low, 2-.34-3.66: moderate, 3.67-5: high

4.3 Hypotheses Testing

The correlation analysis, ANOVA analysis and regression analysis were used to test the hypotheses are presented below.

Hypothesis 1:

Table 3 data illustrate a good relationship between Blockchain and Smart Inventory, where the value of r=0.401, determination coefficient=0.161 which indicate that 0.161 of change in Blockchain related to the change in Smart Inventory. Regression results and value of F=28.858 approve the effect of Blockchain on Smart Inventory, where the value of t=3.089 at the level of (0.05) are significant for Smart Inventory, and this supports the first hypothesis and confirm that the Blockchain impact on Smart Inventory.

Table 3: Correlation, ANOVA and Regression analysis to BLOCKCHAIN in Smart Inventory

	Correlation		ANOVA			Regression			
DV	**r**	**r^2**	**F*****	**DF**	**Sig***	β		**t****	**Sig***
Smart Inventory	0.401	0.161	28.857	1 201 202	.000	(Constant)	.0397	2.984	0.002
						BLOCKCHAIN	0.289	3.098	0.003

* level of significance (α≤0.05) ** Critical t (df/p)=1.64 *** Critical F=3.60

Hypothesis 2:

Data of Table 5 illustrate correlation results between Smart Inventory with Supply chain performance, where the value of r=0.501, determination coefficient=0.251 which indicate that 0.251 of changes in Supply chain performance related to the changes in Smart Inventory. Regression results and value of F=99.872 approve the effect of Smart Inventory on Supply chain

performance, where the value of t=2.952, 4.452 at the level of (0.05) are significant for smart Inventory respectively, and this supports the Second hypothesis and confirm that Smart Inventory impact on Supply chain performance.

Table 5: Correlation, ANOVA and Regression analysis to Supply chain performance in BLOCKCHAIN and Smart Inventory

	r	r2	F***	DF	Sig*	β		t**	Sig*
Supply chain performance	0.501	0.251	39.872	1 201 202	.000	(Constant)	.0428	3.108	0.001
						Smart Inventory	.0401	2.952	0.000

* level of significance (α≤0.05) ** Critical t (df/p)=1.64 *** Critical F=3.60

Hypothesis 3:

Data of Table 7 illustrate a good relationship between Blockchain with Supply chain performance, where the value of r=0.544, determination coefficient=0.296 which indicate that 0.296 of change in Supply chain performance related to the changed in Blockchain. Regression results and value of F=15.982 approve the effect of Blockchain on Supply chain performance, where the value of t=3.193 at the level of (0.05) is significant for Blockchain, and this supports the Third hypothesis and confirm the Blockchain impact on Supply chain performance.

Table 7: Correlation, ANOVA and Regression analysis to Supply chain performance in Blockchain

DV	r	r2	F***	DF	Sig*	β		t**	Sig*
Supply chain performance	0.544	0.296	15.982	1 201 202	.000	(Constant)	/	2.886	.0003
						Blockchain	0.419	3.193	.0001

* level of significance (α≤0.05) ** Critical t (df/p)=1.64 *** Critical F=3.60

Hypothesis 4:

Path Analysis is conducted to calculate the direct and indirect impact of the Blockchain and Smart Inventory on Supply chain performance with the mediating role of Quality. The results show that the value of Chi2 is (45.942) and it is significant at the level of (0.05). The quality fit indicator or The Goodness of Fit Index (GFI) is (0.821), which is close to the correct full fit value (=1).

Table 8: Path analysis to direct and indirect impact of Blockchain and Smart Inventory on Supply chain performance with the mediating role of Quality

….	Chi2	GFI	CFI	Sig	Direct Impact		Indirect	Path	T	Sig
BLCH on SCPR with the mediating role of SMIN	45.942	0.821	0.614	.000	BLCH	.794	.575	BLCH/SMIN	12.791	.000
					SMIN on SCPR	.741		SCPR - SMIN	9.755	.000

GFI: Goodness of fit index
CFI: The comparative fit index
BLCH: Blockchain,
SMIN: Smart Inventory
SCPR: Supply chain performance

For the value of Comparative Fit Index (CFI) is (0.614), which is also close to the true full fit value (=1). On the other hand, the direct effect of Blockchain on Smart Inventory is (0.794), and the direct effect of Smart Inventory on Supply chain performance (0.741). While the indirect effect of Blockchain on the Supply chain performance with the mediating role of Smart Inventory is (0.575), and thus all direct and indirect effect are significant at the level of (0.05). Therefore, we can support the impact of Blockchain and Smart Inventory on the Supply chain performance with the mediating role of Quality.

5. Results and Discussions

Result of the study confirmed the direct impact of Blockchain on Supply chain performance and the direct impact of Blockchain on Smart Inventory. Meanwhile, the results confirmed the indirect impact of Blockchain on the Supply chain performance with the mediating role of Smart Inventory. Companies that fail to achieve the quality of their operations and supply chain would probably face additional costs as well as low customer satisfaction, which reflects on their competitiveness. Therefore, companies should seek to implement the Smart Inventory approach in order to improve quality and reduce costs of poor quality. This study was intended to highlight quality strategies and their linkage with costs in industrial companies. It has examined the requirements availability for Smart Inventory processes and its impact to Cost of Poor Quality at Plastic manufacturing companies in Dubai.

