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An Empirical Study on the Factors Influencing the Implementation of Blockchain-Based Supply Chain Traceability System

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Abstract. Traceability in the supply chain has become more of a priority in recent years. It is important to implement a traceability system that is able to offer accurate information in order to make products, such as food and other goods, safer for consumers. However, there are a number of elements that influence the adoption of traceability systems, and these factors vary in accordance with the economic scale of both companies and the nations in which they are located. This research aims to gain a better understanding of the factors that influence the implementation of a blockchain-based supply chain traceability system in Somalia.

A mixed-mode technique has been utilized to collect both quantitative and qualitative data. Structured data from all the major stakeholders has been collected, analyzed, and interpreted. Though Somalia's SMEs are optimistic that a decentralized, low-cost supply chain traceability system can be established, the study's results confirmed that there are no standards or laws governing the supply chain's traceability practices in the country.

The findings of this study present scientific data on the factors influencing the implementation of a blockchain-based supply chain traceability system, which are especially important to legislators in their quest of creating laws and regulations that protect consumers, practitioners to understand how to manage the traceability function in a cost-effective manner by employing cutting-edge technology, and academicians to find this study to be of practical use, given there has been very little research done on the topic in the context of Africa and Somalia.

Keywords: Blockchain, Traceability System, Supply Chain.

1. Introduction

In today's global market, commodities travel to the edges of the world, where producers and consumers live on different continents. As far as the elements that influence buyers' decisions on which suppliers to work with, pricing is by far the most important(Xin Yan 2022) . However, there are concerns over the safety and quality of the products. For instance, the food industry faced a credibility concern after witnessing food crises such as mad cow disease, bovine spongiform encephalopathy (BSE), and dioxin in chicken feed. Moreover, the effects of genetically modified (GM) crops in foods and the outbreak of campylobacter, escherichia coli, and salmonella increased safety and quality concerns over the food products (Aung and Chang 2014). Hence, supply chain traceability has gained relative importance, particularly in the food sector after numerous food safety incidents(Aung and Chang 2014).

Pant, Prakash, and Farooquie (2015)say that supply chain traceability means being able to get information about the parts of the supply chain, such as processes, inventory, retailers, or wholesalers, down to the lowest level.In the western world, a traceability system has been put in place to make sure that food and other goods are safe.For example, the European Commission created an integrated approach to food safety policy that made it easier for agri-food products to be tracked back to their source(Banterle and Stranieri 2008).

Somalia’s domestic consumption is mainly dependent on imported commodities from outside the country. Somalia imported commodities worth $4.2 billion in 2020.The country's imports have increased by $1.98 billion, from $2.21 billion in 2015 to $4.2 billion in 2020.The main imported products to Somalia are foods, construction materials, fuel, medicine, electronics, and manufactured goods. The main sources of trade are India, Turkey, Pakistan, China, Egypt, Oman, and the United Arab Emirates(OEC 2020).

The government of Somalia is worried about the safety and effectiveness of goods that are brought in.To ensure the safety of all, the Somali Bureau of Standards (SBS) was established under the Standards and Quality Control Act Law No. 27 in the year 2020. The implementation of traceability systems is perceived as a durable and powerful solution to address supply chain safety concerns(Sun and Wang 2019). However, there is no doubt that traceability systems will have cost implications since it is not an activity that creates first-hand value for consumers(Dessureault 2007). With the trajectory of advances in information and communication technology, the world witnessed a rapid change in the process of collecting, appending, monitoring, disseminating, and disclosing information related to the global supply chain (Alan Harrison and Hoek 2008, Gardner et al. 2019). Blockchain technology, a recently emerging distributed ledger, is gaining popularity in various supply chain management applications. Traceability solutions based on blockchain technology can address the shortcomings of traditional traceability systems (Sunny, Undralla, and Pillai 2020).

