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# When is Blockchain Technology Valuable? – A State-of-the-Art Analysis

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## **Abstract**

*Even if there is a common agreement on the general benefits of Blockchain Technology, it is less obvious when the usage of this technology is valuable; i.e. when a Blockchain Technology fit is given for a certain scenario. To assess whether a Blockchain is suitable, various descriptions and frameworks already exist. Nevertheless, decisions when to implement Blockchain Technology are still hype-driven and based on known use cases instead of such frameworks. This study provides a state-of-the-art analysis of papers that offer assessments for a Blockchain Technology suitability. By drawing conclusions on five research problems in this field, a research agenda is derived and guidelines for a BCT framework are suggested. Accordingly, a framework should clearly state (a) the organisational level, (b) what to assess, and (c) how to assess it. Furthermore, a framework should be (d) case independent, and would offer value if (e) patterns are outlined to assess a BCT fit more easily.*

**Keywords:** Blockchain Technology, Distributed Ledger Technology, Technology Fit, Literature Review, Literature Analysis, State-of-the-Art, Research Agenda, Blockchain Framework

## **1.0 Introduction**

Blockchain Technology (BCT) is defined in this paper as a type of distributed systems, that tracks data changes as peer-validated transactions, stores them in a ledger, and replicates them in a distributed network. The distributed ledger stores an immutable history of all time-stamped transactions, secured by cryptographic linkages and protected against manipulation by cryptographic techniques. A transaction on a Blockchain (BC) enables to move assets, which can be any type of digitally represented value (cf. Glaser et al., 2019; Froystad and Holm, 2015; Seebacher and Schüritz, 2017). Hence, in the context of this research Blockchain Technology is used as a synonym of Distributed Ledger Technology (DLT) by abstracting from the technical specification of saving transactions in linked blocks. This definition includes a variety of protocols (e.g. directed a-cyclic graph), but excludes other technologies (e.g. distributed databases).

There is a common agreement on improvements by implementing BCT such as saving costs and time, and increasing efficiency by simplifying processes (Klein et al., 2018). Nevertheless, a Blockchain “is a high-cost, high-overhead storage medium” (Kumar et al., 2019, p. 1), compared to a common database. Therefore, not all use cases or aspects of a use case should be implemented with BCT or supported by BCT and a careful assessment in advance is beneficial (Weber et al., 2016; Klein et al., 2018; Kumar et al., 2019; Valtanen et al., 2019).

To assess whether BCT is suitable for a certain scenario, various descriptions and frameworks appeared recently. They either give general advices when to use BCT, or focus on different organisational levels as processes or business models. Nevertheless, BCT projects entering the acceleration phase yet are still rare (Beck and Müller-Bloch, 2017; Viriyasitavat et al., 2019; Wang et al., 2019). Therefore, this paper gives an overview of the existing prior studies, which provide assessments for a BCT fit. Thereby, this state-of-the-art analysis identifies research problems, which need to be addressed to drive the broad implementation of Blockchain Technology.

The research goals of this study are to

**(1) analyse and synthesise existing research on assessments for a BCT fit,**

and to

**(2) uncover problems and outline an agenda for the ongoing research in this field**

by conducting a state-of-the-art analysis.

This contribution is structured as follows. First, the approach of the systematic literature review is described; including search terms, database, and exclusion process. Afterwards, the literature is analysed and synthesised. In the end, the results of the state-of-the-art analysis are discussed, and a research agenda is outlined.

## **2.0 Systematic Literature Review Approach**

The systematic literature review is conducted as suggested by Cooper (1988), vom Brocke et al. (2009), and vom Brocke et al. (2015). First of all, the scope of the literature review is defined. This literature analysis is focused on the research outcomes, as the overall goal of this research is to analyse and classify existing literature, and identify research problems. Most interesting are criteria or frameworks that allow organisations to assess the suitability of a Blockchain for a certain scenario. Hence, the review is arranged conceptually by organising the findings towards the same abstract ideas. The coverage is representative, as the literature review aims to cover broad content. This

results in a large amount of papers which cannot be covered exhaustively; therefore the number of included contributions has to be limited.

After defining the scope of the literature review, the process is described in 3 steps: literature search, selection, and analysis and synthesis. The literature search determines how the search process is conducted, i.e. search term and database are determined (vom Brocke et al., 2009). Google Scholar is chosen to be the search database, as it covers peer-reviewed scientific literature and practitioner literature alike. This is aimed as the application of BCT is strongly driven by practitioners who implement prototypes to assess the usage of BCT for a certain scenario.