The study results proved the significance of the awareness of Smart Inventory requirements in enhancing the organizational performance. This result is consistent with the results of the study of (Idris, 2016), which showed that the implementation of Smart Inventory processes had a significant impact on improving the growth. Moreover, the results showed that Smart Inventory implantation contribute to reduce the mismanagement practices.

This finding is consistent with the results of the study of Thomasson, & Wallin (2013), which showed that applying new technologies in the inventory contributes to improve companies' competitiveness. The results show that awareness of Smart Inventory requirements and desire to identify errors, make companies to address and repair the defects, and this result is consistent with the results of the study (Dian, Rapi, & Nilda, 2010) which showed that Smart Inventory processes are an effective strategy of quality control, and contribute to the improvement and development of inventory and operations performance.

The factories are intent, on the participation of employees in administrative tasks and decision-making, with the aim of developing their leadership skills and acquiring new ideas. The factories authorize the authorities to increase the performance of the work, to emphasize the importance of employees and to meet their needs and requirements and to provide a comfortable work environment which reflects on their performance. To provide modern mechanisms and the use of modern technology, and keep pace with new technologies to develop performance.

They regularly review the operations policies and procedures, and clarify the methods and tactics to achieve the goals and objectives. Results show that top managements have some focus on quality, with their interest appearing to be in the vision, mission and objectives that included to enhance the quality targeting the customer satisfaction.

This result is consistent with the results of the study He & Goh (2015) which showed that the Smart Inventory applications have contributed significantly to improve their organizational performance. This result is consistent with the results of Mahmood, S., Shahrukh, S. & Sajid (2010) which showed that the cost of poor quality negatively affects the companies' competitiveness.

6. Conclusion and Recommendations

The smart inventory system helps to organizations to create optimistic approach in their resolutions and business management record the inventories through several technology analytic capabilities programs. Smart inventory management is directly working with the SAP and Asset Management system program Maximo and provide cloud solution inventory management system. The old and traditional working procedures of inventory management is quite lethargic and time taking procedures in which many persons were involved in the data entry procedure and sits for period of time to enter the entire inventory details and track the record manually. But Radio Frequency Identification (RFID) is one of the smartest solutions of the technology that replace the entire inventory system in one smart and quick method. RFID is one of the smart ways of technology that helps to track assets and inventory management in more easy and convenient ways. The supply chain performance management create the possibility of the detail information process in one unit and collect all data from various internal and external resources in order to track the inventories for supplying he logistics on time. The functioning of the advance supply chain management performance giving the opportunity to the management to get new insight regarding the supply On and immediately spit the error in the supply chain performance.

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The Universal Artificial Intelligence Efforts to Face Coronavirus COVID-19

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Abstract

Artificial intelligence (AI) has already changed the world and has made an effective impact in a range of fields including industry, criminal law, health, national security, transport, nanotechnology, intelligent cities as well as issues such as algorithms and access to the data. This paper shows how these technologies are a great asset to humans and are programmed to reduce human effort as much as possible. They tend to possess the capability to work in an automated fashion. Therefore, manual intervention is the last thing that could be asked for or seen while operating parts associated with this technology. As well as the paper shows the different universal efforts of AI techniques to face the pandemic of COVID-19.

Keywords: Artificial Intelligence Techniques, COVID19.

1. INTRODUCTION

Although the concept of Artificial Intelligence (AI) has long existed, many researchers believe that it is time for AI to be a reality. Computer science refers to AI research as a "Smart Agents" study: any system which sees and acts in a way that maximizes its opportunities to meet its goals [1]. In 1950, Claude Shannon proposed the concept of computers playing chess. In the early 1960s, AI began. Marvin Minsky believed "the problem of AI simulation is going to be solved within a decade". The first AI applications were introduced during that period. In [2] discussed various ideas on humanoid robots were put into practice in antiquity Greek times. Daedelus, who controlled wind mythology and tried to create artificial people, is an example. Modern AI has begun to be used in history to explain the philosopher's model of human thinking. However, Using AI not only engaged with engineering, information technology, finance, and accounting,

medicinal, marketing, agriculture, human resource management, law, education, sciences of space, customer services but also contribute greatly to the performance of tasks effectively [3].

It is important to facilitate our lives. This paper shows how these technologies are a great asset for humans and are designed as much as possible to reduce human effort. They tend to be able to work in an automated way. The last thing that could be requested or seen in the operating parts associated with this technology is therefore manual intervention.

2. WHAT IS AI?

Much research defined AI in varies ways. The ability of a system to interpret external data accurately, learn about it and use it to achieve specific objectives and tasks through various changes is one of the most common meanings of AI's concepts [1]. Another definition, AI is an analytical computer assisted course that seeks to shape automated systems which could be referred to as smart systems [4]. Moreover, [4] defined AI as the machine-shaped human intelligence. AI is an attempt to create smart entities which can equal or surpass human intelligence and rationality [5]. "The science of making machinery does what, if done by men, would necessitate intelligence [6]. John McCarthy say that logical reasoning is a "standard" more influential than human capacity to quantify intelligence [7]. This approach to AI uses mathematical logic approaches to officialize the complex tasks artificial intelligence machines perform.