The purpose of this study is to investigate the elements that could affect the deployment of a supply chain traceability framework based on blockchain technology. In contrast to countries that have developed their economies, Somalia has not implemented supply chain traceability mechanisms. Only a small number of Somali small and medium-sized enterprises (SMEs) have put in place traceability systems for their supply chains since there are no regulating laws and regulations to guide their implementation. The research of supply chain traceability systems received little attention from academics. The findings of this study will present scientific data on supply chain traceability status, which is especially important to a wide variety of different types of beneficiaries. The results of this study will be useful to a wide variety of audiences, including policymakers, the Bureau of Standards, practitioners, and academics.

2. Literature Review

Supply chain management in today's marketplace is more complex than ever before. This complexity is driven by many reasons such as outsourcing, supplier relations, supply chain networks, technology, regulations, globalization, customer expectations, and product life cycle (Fazli and Masoumi 2012). The supply chain encompasses many moving parts, and its scope is the network structure that connects them together(Yong-Jeong Kim 2022).Since businesses usually seek the supply chain performance gains through integrated global sourcing strategies Sparks and Wagner (2003), it is necessary to foresee the risks as well as assess the supply opportunities (Mayo 2009).

There is no doubt that traceability is an essential quality management system that can enhance the efficiency of data collection, production control, and quality assurances (Bevilacqua, Ciarapica, and Giacchetta 2009).The application of Blockchain-based traceability systems will create information trails and ensures the immutability and security of data. Blockchain technology will improve the security of the data and information shared within the supply chain network and will enable the monitoring and control of the product quality, monitoring and control of the production operations, the acquisition of accurate data, as well as improved visibility and supply chain transparency (Azzi, Chamoun, and Sokhn 2019).

Traceability is defined as the ability to follow, trace, and monitor products throughout all the stages of the supply chain including production, processing, and distribution (Moe 1998, Olsen and Borit 2013, Islam and Cullen 2021, Allata, Valero, and Benhadja 2017, Stanciuc and Moga 2014, Millard et al. 2015, Panghal et al. 2018, Ruiz-Garcia, Steinberger, and Rothmund 2010). Hence, traceability is concerned with the procedure of necessary information to track and follow the product through the supply chain (Banterle and Stranieri 2008). Supply chain traceability is, therefore, a significant strategic service in any business. It is meant to improve the security, and

quality control of the products. Moreover, traceability of the supply will facilitate the combat against frauds and safety concerns (Hu et al. 2013).

A traceability system might be used to reduce the risk of food contamination by examining paperwork, product records, and the amount of the product at the stock(Zahrah, Arkeman, and Indrawan 2021).Consumers are increasingly concerned about the origins and quality of food, which has led to a trend to pay extra for food items whose origin is verified. In spite of the advanced technology now in use, the great majority of traceability systems are often centralized, asymmetric, and out of date in terms of data exchange and interoperability. Early methods of tracking and tracing relied on employees making notes in the field and then entering them by hand into manuals or computers. This strategy is not without its drawbacks, such as inaccurate information capture and ineffective use of available resources.(Demestichas et al. 2020).

Traceability has been managed using cutting-edge traceable technologies like RFID and DNA barcoding. In fact, the vast majority of traceability systems are implemented with heavy use of information and communication technology (ICTs) (Haleem, Khan, and Khan 2019).Each and every technological advancement comes with a unique set of benefits and drawbacks; yet, some technologies are superior to others in certain markets owing to the particular product qualities they provide (Razak, Hendry, and Stevenson 2021)

Food Standard Agency, an independent food safety watchdog, identified the basic characteristics of traceability systems: i) unit identification, distribution, and movement information, and iii) data center system. To trace, an entity should be a traceable resource unit (TRU). Traceable units are batch, trade, and logistic (Montet and Dey 2017). The characteristics of an efficient traceability system can be categorized into breadth, depth, and precision. Breadth refers to the size of the collected information, depth refers to the ability of the system to trace information forward and backward, while precision refers to the assurance to identify the movement of the products (Karlsen, Olsen, and Donnelly 2010). In electronic-based traceability systems, two information flow models are typically utilized, namely the one-step-forward and one-step-back models and the aggregated information model (Hayati and Nugraha 2018)

According to Bosona and Gebresenbet (2013), investments in traceability systems are resource and capital-intensive. Firms' decision to implement a traceability system will dictate a need to reassess, review and change well-established business processes. Moreover, capital will be spent on new ICT equipment while experts are needed to train the staff and develop new procedures. All these activities will have a financial impact on the organization's performance (Bosona and Gebresenbet 2013).

