Smart Contracts Annotated Bibliography

An annotated bibliography is a list of citations to books, articles, and documents. Each citation is followed by a brief (usually about 150 words) descriptive and evaluative paragraph, the annotation. The purpose of the annotation is to inform the reader of the relevance, accuracy, and quality of the sources cited.

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Annotations


The authors, a group of researchers from the University of Beirut and University of Applied Sciences Western Switzerland, take an empirical approach to the analysis of blockchain applications in the supply chain management (SCM) context. The paper begins with a literature review of common problems in both SCM and blockchain development before examining two case studies, namely Ambrosus and Modum, two Swiss startups “that merge IoT, blockchain technology, and real-time sensors” for track and trace. In addition to the challenges of choosing the right blockchain for the right problem, the authors highlight the challenge of validating data before it is irrevocably committed to the blockchain. Both companies opted to have a secondary storage type due to the high costs and low capacity of data storage on the blockchain. Ambrosus developed its own blockchain written in Solidity on top of Ethereum, allowing them to run their smart contracts on their own platform and eventually copy it over to the Ethereum main network.

Overall the article was an informative examination of two real-world blockchain applications and the problems they faced with both their underlying blockchain platforms and the services built on top. There were a few typos in the paper, and the authors repeatedly referred to Hyperledger as a single entity rather than mentioning a specific project. They also made an uncited claim that I am not sure is valid - “Hyperledger will stop working when the number of servers and nodes reach a certain threshold because the number of dropped consensus messages will increase due to channel request congestion.”

This paper would be a useful resource to anyone looking for more concrete discussion of the unique problems that arise from using a blockchain-based supply chain.


The first seven pages of the article are an overview of general information regarding blockchain, smart contracts, and supply chain logistics. Beginning on page 8 potential recommendations are offered; however, they are primarily generalist. The reason I note this article within the AB is what the authors intend to study is interesting. The paper does not act as a ‘case’ as it offers in the title.

The intent of the paper is to address real-time tracking in supply chains to reduce the wait for confirmation of information. The aim of the study is to investigate an alternative private-chain to enhance transparency and distributed collaboration of the supply chain process to include: 1) investigating the feasibility of a blockchain-based tracking process; 2) establishing a blockchain-based business process re-engineering (BPR) framework; 3) evaluating the potential benefits and values of such framework; and 4) shedding light for creating blockchain-based applications in different industries.

I consider this type of article as an "about" article. There are terms, ideas, and information relevant to the problem if you are interested in validating how you view the supply chain. That said, the details expected in a case are not available.


This paper starts off with one of the better high-level overviews of blockchain technology that I have read. The authors provide a great explanation of the basics around networking, protocols, smart contracts, and more. Following this overview, they discuss the benefits and challenges of using blockchain alongside IoT technology. A few real-world examples are discussed such as Block.it, a company that allows users to control access to a smart lock by paying in Ether. The last section of the paper discusses some important deployment considerations that any administers of a blockchain network should consider.

As of Nov 2019 this paper was one of the most cited articles on the topic of Smart Contracts on Google Scholar. Both authors are also highly reliable - Christidis is a co-creator of Hyperledger Fabric, and Devetsikiotis is Department Chair of Electrical and Computer Engineering at the University of New Mexico with numerous publications related to IoT.

I would highly recommend this paper to anyone that would like to understand the basics of the underlying technologies that support a blockchain. As far as discussion around blockchain and IoT, the paper was a little sparse. I would recommend it as a good overview of the topic, and perhaps a good resource to find more in-depth papers on blockchain and IoT in the References section.


This paper describes the methodology of how data for tracking agricultural data for the food supply chain is not standardized globally and how this creates inefficiencies. The authors propose using IoT sensors to automate logistical data collection, standardizing the tracking data using the GS1 protocol, and recording this information using ERC-721 non-fungible tokens on the Ethereum network. The application interface to the smart contracts is called Harvest Network.
The authors describe the tools and high-level architecture for implementing their solution to the problem. It would have been interesting to get a more detailed case study on one of their implementations, or some “lessons learned” from their implementation in the field. Unfortunately, in Dec 2019, the harvestnetwork.io URL takes you to a blank page, so perhaps the project is no longer active.

The ideas are interesting and some introduction is provided regarding the GS1 protocol and tokenization using ERC-721 Non-Fungible Tokens on the Ethereum network.


The paper discusses how smart contracts and blockchain technology can be applied to smart rural supply chains and what new business models for rural companies can look like. The authors, from Bulgaria and Estonia, describe rural challenges that mirror the challenges in the rural community I live in, in California. The reference to IoT as delivery robots was not expected, although the interpretation is interesting and references to ‘big ag’ ring true.

The authors do not discuss implementation details; however, they offer intriguing ideas. They view the biggest opportunity of blockchain technology and smart contracts in the rural supply chain sector in the restructuring of agricultural commodity trading markets. They note ‘big ag’ domination allows them to dictate the rules and processes in the agriculture sector, often managed with their own IT systems and organizational structures. Smart contracts can, for example, work to consolidate and organize transportation systems with a trusted and automated execution of transactions with safeguarded information and money streams.

I recommend this article as informative and relevant for rural logistics considerations and challenges.

**Annotated Bibliography - Example format**

- 2 to 4 sentences to summarize the main idea(s) of the source.
  - What are the main arguments?
  - What is the point of this book/article?
  - What topics are covered?

- 1 or 2 sentences to assess and evaluate the source.
  - How does it compare with other sources in your bibliography?
  - Is this information reliable?
  - Is the source objective or biased?

- 1 or 2 sentences to reflect on the source.
  - Was this source helpful to you?
  - How can you use this source for your research project?
  - Has it changed how you think about your topic?

**Links to articles for possible inclusion and addition, please read articles of interest and create associated annotations.**


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