3. THE CHARACTERISTICS OF AI

According to [8], as shown in Fig. 1, the most important characteristics for AI are:

- *Deep Learning:* A machinery that teaches computers to learn by example what naturally happens to humans. There are many areas of AI technology, such as autonomous vehicles, computer vision, automatic text generation, and the like, where deep learning is increasing in scope and use.
- *Facial Recognition:* Facial recognition enabled individual faces to be recognized by means of biometric mapping. The progress made in surveillance technologies has been path breaking. The knowledge is compared to a database of known faces to find a match.
- *Automate Simple and Repetitive Tasks:* Without breaking a sweat, AI could do the same work repeatedly. For example, Siri, an Apple Inc. voice assistant. In a single day, it can

handle so many orders. Automation would not only increase efficiencies but would also lead to lower overhead costs and a safer working environment in some circumstances.

- *Data Ingestion*: Data ingestion means that knowledge is transported from different sources to a data storage medium where a company frequently accesses, uses, and analyzes it. AI analyzes a large number of these data with the help of neural networks and contributes to a logical conclusion from it.
- *Chatbots:* Chatbots are software that provides a window with either audio or textual input to solve customer problems. Before bots, only certain commands were used to respond. It did not know what you meant if you said the wrong thing. Now when you are talking to the chatbot you do not have to be ridiculously specific. It knows not just commands but language. The chatbots not only provide services focused on problems faced by customers, but also provide users with product suggestions. That is all due to AI alone.
- *Quantum Computing:* The field focuses on the creation of quantum algorithms for computer-based work within AI, such as machine learning. It is an interdisciplinary field.
- *Cloud Computing:* Data storage would have been a serious problem if such a large number of information had been channeled every day. Capabilities AI's work in the cloud-based enterprises to make organizations more efficient, strategic, and insight-oriented.

4. AI TECHNIQUES

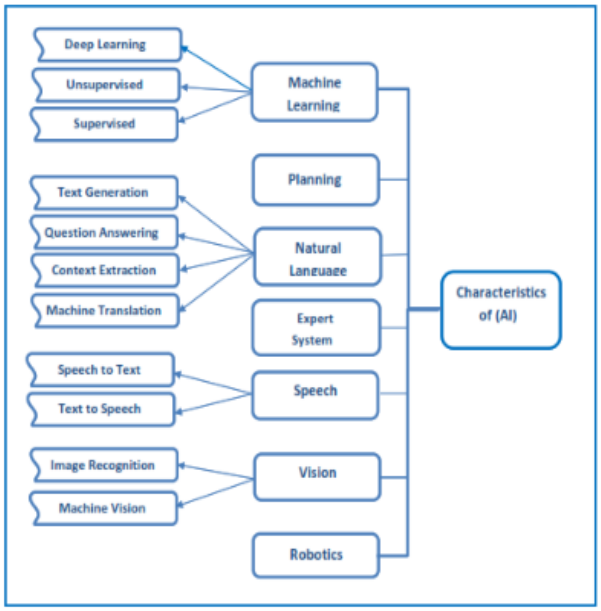

Fig. 1. Characteristics of AI

The positive impact of AI reaches almost every dimension of human life. AI was applied for several models, forecasts, and decision support and control systems in such diverse fields as engineering, economics, linguistics, law, manufacturing, and medicine [8-9]. The following are examples for how AI techniques are taking part in different fields of life:

A. Applying AI Techniques in Finance Filed

The financial services industry includes AI for massive processing of data, trading, online communication with clients and performing a variety of other essential functions. In [10] carried out a study to search for AI's effect on the real world, on finance, which has been of significant benefit to many financial sectors from the implementation of AI applications. He concluded that AI technology would increase efficiencies, lower costs, enhance efficiency, boost customer satisfaction levels, and encourage financial inclusion in the provision of financial services. There are many researches which presented the benefits of using AI in finance [11-14].

B. Applying AI Techniques in Human Resource Filed

In [45] explained that although the effectiveness of using AI in Human Resource (HR) practice, most organizations continue to be lagging in integrating AI with HR practices due to their integration costs or are afraid that some business processes may be handled by a non-human entity. Moreover, other researchers presented how AI is effective tool in HR [15-16].

C. Applying AI Techniques in Civil Engineering Filed

In the field of adaptive civil engineering systems, [2] have made progress. In an active tensegrity system control setting, self-diagnosis, multi-target type management and enhancement learning processes have been introduced. It is Specifically suitable for modeling complex systems with known input-output data sets among AI computer technologies. The modeling of cement-based materials can be efficient, non-linear, complex, and unambiguous using single, dual, or multiple damage factors. Many other researchers made development in that field [16-19].

D. Applying AI Techniques in Healthcare Filed

AI is already used effectively in the field of health care, ranging from online appointments planning to online checks, follow-up appointments calls for reminders, diagnosis of the aid for diseases, assistance with procedures of surgery, radiation treatment and offering mental health therapy [20-21]. Japan has the leadership in using of AI technology in health care. It has already introduced AI robots helping geriatric people to workday by day, from taking morning pills to adjusting the AC temperature during bedtime. It is also useful in the diagnosis of Glaucoma [22]. In China, a primary method for early diagnosis of COVID-19 was AI-powered CT scanning of the lungs, reducing the time spent on diagnosing a case from 30 minutes to seconds. The branch that has been the most up-to-date and welcoming to the use of new technology in clinical imaging and storage is radiology. By identifying rapid negative tests in computed tomography, X-rays, magnetic resonance imaging, particularly in high volume settings, and in hospitals with less available human resources, AI could provide substantial support in radiology [20]. Currently, three South Korean medical institutions, Gachon University Gil Medical Center, Pusan National University Hospital and Konyang University Hospital, have introduced IBM's Watson for Oncology artificial intelligence system that can identify, evaluate and compare treatment options by understanding the medical record and applying its training to each individual patient [23].

