**UNIVERSITY OF GHANA COMPUTER SCIENCE DEPARTMENT**



**COURSE TITLE: RESEARCH METHODS**

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Systematic Literature Review Protocol: Securing Online Transactions with Blockchain Technology

## INTRODUCTION

There are countless Internet based services that impact our lives daily because of their easy accessibility through the World Wide Web, a simple mobile computing device with Internet Connection, and there is little one can’t do. Such services include online financial transactions which were initially introduced by Online shopping/e-commerce websites in the 1990s. Today a large percentage of these transactions are vulnerable thus posing a threat to the whole financial ecosystem that even Institutions like banks or insurance companies have come to adopt. These vulnerabilities exist because traditional online payments face significant challenges such as data theft due to black hat hacking schemes and state compliance etcetera. This research explores how Blockchain technology can be leveraged to better offer secured, transparent and immutable financial transactions. A Blockchain is a distributed ledger that is immutable thereby ensuring the authenticity of a financial transactions without the regulation of central Institutions such as banks, brokers and third parties. This technology offers users immutability, insight and data provenance which are the needed requirements of a secure, efficient and trusted online payment system. A Systematic Literature Review (SLR) approach has been selected to synthesize the Blockchain information available to bring forth a set of Blockchain related research questions. By adopting an SLR system, a trustworthy, re-iteratable and thorough methodology will be used. This review begins with outlining the objectives which at the end of the process, should be met. Furthermore, other systematic review Literature studies have been identified that explores use of Blockchain technology as an intervention by discussing relevant questions that will allow for the formation of a significant scope for additional technological research, we will also deﬁne exactly how each step was carried out in relation to the search strategy. The selection criteria section entails the grouping of literature into two criteria namely the inclusion and exclusion criteria which will determine the accepted literature needed in the systematic review protocol. Additionally, the eligibility criteria such as the population, intervention, comparators and outcomes (PICO) will be developed as framework to help make informed decisions about the review objectives.

# OBJECTIVE

The main objective of this review is to collect and analyse the blockchain technology using a set of research questions that will be obtained via a search strategy. A more detailed list of objectives is listed below:

* To perform a systematic literature review of available blockchain and cryptocurrency literature.
* To choose a sub-set of research studies to explore thoroughly.
* Gather and study the evidence carefully to obtain the merits and de-merits of using a blockchain and cryptocurrency approach to securing financial transactions online.
* To highlight and discuss the current state of affairs pertaining to the Blockchain research field.
* To establish the best framework that ensures future additional research activities.

# RESEARCH QUESTIONS

In this section, a review question is devised to tackle the objectives above:

“**HOW HAS BLOCKCHAIN HELPED TO PROTECT AND SECURE ONLINE FINANCIAL TRANSACTIONS IN THE PAST?**”

This research question was derived through discussions explored by other journals that provide insight into the issues of online transactions and how the Blockchain technology has helped curbed it through cryptocurrency. For this research question to hold up, and to ensure the credibility of the collection of all necessary relevant data, several other research questions have also been developed. The secondary questions are supposed to ensure the research will have a broader scope, whilst providing an indexed foundation for further analysis into the use of Blockchain and cryptocurrency. The questions are as follows:

[RQ1] Which cryptocurrencies are being used to make online payments at the moment?

[RQ2] Are cryptocurrencies used in physical commerce?

[RQ3] What demography uses Blockchain technology for payments (i.e. which country do they reside in, their ages, level of education etc.)?

[RQ4] How are researchers investigating the development of new cryptocurrencies?

[RQ5] How can blockchain security improve the credibility of online transactions?

[RQ6] How do we make online transactions faster without intermediaries?

[RQ7] How does Blockchain help curb online fraud, hacking and other nefarious activities relating to payments.

[RQ8] Do research articles suggest use of Blockchain technology to make payments online?

# SEARCH STRATEGY

Here, we outline the search mechanism that will be used for the study. This process is meant for literature collection which relates to the inclusion and exclusion criteria that will be detailed later in this review. This review will adopt a search strategy that includes accredited electronic databases such as springer, IEEE, ScienceDirect, Elsevier and online articles etcetera.

## 4.1 Search Resources

The resources below will aid in the research findings:

**Accredited Electronic Databases**

**Elsevier**: is an online service of Dutch origin and one of the world's leading content providers of scientific, technical, and medical research information.

**ScienceDirect:** is a leading source for research publications, it offers researchers a wide array of scientific, technical, and medical papers, journals and articles.

**ACM Digital Library:** The Association for Computing Machinery’ library serves as a digital network for research. It offers a full context of all ACM publications.

**Wiley:** Is an online library of journals and articles that covers research categories like physical sciences, social and computing topics.

**IEEE:** This is an engineering association that offers access to scientific and technical research content via their publishing unit.

**ISI Web of Science:** TheWeb of Science is a web portal which offers access to different databases that provide extensive citations for many different academic research fields.