The regulatory environment, size of the firm, ICT infrastructure, processes of production, product features, organizational structure, supply chain complexity, strategy, and organizational culture, as well as the amount of information to be

recorded, will determine the actual costs of traceability (Asioli, Boecker, and Canavari 2014). Investing in traceability systems will result in capital expenditure as well as operating expenses. Table1.0differentiates the implementation and operational costs:

Table 1: Types of traceability costs

Type	Implementation	Operational
Effort and time (administration, workforce, and ma nagement)	The search for information, Processing, Change management, Tests, and Interruptions	Reporting, Interruption, and Mock recalls
Software and Equipment	Purchases and Installation	Contracts and upgrades
Training	Comprehensive Training	Ongoing, for new staff
Consultants	For system design, Compliances, legislation	Debugging Challenges, Upgrades of Compliances, and legislation
Materials	New system	Labels/Packaging
Audits and Certifications	Audit and certification	Repeat audits/ certification

Source: adapted from Asioli, Boecker, and Canavari (2014)

Blockchain technology has emerged as a disruptive and general-purpose technology to address concerns over the trust, and transparency of business transactions between organizations (Yli-Huumo et al. 2016). The emergence of blockchain technology was based on the phenomenon of avoiding symmetry and repetition of the objects via a decentralized, secure, and transparent, approach (Badhotiya et al. 2021).

The data recorded in a distributed ledger system of the blockchain will remain consistent, precise, well-timed, and accessible across the world (Min 2019). Blockchain is well-known for with secure, transparent, and precise mechanism for business-to-business transactions, particularly financial transactions. The data is embedded within a distributed networked system that makes it transparently accessible. Altering the block data requires an extensive amount of high technology and it is very difficult to acquire such technology power to get ahead of the network

and the entire system. This had proved that blockchain-based systems are transparent, secure, and consistent at all levels (Badhotiya et al. 2021).

Modern supply chain management places a growing emphasis on HSE (Health, Safety, and the Environment). Traditional tracking techniques, such as bar code scanning and checkpoints, give partial data. IoT technologies, like RFID, have recently made it possible to monitor and trace supplies automatically at nearly no operational expense. The Internet of Things (IoT) has made it possible to track items all the way through the supply chain, which was previously impossible with conventional technologies (Zhou and Piramuthu 2015).

However, solutions based on Blockchain technology have recently gained momentum and popular acceptance among supply chain management perspectives. Blockchain offers a transparent and traceable approach to handling business transactions between participants who don't trust each other (Queiroz, Telles, and Bonilla 2019). Blockchain has already shown its effectiveness as a supply chain traceability system, and this trend is likely to continue (Song, Sung, and Park 2019).

2.1. Theoretical Framework

Supply chain traceability systems are useful tools in addressing concerns related to the quality and safety of products. There are an investment and operational costs involved in developing such systems. Literature shows that the traditional supply chain traceability systems can impact a firm's financial performance hence; these firms are not willing to implement these systems. According to Xu, Zhao, and Liu (2020), data related to the supply chain is cooked and falsified which in turn can harm the safety of the consumers. Today's consumers consider transparency and traceability an important criterion of food safety and security (Roth et al. 2008).

The overall theoretical foundation of this study is based on the transaction cost economics theory. Transaction Cost Economics is a theory that asserts the possibility of finding an alternative approach to the traditional mainstream economics through the lens of choice. Considering the opportunism and bounded rationality concepts, the exchange of economic activities can be perilous to one's health; therefore, parties seek a cost-effective form of governance that can mitigate foreseeable problems (Williamson 2008). This study aims at examining the possibility of developing a cost-effective blockchain-based supply chain traceability framework by identifying requirements and factors influencing from the viewpoint of SMEs and government.