E. Applying AI Techniques in Marketing Filed

In [24] showed that implementing AI is useful for future marketing strategy growth. AI is a tool for digital marketers to inspire them and tricks you to get the brand or an individual or group of people to learn it and make it high. It is fair to assume that AI is a secure investment that earns dividends [25]. To convert digital systems into all sectors that contribute to technological progress that will help in economic development, AI technology is a goal for Saudi Arabia during the current period of its [26] initiative to be one of the leading countries in Middle East in implementing and investing of AI applications for the sake of society and individuals [27].

F. AI Techniques in Wastewater Treatment Field

There are many studies covered the effective role of the importance of technological advancement such as AI techniques in the chemical analysis and wastewater treatment. [28] stated in their study the importance of AI technologies in treatment processes of the effluent discharge from hospitals that has an eminent quantity of chemical waste. [29] covered some aspects of the worldwide disposal and regulatory standard for hospital effluent discharge, its managements and treatment technologies that are widely implemented and perfectly suited. To treat 10m3/day of hospital wastewater, a pilot scale CW system was used. The system was tested for 3 months to assess its efficiency in wastewater removal. With all removal efficiency 94% (COD), MLSS (97%), TSS (98%), BOD5 (96%), Phosphate (98%), HSFCW coupled with a tube settler (79 %) [30].

G. AI techniques in Nanotechnology Field

[31] also discussed the fact that since the 1994 development of nanotechnology, developed countries have sought the use

of modern technologies in all fields, including water purification, in their study entitled "Water and Wastewater Treatment using nanotechnology. There were positive results compared to other water treatment techniques because of their high surface area (superface/volume ratio), metal containing nanoparticles, carbonaceous nanomaterials, zeolites and dendrimers and nanofibers. In their paper, [32] discussed a few recently used nanomaterials that are currently used in water treatment, with an emphasis on nano-based adsorbents and filtration membranes.

5. SCOPE OF AI IN THE MIDDLE EAST BEYOND 2030

The scope will almost certainly increase after 2030, when AI affects the economy and society. The complexity of AI would almost certainly grow both in the economy and in society. Therefore, to provide a springboard for the future it is necessary for the Middle East to be strategically positioned. The most significant gains, which are equivalent to 12.4% of GDP, are expected, in absolute terms. AI in Saudi Arabia is contributing over USD 135,2,2 billion to the economy by 2030. The UAE is projected to have a significant effect in comparison with approximately 14% of GDP in 2030. As well as the expected annual contribution growth for Bahrain, Kuwait, Oman, and Qatar is 14% of GDP [33].

6. CONTRIBUTION OF AI TO GROSS DOMESTIC PRODUCT (GDP) BY 2030

The International Data Corporation (IDC) analysis estimates that the Middle East and Africa (MEA), cognitive and AI system expenditure will grow from 37,5 million dollars in 2017 to over 100 million dollars in 2021, which is a 32 % increase yearly [33].

7. THE DEVELOPMENT OF AI TECHNIQUES IN THE DEVELOPED COUNTRIES

Innovative intelligent manufacturing strategies and policies have been formulated by developed countries, such as the United States and Germany, using AI, such as the Advanced Manufacturing Partnership Plan (2011) and the Industrial Internet (2012) in the United States and the Industry 4.0 Plan (2013) in Germany. The 'Industrial Internet' was adopted by the U.S., which can intelligently analyze intelligent equipment, employees, and data in an intelligent way to make smarter decisions possible. This achieved such a good result. Significant results have been achieved by CPS-based smart manufacturing technology in Germany, e.g., in Germany The Amberg plant is a smart plant model of the Siemens company. The real factory is run together with the virtual factory at Amberg, and the real factory data and production environments are reflected by the virtual factory through which individuals can manage and control the real factory. Almost 75% of the manufacturing operations have been automated. In robotics, autonomous vehicles, and quantum computing, Germany also has leadership [34]. Chinese scholars have built various types of AI models in China to predict the consumption of petroleum. The large amount of data in the financial market could be used for analysis by artificial intelligent algorithms [35]. According to an online survey of students conducted at Canadian medical schools, as well as in Canada, they expect to add AI to the curriculum as a complement to radiology [36].

8. UNIVERSAL AI EFFORTS TO FACE CORONAVIRUS COVID-19

Medical image processing, which has recently appeared in several coronavirus research studies, has been using AI techniques as a fundamental function for COVID-19 detection. [37] for other uses of the DL in medical image analysis. It is recognized from these studies that X-ray images and computed tomography (CT) scans are commonly used to automatically detect the infected case of COVID-19 as a DL model input. A deep convolutionary neural network (CNN) model was developed for the detection of COVID-19 cases in [38]. The proposed CNN model can

achieve an accuracy of 93.3 percent by practicing 13,975 images of 13,870 patients on an open-source dataset [39-44] considered the use of ML and DL techniques for COVID-19 detection with chest CT scans. These works show high performance as they can achieve a high classification accuracy, e.g., 99.68% in [45], an area under curve (AUC) score of 0.994 in [43], AUC of 0.996 in [45], and 82.9% accuracy (98.27%) with 80.5% accuracy (97.60%) and 84% sensitivity (98.93%) in [43-44].

