

# Smart Contracts based on Blockchain Technologies: A Literature Review

## Bachelorarbeit

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vorgelegt von

Name: Scholz



Vorname: Julian



Prüfer: Prof. Dr. Michael Breitner

Betreuer: Dennis Eilers

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# 1 Introduction

The ongoing digitalization is having a major impact on the business sector, as companies compete for the most efficient and customer-friendly solution of technology implementation. A technology that is currently experiencing a major hype is the blockchain technology (Gartner, 2017). This technology combined with its extended applicability, namely smart contracts, provides the opportunity to establish a reliable and secure trading environment between two untrusted parties without the need of an intermediary. Consequently, the need of trust between two parties engaging in a trading business seems to become obsolete, as smart contracts provide a transparent level of interaction, with conditional execution of successive procedural instructions. Within an economic setting, it enables companies to increase the level of automation of transaction and billing processes with customers, as smart contracts work as an autonomous unit after initial coding. The omission of the trust component, however, refers only to third party institutions and individual counterparties, since the application of trust in the execution of code with its predetermined commercial terms is still indispensable.

*“Code is Law”*  
(Lessig, 1999)

The opportunity of a detailed contract assessment feasible beforehand for both participating parties, implies an individual responsibility and risk assessment of each actor. In a cyberspace where regulating institutions can hardly interfere, the encoded agreement between untrusted parties constituting the smart contract adopts the part of the regulator. However, the business process implementation of blockchain-enabled smart contracts by companies faces besides technical obstacles, the challenge of conforming implied business models with predominant legal requirements.

This thesis connects to the current theoretical state of research which is elucidated by means of the literature review methodology after Webster and Watson (2002) and extends it by the examination of the various fields of practical applications of smart contracts. After the perception of the status quo, a technical foundation is provided for the reader to facilitate the comprehension on a detailed further processing. The goal of this thesis is to close the currently existing research gaps of an excess of theoretical proposed implementation frameworks and to provide a profound insight of technology adoption from a company’s point of view. Hence, case studies from different business sectors are analyzed to illustrate possible solutions and to elaborate on certain chances and challenges this technology adoption denotes. Based on these practical insights, a SWOC-analysis is conducted to relate the internal strengths and weaknesses to the external opportunities and challenges companies experience in the process of realization.

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## 6 Conclusion and Outlook

By means of the conduct of a literature review based on the methodology imposed by Webster and Watson (2002) two research gaps on the topic of blockchain technology based smart contracts were prevailed. Namely, the supplementation of the existing theoretical contributions with an illustration of practical applications and the elaboration of the company's point of view on the technology adoption. These research gaps are tackled by the elaboration of different case studies to provide a detailed representation of practical application opportunities of smart contracts and the development of a SWOC-matrix to provide detailed insight of active actors within an economic setting. Subsequent to the provision of a technical foundation, the significant factor of disintermediation encompassing the blockchain technology is discussed, which features an essential component within the case studies.

The case studies comprise early adopters and feature the analysis of business model based on blockchain-enabled smart contracts. The examples of the technical application in practice reveal present efficiency issues using high activity level blockchain platforms, e.g. Ethereum. Furthermore, the analysis exposes a conflict between intended business model architectures and existing legal constraints. The combination of smart contracts with IoT devices features a main emphasis in the examined business models and reveal a positively related reciprocal effect on utility and efficiency. The potential chances and challenges technology adopting companies face are related to the internal strengths and weaknesses within the SWOC-analysis. The aspect of a transparent handling and provision of smart contract code constitutes a first step towards the establishment of mutual trust.

The blockchain technology and the utilization of smart contracts resemble a current strategic technology trend (Panetta, 2017). The technology provides versatile applications and is focused on by well established companies and startups. Smart contracts extend this range of blockchain applications. However, many regulations on data privacy and limitations on the automation processes and replacement of established companies and state regulatory institutions are subject to this technical development. To fully exploit the blockchain potential, as well as the use of smart contracts, this technology needs to find a broad recognition within a political setting, since a public political discussion on this topic sets the fundamental path towards a secure and legitimate engagement. Regarding the increasing electrification of the mobility sector, self-paying autonomously driving cars constitute a proposed vision, as well as a possible taxation of machines utilizing blockchain-enabled smart contracts (Schütte et al., 2017).