ERIC (Education Resources Information Centre) will be included to ensure that the search of Blockchain technology is exhausted in the educational context.

**Academic Articles**

The Academia.edu and the Oxford Computer Journals.

## 4.2 Search Strategy

Blockchain and cryptocurrency text searches will be run on each of the resources outlined in the search resources . These search strings follow a devised protocol and will be run on all the electronic resources as discussed below:

1. (Blockchain OR cryptocurrency) AND (“online” OR “payments”)

2. (Blockchain OR cryptocurrency) AND (“In finance” OR “In financial markets”)

3. (Ethereum OR Smart Contracts) AND (“for payments” OR “for online transactions”)

4. (Creating OR Developing) AND (“a blockchain” OR “a cryptocurrency”)

5. (Blockchain OR Distributed ledger) AND (“technology”)

6. (Blockchain ) AND (“protecting OR securing transactions”)

## 4.3 Search Results

A large number of references is expected during the review process so a bibliographic software called Mendeley will be used to manage the references. Each suitable paper’s references will be entered for inclusion in the systematic review literature including a copy each abstract, a unique ID key for identification and an additional text explaining the reason it was chosen. The purpose of this is to make the research process iterative, transparent and to document the search process especially in the order in which it was conducted where search results are also recorded for future review. In case of any change to the search strategy, it will be documented and justified. Furthermore, a journal that is found in two or more resources will only have the one included in the Systematic Literature Review. The accepted journals will be stored on an external drive where each filename is changed to the unique IDs.

## 4.4 Selection Criteria

This section of the review explores the grouping of literature into two criteria namely the inclusion and exclusion criteria which will determine the accepted literature needed in the systematic review protocol.

4.4.1 Inclusion Criteria

* All Publications that contain the use of Blockchain or Cryptocurrency in either finance or to protect monetary data.
* Literature that contains past studies in blockchain development or have an experience report attached will be considered.
* All papers which report on similar research will have only the very recent paper will be included.
* Only papers with date of publication not exceeding the last 10 years before 2019 are accepted.
* Other kinds of literature, for instance articles or reports, will be included if it helps answers some of the research questions.

4.4.2 Exclusion Criteria

* Papers whose main area of expertise is not in the use of Blockchain or cryptocurrency will be excluded, but on the general use of blockchain for big data, as part of land registration, or to protect electoral voting data.
* Publications which just simplifies the use of a Blockchain approach or just describes the technology but does not technically explore the technology will be excluded.
* Publications that do not contain a full description of the paper in the abstract will be excluded.
* Papers that are in any other language except English will be excluded.
* Open Letters, non-tech/non computing journals will not be accepted in the systematic literature review.

# ELIGIBILITY CRITERIA

|  |  |
| --- | --- |
| **PICO** |  |
| Population | Online shoppers who visit ecommerce sites or apps, More than 1.65 billion people shopped online in 2016 and the number continues to increase and they all need to on the security and transparency that Blockchain offers. |
| Intervention | * The Blockchain technology allows for secured online transactions without the reliance on central third party institutions like payment aggregators and banks. * The Blockchain technology makes it impossible for hackers to steal monetary information. |
| Comparison | Traditional online payment processing like credit card or mobile money payments pose the risk of duplicate entry or fraud. |
| Outcomes | Transactional data cannot be altered or deleted making online payments with Blockchain so far the safest. It is more robust because of the cryptographic hashing and timestamps. |

# DATA EXTRACTION

This section discusses the information retrieval process that is required from which the publications in the inclusion criteria will be obtained. The following below is a list of tools that will be used for data extraction:

#### **Convidence**

A systematic review platform for managing each step of a systematic review project, including data extraction. It can help researchers to customize their inclusion and exclusion tables and export that data.

* **Mendeley**

This is a reference manager for academic researchers to manage or share research papers. This helps researchers to generate and alter bibliographies for scholarly articles.

#### **The Systematic Review Toolbox**

This is a well-structured web application that is community-driven and searchable in order to support the systematic review. The site has an advanced search option which restricts a search process to a particular data extraction domain.

All the tools above especially Mendeley have the necessary tools to search for data pertaining Blockchain.

* 1. Data To Be Collected
  + Information about most cryptocurrencies and how they work.
  + Information about smart contracts.
  + Methodology of the Blockchain study.
  + The Aims and Objectives of a Blockchain or a Cryptocurrency
  + The proof of work in different Blockchain instances.
  + Information on the comparable technologies (i.e. other technologies used for online payments).
  + Findings and conclusions of blockchain research work.
  + The effectiveness of blockchain technology as applied to online payments.
  + Nature of the existing Blockchain and cryptocurrencies.
  + Type of computer languages used in existing blockchain.

# DATA SYNTHESIS

A summary of findings across all blockchain studies is to be extracted and then tabulated so that an effective algorithm will be determined to create a new cryptocurrency that fits into the online payments field. This will involve a take on existing cryptocurrency algorithms gathered from different publications which were used to create popular cryptocurrencies like bitcoin and ethereum.