A. Apple and Google Team Up to " Contact Trace" COVID-19

Apple and Google have been creating mobile applications that tell users whether they are linked to someone who has recently been infected. The group plans to team up in a few months to deliver the product, which is built into billions of iPhones and Android devices worldwide. That would permit smartphones to log in to other devices they come near, enabling the so-called touch tracking of the disease, and these have succeeded in areas such as South Korea, where mass virus tests have been carried out [45].

B. Speeding Up Drug Discovery and Development

AI can enable new drugs and vaccines to be detected, develop, and measured faster than ever. For instance, Insilco Medicine, a portfolio company of Longevity Vision Fund, was able to use its AI techniques for successfully recognizing thousands of molecules in just four days for possible medications. Insilco Medicine then launched an open policy and published the updated results on its website to allow all researchers to download the data free of charge, ultimately contributing to the global fight against the epidemic [45].

C. Reducing Fatality and Optimize Disease Management

Applying AI techniques can help in controlling the epidemic and reduce deaths by reducing the burden on healthcare workers and by reminding patients of correct treatment procedures. Medical care staff members are at high risk of exposure and contraction to Covid-19. Until now, Covid-19 has infected thousands of Medical care staff members in China as well as many other countries. AI can help to alleviate the burden. For instance, China uses robots to provide faster diagnostic tests. Also, AI assists Hangzhou City Ambulances to speed up traffic.

Moreover, AI can also help people to better understand what their reactions should be in case they affected with the virus. China has released an App that lets people verify whether a confirmed COVID-19 patient has taken a flight or a train. Moreover, it is using drones to ensure adequate measures are taken by the residents [45].

D. Forecasting Epidemics

Applying AI techniques can alert from an impending outbreak and give people ample time to plan for it. To evaluate information from a variety of sources and monitor over a hundred infectious diseases, BlueDot, a global AI software company, uses AI-powered algorithms, machine learning, and natural language processing. In the coming days, it is expected that AI could even use social media data to predict human actions and possible outbreaks [45].

CONCLUSION

Artificial intelligence is known for a long time now for its importance and its subsequent components. They are seen to make this world a better place as instruments and techniques.

These machines tend to speed up your processes and tasks with a guaranteed degree of accuracy, making them an important and useful tool.

These technologies and applications are not only related to our overall and everyday life, in addition to making the world an error free place with their simple and daily techniques.

It also affects and is important for other areas too.

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Renewable Green hydrogen energy impact on sustainability performance

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ABSTRACT

In today's world, the major source of energy is fossil fuels, which are nonrenewable and cannot be used once exhausted. At the start of the twenty-first century, main challenges with current energy infrastructure throughout the world were a finite supply of fossil fuels, ever-increasing energy use, and the growing environmental impact of greenhouse gas emissions. Fossil fuel energy is economical due to existing infrastructure, but it has significant downsides and has a severe impact on the environment.

As a result, renewable energy sources are being investigated as potential contenders to supply the bulk of energy demands. Hydrogen is the least harmful to the environment of these fuels. Hydrogen is a clean, long-lasting fuel with the potential that is the source of future global energy. It may potentially be used to replace current fossil-fuel-based energy infrastructure. This is seen as a solution to the above-mentioned challenges, such as global warming and environmental degradation. It is impossible to overestimate the relevance of environmental and economic factors in the development of hydrogen infrastructure. This article discusses the many aspects of hydrogen, including as manufacturing, storage, and applications, with a focus on the environment and the economy.

Keywords: Renewable energy, Green hydrogen energy, sustainability performance

1. INTRODUCTION:

While minimizing the effects of global warming, the hydrogen (H2) market has the potential to act a substantial part within worldwide power mix. To pass the twofold test, government authorities, corporate leaders, engineers, and buyers must work together to make a cautious and meaningful step. Every year, roughly 70 million tons of H2 are produced across the world (MTPA). Furthermore, H2 is mostly originated from coal and petroleum gas; the Energy Information Administration (EIA) estimated that the H2 generation uses 7% of all flammable gas. (IEA, 2019 a)

They are mostly used in the development of high relative resources such as methanol, alkali, and gas-to-fluids (GTL) power, as well as refinement and steel production. As a result, H2 serves as a critical middle ground in industry. In any event, pure H2 consumption accounts for just around 6% of overall H2 output, indicating that it plays a little role in the world energy balance. Despite the fact that hydrogen is required for the manufacturing of relatively high quality goods, problem with manufacturing of H2 is that it is frequently obtained methods that are based on fuel upgrading of methane, coal, and biomass gasification, for example, all yield fossil fuel by products and other ozone-depleting substances. (IEA, 2019 a)

Hydrogen is predicted to make a substantial contribution to transportation, according to the Hydrogen Council, a United Nations group under the World Economic Forum (about 150 MTPA), modernization (approximately 110 MTPA), power production (over 140 MTPA), and other industries. As a result, there is a significant potential to create Hydrogen from environmentally friendly sources for the purpose to fulfils the growing need for Hydrogen in transport sector and other applications. (IEA, 2019 a)

By 2050, The International Maritime Institution (IMO) is a United Nations organization that deals with maritime issues, wants to decrease ozone-depleting chemical emissions in half from present levels. To achieve these goals, they demanded a transition in the delivery region from dependency on petroleum goods to an energy blend that included low carbon discharge powers. Green hydrogen is regarded as a carbon-neutral fuel. (IEA, 2019 b)