3. Methodology

A mixed-mode strategy has been used to investigate what aspects impact the implementation of blockchain-based supply chain traceability system in Somalia. Data from small and medium-sized businesses (SMEs) has been gathered using a quantitative survey approach. The senior management of the Somali Bureau of Standards has been interviewed for the purpose of gathering qualitative data. The

primary methods of data collection for this study were face-to-face interviews and written questionnaires designed according to a Likert scale with five points. The questionnaire was distributed to importers of commodities into Somalia

Interviews, as well as a self-administered and structured questionnaire, were used to collect data from the participants in the study, and these methods were used to obtain both quantitative and qualitative information. In order to ensure the validity and reliability of the data reported in this study, the instruments used to collect the data have been checked. In order to provide a concise summary of the information (data) acquired from the respondents, descriptive statistics have been utilized. Using descriptive statistics like mean, frequency, and standard deviation, we may examine how various groups of sample units fare in terms of our independent variables of interest.

Using the Statistical Package for Social Scientists (SPSS), the data from the questionnaire were first structured, and then coded, before being placed into a computer. The researcher asked open-ended questions to collect qualitative data from key informants. The recognition of similarities and differences was made possible through the analysis of the qualitative data, which was followed by the labeling and coding of those data. Content analysis was used to sort out and categorize any verbal or behavioral information that needed to be classified. The gathered data were summarized, and then tabled, in order to make sense of them and to place emphasis on the most important messages, traits, or discoveries.

4. Results and Discussion

4.1. Respondents' Personal Information

The study found that 90% of respondents were men. The vast majority of those who participated were upper-level managers in various departments or the organization as a whole. The study revealed that 86% of respondents had between two and ten years of experience. Table 2.0 presents both the frequency and the percentage distribution of the respondent's personal information.

Table 2: Personal Information and Business Characteristics

Characteristics	Frequency	Percent
Gender		
Male	135	90
Female	15	10
Current Position		
General Manager	30	20
Department manager	60	40
Project manager	29	19.3
System operator	10	6.7
Other	21	14
Experience		

1year	11	7.3
2-5 year	77	51.3
5-10 year	49	32.7
>10 year	12	8
Educational background		
High school	78	52
College	32	31.2
Undergraduate	28	18.7
Postgraduate	12	8

Source: Author (2022)

4.2. Characteristics of the Firms

According to the findings of the study, just 10% of the companies were traded publicly, while the remaining 90% were privately owned. The majority of businesses, 83%, were found to have fewer than 100 workers. Almost two-thirds of these corporations import food and agricultural products from other countries. Table 3.0 displays the frequency and percentage distribution of the following company characteristics:

Table 3. Characteristics of the Firms

Characteristics	Frequency	Percent
Firm ownership		
Public	15	10
Private	135	90
Employees		
Below 100	124	82.7
Above 100	26	17.3
Commodities		
Raw material	39	26
Food production	55	36.7
Agricultural products	23	15.3
Construction material	33	22
Product/service risk		
High	66	44
Low	84	56

Complexity		
High	22	14.7
Medium	101	67.3
Low	27	18

Source: Author (2022)

4.3. Factors affecting the implementation of a blockchain-based traceability system

Traceability in the supply chain has become more of a priority in recent years. Respondents were asked to provide a description of the existing laws and regulations that govern the execution of the traceability system in Somalia. This was done with the intention of gaining a better understanding of the situation. Additionally, respondents were asked about financial sources for establishing traceability systems and the backing of current cutting-edge technologies. The findings of each component will be presented in accordance with the opinions of the respondents in the sections that follow.

4.3.1 Regulation

In order to determine the regulatory elements that influence the adoption of a blockchain-based traceability system, respondents were questioned regarding the existence of traceability legislation, standards, and regulations. The results of calculating the mean and standard deviation of each factor are presented in Table 4.9.

