

# Blockchain Technology Concept for Improving Supply Chain Traceability in the Ivory Market

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## ABSTRACT

Supply chain traceability is gaining momentum as a means to gain visibility across the supply chain. In order to curb poaching in the wildlife sector and harvesting of resources such as ivory, there is a need to introduce foolproof technologies. This article proposes the use of blockchain in tracing the supply chain of ivory and other wildlife products from source to destination. The article is based on a literature review on wildlife practices. Ivory trade participants were identified and mapped into a blockchain model using blockchain modeling techniques. The proposed blockchain approach allows transaction recording as blocks and visibility to relevant participants.

## KEYWORDS

Blockchain, Internet of Things (IoT), Ivory, Public Ledger, Supply Chain, Traceability, Wildlife Poaching

## INTRODUCTION

### Motivation

Supply chain traceability is gaining momentum as a means to gain visibility across the entire supply chain. Advancements in technologies such as cloud computing and internet of things (IoT) are making traceability possible. In order to restore sanity and dignity to the wildlife sector and harvesting of the precious resources such as ivory, there is need to introduce full proof technologies such as blockchain in order to gain traceability. The technology is envisaged to identify any counterfeiting and nab the culprits. This article proposes use of blockchain in tracing the supply chain of ivory and any other wildlife products, from source to destination. Murky dealings in the wildlife supply chains have led to the adverse effects of poaching and threatening extinction of some species. In other industries, such as the food industry, where domesticated animals are the source of produce, there is better management to ensure sustainability. Production methods have been perfected, supply chains have been optimized, and recently there is more emphasis on Chains of Consensus (CoC). The value chain systems have been well developed to include certifications, monitoring and control at crucial stages. Loopholes such as stock theft have been effectively curtailed. Every value chain system needs corporation in order to be effective. Rather than advocating for complete ban of the ivory market and other wildlife products, there is need to bring corporation, transparency, and traceability in the value chain for wildlife products. Through corporation at various levels, murky dealings can be eliminated.

DOI: 10.4018/IJAIE.287873

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## Literature

Elephants are among wildlife classified under the endangered species (CITES, 2017). The demand for wildlife products is viewed as the driver for fast depletion of the wildlife resources across the world. When there is no market for the wildlife and associated products, the risk of extinction will be significantly suppressed. Natural death is by far a minor threat to most of flora and fauna. Although efforts have been made to restrict trade in the endangered species, informal markets propped up and are significantly threatening a complete disappearance of the endangered species. Poaching of wildlife is seriously condemned worldwide. Poachers kill elephants and other wild animals with cruelty. They hastily hack off the tusks, cover the animal with shrubs and disappear. Covering of the animal is meant to disguise the rangers until later when the animal starts decomposing. The sight of a ruthlessly killed animal is loathsome to tourists. Poaching adversely affects tourism and the whole value chain of wildlife products. Culling and cropping is also viewed as unethical. Some argue that when executed properly, the process is none disturbing.

*Africa is home to most of the natural and wildlife resources and her economy depends on the resources. Africa is believed to have been home to around 20 million elephants before the European colonization. Only 1.3 million elephants remained by 1979 (McKenzie & Formanek, 2016). The total population of elephants in African Savannah to date is estimated to be 352, 271 (Chase et al., 2016). The elephant population in Botswana alone is just below a third of the continent's remaining Savannah elephant population. There are many reasons attributed to the huge population concentration in Botswana compared to other countries. These range from strict control of anti-poaching to little disturbance of the large wild herds. Botswana suspended elephant trophy hunting in 2014 and mooted the shoot to kill policy as part of the measures to curb poaching of the elephants for their ivory. Unlike other countries with huge human population, Botswana's population is around 2 million people. The country has huge safari parks and game reserves. Every other resource, natural resources and wildlife, is threatened by extinction. Efficient management techniques are necessary to ensure longevity of existence. When dealing with wildlife, ethics also come into consideration. A host of management practices used to control elephants are: (a) enlarging the range available to elephants, (b) fencing to contain or exclude elephants, (c) the use of repellents, (d) translocation, (e) driving/disturbance, and (f) cropping and culling. Some methods are non-lethal and favorable, whilst others are lethal and unfavourable (Cumming & Jones, 2005; Seloana, Potgieter, Kruger, & Jordaan, 2017; Seloana, Kruger, Potgieter, & Jordaan, 2017). Contribution based on literature and current practice in the ivory market, as well as blockchain initiatives, ivory trade participants and the traditional supply chain were identified. The participants were then mapped into a blockchain model. The concept uses blockchain modeling techniques. The proposed blockchain approach allows every transaction to be recorded as a block in the chain and is visible to relevant participants. The blocks of information cannot be tampered with since any change to the recorded information will break the chain. The blockchain solution is sustainable, whilst benefiting host countries and formal international markets relying on wildlife.*

**Paper Organization** The article is organized into four subsequent sections. The literature review section covers literature on elephant management, economic value and products derived from elephants. The section on proposed supply chain model for ivory reviews practices on modern supply chains. Further aspects addressed include modelling the blockchain based supply chain model for tracking elephants and ivory. This is followed by the discussion section, which discusses the proposed model. The last section is the conclusion. This summarises the research, future direction, and limitations.

## LITERATURE REVIEW

The article is based on literature review on the current wildlife practices and blockchain initiatives. Current trends and challenges faced by wildlife and national parks authorities are presented in this

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