Sustainable growth demands a steady supply of fossil fuels at a fair price, with minimum or no negative consequences. In actuality, coal and gas reserves are limited, and so lacked the traits required for long-term growth and survival, whereas renewable energy sources are abundant. (I R. M. Dincer, 2004). Environmentally reach energy, in particular, is the most cost-effective and environmentally benign means to boost long-term technical advancement

and people's standard of living, along with the industrialization. As a result, long-term and an effective H2 energy policy must be devised for the purpose toencourage the use of H2 resources obtained from sources of non-fossil fuels and hydrogen technologies based on renewable energy sources. (Midilli A A. M., 2005)

The purpose of ongoing research is to identify the link between H2 energy systems and worldwide economic growth and sustainability, as well as on the importance of H2 based energy sources derived from renewable energy systems in long-term manufacturing. As a result, the study's primary objectives are to enhance our understanding of H2 based energy sources' long-term viability and to encourage the strategic deployment of hydrogen power systems towards long-term growth. This study also looks at key strategies to renewable power energy system based on the H2, as well as global sustainability initiatives.

2. LITERATURE REVIEW:

There is a huge need to construct a Rational and systematic efficient framework to evaluate the influence of Environmentally reach energy-based H2 power systems on environmental sustainability, world stability, and results reflect. (Dincer I R. M., 2005)

Midilli has recently produced empirical formulations for worldwide economic growth and destabilization, and also environmentally reach energy alternatives for the long-term sustainability and their interdependencies. Dincer and Rosen went on to define long lasting positive enhancements as the intersection of energy, ecological, financial, physical, and social sustainability. This research, in general, add to existing research on hydrogen power systems and their significance in long production. (Dincer I R. M., 2005) As a result, the following sections will now be discussed:

2.1. Worldwide economic growth and the H2 based energy sources system:

The usage of fossil fuels has been connected to global climate change, global energy disputes, and energy resource constraints, constituting an increasing danger to worldwide economic growth. These negative consequences can be seen on a local, regional, and global scale. Significant global problems will almost certainly increase if fossil fuels are used more

extensively. Global population increase, fast technological advancement, and rising energy consumption all add to this worry.

In the past, fossil fuels, the primary source of energy may have been employed to alleviate global energy issues. However, due to significant growth in global energy demand and consumption, , fossil fuels cannot remain the primary source of energy indefinitely. (Contreras A, 2009)

These reasons create a substantial incentive to the generation of H2 from sources that does not uses fossil fuel and the implementation of Environmentally reach energy coupled energy system based on the H2 to adjust for the constraints of conventional resources and enhance worldwide economic growth. If worldwide economic growth is improved through the use of H2 based energy sources and technology, the hydrogen-based measure of the sustainability is projected to grow. (Conte M, 2001)

For the purpose to reduce the consequences of usage of the fossil fuel resources, increase hydrogen generation from non-fossil fuel resources, and ensure worldwide economic growth and sustainability, H2 based energy sources plans and a hydrogen-based global sustainability road map should be developed and executed. As a result, actual implementations of these fundamental needs might produce a variety of outcomes, including,

- Decrease the use of fossil fuels;
- Decrease tensions between nations over energy resources;
- Make it easier or more necessary to develop new technologies,
- Minimize pollution of the air, water, and land, as well as forest loss; and
- Reduce energy-related diseases and fatalities. (Conte M, 2001)

2.2. H2 based energy sources system and sustainability:

Long lasting positive enhancements necessitates a long-term supply of H2 based energy sources that is immediately and sustainably accessible at a fair cost, and that may be used for almost all essential tasks regardless of negatively impacting society. One of the key priorities of energy policymakers throughout the world should be to promote energy system based on the H2 for sustainability and worldwide economic growth. (Midilli A A. M., 2004)

In terms of flexibility, adaptability, and low operating costs, environmentally reach energy-based energy system based on the H2 differ greatly from customed practise to obtain energy from fossil fuels technology (e.g., large capital investments, long implementation lead times, operating cost uncertainties regarding future fuel costs). Traditional energy systems can be expensive and environmentally unfriendly, but a H2 based energy sources system based on renewable power can be attained at good cost that is economic and according to the environmental friendly option. Furthermore, H2 based energy sources and hydro power sources may play an essential part in addressing energy demands in both household and industrial sectors, which is critical for sustainable. (Midilli A A. M., 2004)

Environmentally reach energy-based H2 based energy sources solutions have lately emerged as a vital component of the stability and sustainability of H2 based energy sources:

- They have minimal or no certain negative environmental effects. H2 based energy sources resources are available in a variety of forms, allowing for a wide range of uses.
- They are unaffected by depletion. If employed effectively in the relevant applications, energy system based on the H2 can have a stable and productive way for supply of energy for nearly endless span of time.
- They advocate for system devolution and semi-independent native strategies that seem to be moderately of the national network, increasing system flexibility and providing economic benefits to small, isolated areas.
- Furthermore, equipment's small size minimizes time it takes from conception to operation, giving it more flexibility in taking action to unpredictably changing progress in energy consumption.