Respondents acknowledged the absence of traceability rules and regulations in Somalia, which hinders the implementation of cost-effective blockchain-based traceability systems across enterprises operating in the nation to guarantee their capacity to trace their supply chain network and protect customers and the environment. The vast majority of respondents agreed that no traceability regulations exist at the present time. According to Table 4.9, the mean absence of traceability laws and regulations in Somalia is 3.65. Findings from the study's respondents indicate that the lack of traceability standards is a barrier to the widespread adoption of a blockchain-based traceability system in Somalia.

According to Table 4.0, the mean score for the absence of traceability standards is 3.61, making it one of the primary variables that contribute to the difficulty of implementing a traceability system in the country. Participants in the survey reported that there are no policies in Somalia that promote or guide the implementation of traceability.

The participants in the study noted that one of the obstacles to the implementation of a blockchain-based traceability system in the country is the lack of a regulatory agency. According to the findings presented in Table 4.0, the mean

score for the absence of regulatory bodies is 3.62. As a result, regulatory bodies ought to be established in Somalia in order to implement a robust and trustworthy traceability system.

Table 4. Laws and Regulations

Statement	N	Mean	Std. Deviation
absence of traceability laws and regulations	150	3.65	1.055
absence of traceability standards	150	3.61	1.073
Absence of a policy guide for implementing traceability systems	150	3.49	1.122
absence of regulatory bodies	150	3.62	1.066

Source: Author (2022)

Respondents recognized that Somalia does not have any norms or regulations regarding traceability, which makes it difficult to develop efficient blockchain-based traceability systems across all businesses operating in the nation. The study's participants observed that the absence of a regulatory body is one of the challenges to the country's adoption of a blockchain-based traceability system.

4.3.2. Investment opportunities

The study looked at how government and private sector investment interventions affected the rollout of supply chain traceability systems that used blockchain technology in Somalia. Respondents were questioned on the contribution of government financing that assists businesses in the implementation of cost-effective traceability systems within their supply networks in order to achieve a deeper understanding of the phenomenon.

Participants in the study attested that financing and support from the government will encourage the introduction of a traceability system in the nation. The majority of respondents concurred that funding opportunities will make it simpler to set up a cost-effective blockchain-based traceability system in Somalia, enabling businesses and regulatory agencies to track incoming goods and verify safety standards are met. According to Table 5.0, the mean government funding for traceability system implementation is $3.14.

According to the study respondents, one of the factors that contributes to the adoption of a blockchain-based traceability system in Somalia is the allocation of a certain budget for investing in the system. According to Table 5.0, the corporate budget for investment in the traceability system has a mean value of 3.19, which suggests that it might have a significant influence on the success of the system's implementation in the nation.

The participants in the study noted that investments in system operation and maintenance are also contributing factors to the implementation of a cost-effective blockchain-based traceability system in Somalia. According to the vast majority of

respondents, investing in system operation and maintenance will make it easier to adopt a traceability system, which is consistent with the mean of 3.45, as shown in Table 5.0.

According to the participants in the study, the willingness of consumers to purchase products that can be traced is a factor that might positively contribute to the implementation of a blockchain-based traceability system in the country. According to Table 5.0, the mean of consumer willingness to pay for traceable food is 3.63; hence, customers' commitment to consume traceable products may greatly contribute to the development of a cost-effective traceability system.

Table 5: Traceability Investment

Statement	N	Mean	Std. Deviation
Government funding for traceability system implementation	150	3.14	1.243
Cooperate budget for investment in the traceability system	150	3.19	1.079
System operation and maintenance investment	150	3.45	1.027
Consumer willingness to pay for traceable food	150	3.63	1.071

Source: Author (2022)

The study examined how government and private sector funding interventions contribute to the implementation of blockchain-based supply chain traceability systems in Somalia. Participants in the survey confirmed the fact that the provision of financing and assistance by the government will inspire the nation to institute a system of traceability. The participants in the study came to the conclusion that investments in system management and maintenance are essential to the process of putting in place a blockchain-based traceability system in Somalia that is not only user-friendly but also efficient in terms of cost.