The global need for development of energy through sustainable ways is steadily rising. For both emerging and established countries to attain worldwide economic growth and sustainability, widespread deployment of a H2 based energy sources system based on renewable energy may be critical. As a result, H2 based energy sources and technology are required for worldwide economic growth and valuable economic progress. The relationship between an Environmentally reach energy-based H2 based energy sources system and sustainability is critical for both established and developing (or developing) countries. (Afgan NH, 2004)

In addition, looking at the links between the H2 based energy sources system and long-term development reveals that green technology is inextricably linked to long-term

development. As a result, achieving H2 based energy sources-based long lasting positive enhancement necessitates the use of H2 based energy sources from sources that does not uses fossil fuel and energy system based on the H2, as well as efficient H2 based energy sources resource usage. (Afgan NH, 2004)

Taking into mind these critical factors, the benefits of an Environmentally reach energy-based H2 based energy sources system may be described as follows:

- Hydrogen may contribute to environmental sustainability since it is a high-quality, ecologically friendly energy that is also a safe, trustworthy energy transporter that generates no harmful exhaust.
- Hydrogen may initiate environmental balance since it easily can distribute through pipelines.
- As a chemical feedstock in petrochemicals, food, microelectronics, ferrous and nonferrous metals, chemical and polymer synthesis, and metallurgical processes, hydrogen may also be used as an energy carrier in clean and sustainable energy systems.
- Because H2 can be used in so many aspects of business and everyday life, it is easier to move to a hydrogen economy, ensuring economic and social sustainability.

2.3. Factors and solutions for ensuring the sustainability of H2 based energy sources:

Energy system based on the H2 will play a crucial part in future energy situations. The most essential factor in deciding the specified purpose of H2 based energy sources and technology will most likely be energy demand. In the future, energy system based on the H2 are predicted to supplant fossil fuel-based energy systems as the primary portable energy carrier for household and industrial uses. Hydrogen production in the world has reached 50 million tons per year (45 billion kg per year), accounting for around 2% of global energy use. Annual worldwide hydrogen use, on the other hand, is now in the 400–500 billion Nm3 range. Around 97 percent of this total comes from captive or internal production, with only approximately 3% coming from merchant sources. (James, 2003)

About 99 percent of total is derived by carbon fuels, mostly gas steam reformation. Different methods of synthesis and energy sources are used to make gas. Gas is produced by utilizing alternative fuels such as hydroelectric, photovoltaic, and air to produce crude oil and/or liquid. For example, electrolytic with electricity may create 108.7 kilo of one chemical

element gas from 1 m3, and the power of this amount of gas is equivalent to 4221 gallons of gas. Steam is used in the manufacture of gas, which is fuelled by either fossil or renewable energy sources. (James, 2003)

Consider the energy capacity for every volume, usage effectiveness factor (u = f /h = 1), usage stability (which would be high for hydrogen), plan of action, polluted air and physical impacts (which can be lesser for hydrogen, based on energy source used to produce it, especially since CO2 would not be a necessary waste) of hydrogen fuel. Hydrogen's properties as an energy carrier include being limitless, safely storable and transportable, widely used in a number of applications, created through a variety of techniques and from a diversity of ways, and very affordable to use. As a result, the shift to a hydrogen-based energy market is taking its time but will almost certainly not be completed until the mid or late decade. (James, 2003)

Planning for hydrocarbon fuel sources established and driven by strong primary forces and connected centers should encompass sociological, ecological, energy, financial, industrial, and political components of the hydrogen-based system in order to secure global economic development and sustainability. Certain strategic plans should be made and analysed in order to put H2 based energy resources strategy into action and illustrate the importance of a renewable power H2 based energy sources system for sustainability. The research depicts strategic plans, as well as related components, for the use of an Environmentally reach energy-based H2 based energy sources system for greater sustainability in this regard. As a consequence, such necessary initiatives might play a critical role in offering industry and economic help for the transformation to a hydrogen energy and resource system based on the H2 molecule:

Projections for H2 based energy sources are being monitored and analysed.

- The govt's and the public majority's commitment for the economy is based on H2 sources of energy;
- Manufacturing, usage, delivery, exchange, administration, and marketing of H2-based energy sources;
- H2-based sustainable energy system: research, development, and deployment
- The focuses on the design of environmental systems that rely on H2 based energy sources, as well as the availability, productivity, and reliability of H2 based energy sources and technologies.

3. PROBLEM STATEMENT:

Fossil fuels, which are nonrenewable and cannot be utilized once depleted, are the primary source of energy in today's globe. The primary issues with present energy infrastructure throughout the world at the turn of the twenty-first century were a finite supply of fossil fuels, ever-increasing energy usage, and the growing environmental effect of greenhouse gas emissions. Because of existing infrastructure, fossil fuel energy is cost effective, but it has considerable drawbacks and has a negative influence on the environment.

Carbon and other greenhouse gases are emitted into the atmosphere when fossil fuels are burnt. Significant changes in Earth's climate have resulted from excessive greenhouse gas accumulation in the atmosphere, a trend that is only anticipated to intensify as more fossil fuels are used. As a result, they are not only the most expensive resources, but also the most environmentally damaging. (Conte M, 2001)

4. METHODOLOGY:

To complete this review, three alternative methodologies were used: (1) Computerized searches of selected databases including such PubMed, ERIC, Medline, and PDF documents; (2) Reference section in APA Format of current evaluations and original research; and (3) The references and assessed data were further supported by statistical analysis utilizing a program like statista.com.

Following the fundamental methodologies, a systematic study of 15 important databases on Green H2 based energy sources was conducted for the article, and its function in sustainable performance was investigated. Some items were removed from the database after a review because they did not meet the inclusive criteria.