4.3.3. Technology Support

The study looked at how government support for technology may affect the implementation of blockchain-based supply chain traceability systems in Somalia. Respondents were questioned on the contribution of technology support from the government to the implementation of a cost-effective traceability system in the country. Respondents were also asked about the reliability and accuracy of blockchain-based traceability information and how it could help make supply chain traceability systems more cost-effective. Each factor's mean and standard deviation were computed, and the findings are displayed in Table 6.0.

A majority of respondents to the study agreed that if the government provided funding and resources for the development of a traceability system, its implementation would be accelerated. The vast majority of respondents were of the opinion that technological support will make it possible for businesses to establish blockchain-based traceability systems that are efficient and cost-effective. The mean of government support for technology is 3.49, as seen in Table 6.0.

Respondents to the study agreed that the implementation of cost-effective supply chain traceability systems in Somalia would greatly benefit from the integrity and legitimacy of blockchain technology. Table 6.0 shows that the integrity and authenticity of the traceability system have a mean of 3.62, which illustrates that it can encourage the development of reliable traceability systems across the country.

Participants in the study indicated that the user-friendliness and ease of operation of blockchain-based traceability systems will contribute to the implementation of an effective supply chain traceability system. In line with the mean value of 3.45 shown in Table 4, the majority of respondents acknowledged that a user-friendly system will aid in the deployment of the traceability system. According to the study's respondents, a blockchain-based traceability system will facilitate communication between customers, importers, and regulatory organizations. According to Table 6.0, the mean of simple communication between firms, regulatory bodies, and consumers is 3.99; hence, a blockchain-based traceability system will readily bring all interested parties together so that they can share information when it is required.

Table 6. Technology Support

Statement	N	Mean	Std. Deviation
Technology support from the government is needed to establish a traceability system.	150	3.49	1.122
The integrity and authenticity of traceability information	150	3.62	1.066
Traceability systems operate easily (user friendly).	150	3.91	1.170
Easy communication between firms, regulatory bodies, and consumers	150	3.99	1.117

Source: Author (2022)

The majority of the respondents were of the opinion that the adoption of a traceability system would move along more quickly if the government were to contribute funding and other resources toward its creation. The respondents believed that firms would be able to use technology to put up effective and affordable blockchain-based traceability solutions.

4.4. Governing rules and regulations that motivate firms to develop traceability systems

The study looked at the laws and regulations already in place in Somalia that might help with the rollout of a supply chain traceability system. To gather the pertinent information about the laws, rules, and regulations that govern the traceability function in Somalia, the study interviewed senior management of the Somali Bureau of Standards. The Somali Bureau of Standards (SoBS) was founded by the Somali government in 2020 on the basis of the Standards and Quality Control Act, Law No. 27, which was developed in the same year. The Somali Bureau of Standards' primary

mission is to build a strong quality infrastructure for Somali standards, metrology, accreditation, and conformity assessment in order to protect customers and the environment from potentially hazardous products.

Respondents were questioned regarding the present food traceability laws and regulations, the supply chain standards that are in place to safeguard citizens, the policies and guidance papers that support the implementation of a traceability system, the government's support in implementing a traceability system, their stance towards the implementation of a distributed blockchain supply chain traceability system, and the position of the bureau in the implementation of a cost-effective blockchain-based food traceability system. In the following sections, a summary of their responses will be presented.

4.4.1. How do you describe Somalia's food traceability laws and regulations

All of the respondents were of the opinion that Somalia does not have any laws or regulations that mandate the implementation of supply chain traceability systems in businesses that are currently operating in the country. Respondents mentioned that, in accordance with Act Lr. 27, the constitution of Somalia, in the year 2020, a national standards organization known as the Somali Bureau of Standards was founded with the responsibility of supervising and administering all items coming into Somalia. However, respondents emphasized that despite the Bureau of Standards' relatively recent establishment, it already possesses the requisite capabilities to work on the development of all essential frameworks that ensure the safety of citizens and the environment.

4.4.2. What are the supply chain traceability standards in place to protect consumers from harmful products?

The respondents stated that there are food and agriculture standards that encompass the full supply chain, beginning at the farm and ending with the consumer's plate. But the Somali Bureau of Standards has not yet made it a requirement to use the ISO, ARSO, or SMIIC standards that have been adopted. This is due to poor infrastructure, a lack of government enforcement, and a lack of awareness of the requirements among the general public.

4.4.3. Does the government offer support in the form of funding, equipment, training, or maintenance to encourage enterprises to establish a traceability system in Somalia?

The study's respondents unanimously agreed that, due to its financial inability to play such a role, the government of Somalia does not provide any assistance to the local businesses in their efforts to develop a supply chain traceability system, including finance, equipment investment, employee training, or system maintenance.

4.4.4. What is the position of the bureau in the implementation of a cost-effective blockchain-based traceability system?

Respondents to the study acknowledged that the Somali Bureau of Standards will support and commit a budget to the implementation of a cost-effective blockchain-based traceability system framework in the country. This was supported by the fact that one of the mandates of the Somali Bureau of Standards is to prevent any incident that can create health dangers to persons as well as the environment. In addition, respondents were in agreement that the bureau will work to facilitate the deployment of a traceability system because such a system will encourage the growth of businesses and increase the effectiveness of the supply chain.

4.4.5. Describe the critical success factors that influence the implementation of a distributed supply chain traceability system.

The majority of study participants concurred that top management support is a crucial component of Somalia's ability to successfully adopt a blockchain-based traceability system. Policymakers have also been cited as having a role to play in facilitating the rollout of traceability infrastructure by enacting the legislation and regulations necessary to compel businesses to use such systems. In addition, respondents agreed that law enforcement is a crucial aspect of the implementation of a blockchain-based supply chain traceability system in Somalia.

Participants in the study have also emphasized that initiatives to raise consumer awareness and involve stakeholders are among the crucial success factors that will help Somalia develop a cost-effective blockchain-based supply chain traceability system.

5. Conclusion and Recommendations

This research sought to better understand the factors influencing the implementation of a blockchain-based supply chain traceability system in Somalia. A mixed-mode technique has been utilized. The findings of the study recognized that Somalia does not have any norms or regulations regarding traceability, which makes it difficult to develop efficient blockchain-based traceability systems across all businesses operating in the nation.

Respondents are optimistic that a decentralized traceability system would pave the way for the creation of a cost-effective, reliable, and transparent traceability system in the nation and provide a better solution to any uncertainty concerns in consumer protection. The participants in the study indicate that the Somali Bureau of Standards would support and devote a budget to the development of a cost-effective blockchain-based traceability system framework in the nation. In addition, respondents agreed that implementing a blockchain-based supply chain traceability system in Somalia requires strong law enforcement. Participants in the research have also noted that attempts to increase consumer awareness and engage stakeholders are

among the critical success factors that will help Somalia establish a blockchain-based supply chain traceability system.

It is abundantly evident that supply chain traceability is no longer an option. Policymakers should adopt the required rules and regulations that control the traceability of the supply chain to Somalia in order to secure the safety of customers as well as the environment. The Somali Bureau of Standards needs to formulate relevant requirements and stipulate that these standards have to be satisfied prior to the production or importation of goods. Utilizing digital technology may result in a multitude of positive outcomes. The bureau should concentrate on creating a decentralized blockchain-based traceability system where enterprises will have access to record all pertinent supply chain data, consumers will provide comments and events they encounter while consuming goods, and the regulatory agency will monitor and manage the safety and transparency of the supply chain.

Last but not least, there are some limitations in this study. The scope of this study was limited to Somalia. As a consequence, the findings cannot be extrapolated to the region in general. Further research is needed to fully explore the effects of these variables on the introduction of supply chain traceability systems in the East African region.

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