Original research papers and articles relevant to green hydrogen and its impact were included in the inclusive criteria that are: (1) Separate data on Green Hydrogen resources that was relevant in a sustainable performance perspective; (2) English Language; (3) Visible reviewed articles that clearly specify the desired data; (4) Analyzed reports on the basis of sustainable performance as a dependent variable; (5) Researched the correlations or relationships between Green Hydrogen resources and long-term performance, using data collected from demographics, behavioral characteristics, and environmental factors. The papers were gathered from research conducted between 2004 and 2021.

5. DISCUSSION AND ANALYSIS:

Solar, wind, hydro, and nuclear energy may all contribute to Environmentally reach energy-based hydrogen generation, which can help to enhance worldwide economic growth and sustainability. The worldwide economic growth and sustainability ratios based on H2 based energy sources are increasing as the H2 based energy sources utilization ratio rises. The greatest H2 based energy sources impact ratios between 73.333 percent and 100 percent offer the best outcomes for H2 based energy sources-based sustainability ratios. Using 10%, 20%, and 50% non-fossil fuel hydrogen utilization ratios in 2010, we get H2 based energy sources-based sustainability ratios of 0.213 percent, 1.086 percent, and 11.111 percent for a 73.333 percent H2 based energy sources impact ratio, and 0.291 percent, 1.481 percent, and 15.161 percent for a 100% H2 based energy sources impact ratio, respectively.

In Example 1, the optimum effect ratio of H2 based energy sources is between 73.334 % and 100 percent. As a result, in fact, the greatest proportion (e.g., 100%) of the simulated results show in case-1 should be employed to achieve the highest hydrogen-based sustainable ratio, which appears to give superior results. Research must be applied in practice to increase the H2 based energy sources-based measure of process involves on H2 based power sources methods, factors, and programs for a larger H2 based power sources impact ratio.

Hydrogen-based policies, regulations, and initiatives are undoubtedly essential to ensure global economic development and sustainability while mitigating the negative consequences of fossil-fuel use. As a result, it is recommended that, while considering H2 based energy sources plans, the importance of an Environmentally reachable energy-based H2 based energy sources system that reduces global difficulties and provides a sustainable energy system be stressed.

Strategies, variables, and programs based on H2 seem to be critical for long-term positive improvement and better durability in a developed state. For the goal of establishing and implementing an eco friendly energy-based energy system that is based on H2 and uses. As a consequence of global environmental challenges, energy supplies and availability concerns, and technological advancements, they are definitely have become more important to individuals.

If the current rate of rise in fossil fuel usage continues, the planet will be subjected to a slew of negative consequences. More fossil fuel usage will destabilize the planet and exacerbate local and global environmental issues, leading to greater global instability. As a

result, it is suggested that fossil fuel use be decreased and that a H2 based energy sources system based on Environmentally reach energy be progressively built.

6. CONCLUSION:

Hydrogen has been utilized as a feedstock in a number of important businesses for decades. Hydrogen might provide the "missing link" in delivering large amounts of renewable energy to sectors like transportation, industry, and existing natural gas consumption that would otherwise difficult to decarbonize through direct electrification. The hydrogen fuel cell can assist accelerate the energy transition by committing to a protracted aim of raising significant investment in low-carbon hydrogen research and commercialization while permitting interaction with other industries (e.g., industry, electricity system, buildings, transport, and global trading). Hydrogen has the capability of transporting renewable energy across long distances.

Hydrogen might be created in places with abundant and low-cost renewable energy sources, and then transported to areas with limited capacity or higher renewable energy production costs. Hydrogen-based renewable energy transportation may be constructed in a range of sizes, from tiny to huge. As hydrogen becomes more extensively utilized, it will necessitate cross-sector collaboration in hydrogen generation, storage, transportation, and distribution. Hydrogen possesses the technology to facilitate a long-term energy transition, but it must be developed quickly for the purpose to achieve cost reductions and economic feasibility.

Large-scale applications that can rapidly provide large-scale economics, require little infrastructure, and are the highest performing solution in their respective domains should be the key emphasis. In this regard, heavy-duty transportation (large fleets of hydrogen buses, trucks, trains on non-electrified lines, and maritime, among other things) and large industry (refineries, chemicals plants, methanol production, and maritime, among other things) will be ideal starting points, where renewable hydrogen is a good solution for achieving climatic goals.

In comparison to the fossil fuel industries, it is clear that significant infrastructure investment will be made to supply clean hydrogen to end users. The cost of renewable energy has lately plummeted considerably, making it feasible.

Considering the H2 based energy sources strategies presented in this paper, it is reasonable to conclude that providing the necessary incentives and interactions among countries, scientists, researchers, societies, and others is the most important scenario for encouraging the transition to hydrogen economy and technologies and promoting an environmentally friendly H2 based energy sources system.

As a result, it is anticipated that this paper will contribute to:

- Assist in comprehending key concepts and concerns related to global economy stability through hydrogen-based energy sources and sustainability of the global market.
- Establish a relationship between use of H2 based energy sources and the development of a sustainable future.
- Promote the long-term systematic use of H2 (hydrogen-based energy) as a source of energy.
- For the purpose to improve energy supply, increase incentive for the use of H2 based energy sources techniques.
- Consider the H2 based energy system as a means of reducing negative environmental consequences.
- To explore various H2 based energy sources solutions for sectoral application, create a scientific platform.

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