The keywords of the search term should be as precise as possible to exclude contributions that are not necessarily relevant (vom Brocke et al., 2009). The suitability of BCT for an organisation or project can be assessed on different levels. Either a more strategic level from a management perspective is evaluated, or a concrete business case is analysed for a BCT fit. Hence, the search term needs to cover the organisational perspective on different levels. To nevertheless be as precise as possible, three organisational perspectives are chosen, i.e. business model (BM), value chain (VC), and business process (BP).

As these organisational concepts are interrelated, we state short definitions which are being used in this research context. A business model is an organisation-centred unit of analysis to explain how business is done, including value capture and value creation (Zott et al., 2011). Furthermore, it serves as a layer between an organisations business strategy and business processes enabled by information technology (IT) (Al-Debei and Avison, 2010). A business process enables a more detailed view on an organisations value creation, as it is defined as a chain of “inter-related events, activities, and decision points that involve a number of actors and objects, which collectively lead to an outcome that is of value to at least one customer” (Dumas et al., 2018, p. 6). The value chain (originally introduced by Porter (1985)), consists of value creating core processes and support processes of an organisation; processes are illustrated as a sequence of sub-processes (Dumas et al., 2018).

The English terms business model, value chain, business process and their German equivalent are combined with the terms Blockchain, and Distributed Ledger Technology as a synonym. Hence, the concrete search term is the following: “(‘blockchain’ OR ‘block chain’ OR ‘distributed ledger technology’) AND (‘business

model' OR 'geschäftsmmodell' OR 'value chain' OR 'wertschöpfungskette' OR 'value creation' OR 'business process' OR 'geschäftsprozess')”.

The supply chain perspective is excluded consciously, because it is often described as a BCT use case instead of an inter-organisational perspective. As “[s]upply chain management is the backbone of any industrial sector” (Madhwal and Panfilov, 2017, p. 1051), the inclusion of this term would lead to biased results that overrepresent one sector.

Based on the previously described literature search, the literature selection process follows the scheme in Figure 1.

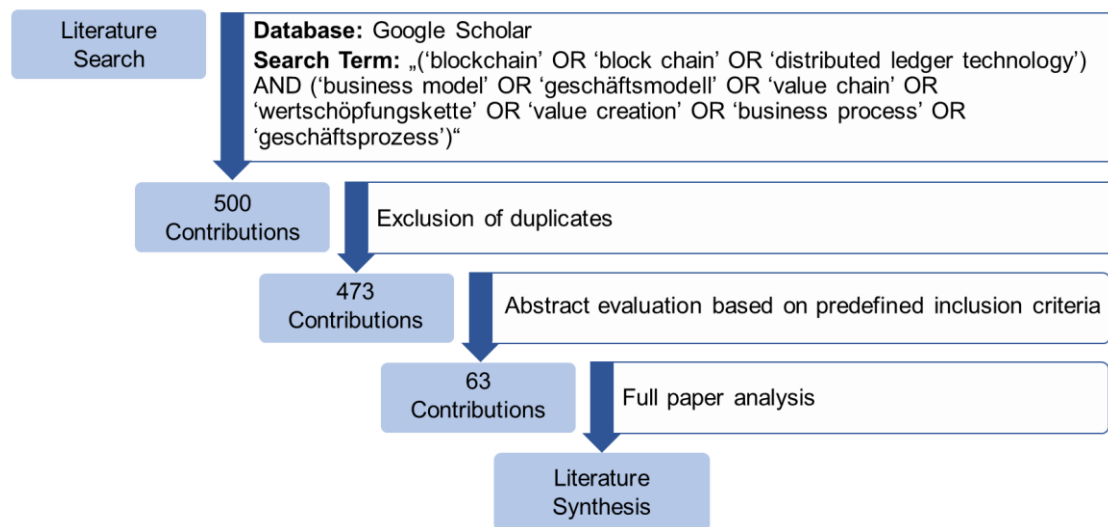


Figure 1: Literature search and selection process

After conducting the search with the stated term on Google Scholar, the first 500 results (date: 11-19-2019) are picked. The restriction to 500 contributions is chosen as this number is sufficient to synthesise the results and give an idea of the state-of-the-art on this topic. After excluding duplicates, 473 contributions remain. Their relevance is determined by analysing their abstracts. An abstract is assessed as relevant if it suggests that the paper will contribute to one of the following questions:

- Which BM/ VC/ BP are suitable/ not suitable to be supported or implemented by BCT?
- When are BP/ VC/ BP suitable/ not suitable for BCT?
- Which characteristics/ components/ properties/ etc. determine a beneficial usage of BCT for BM/ VC/ BP? (Specific industries are included.)
- How do BM/ VC/ BP with and without BCT differ? (Specific industries are included.)

Contributions are excluded if they only describe a BM/ VC/ BP of a specified use case or if BM/ VC/ BP changes by BCT regarding only one specific aspect (e.g. trust) are analysed. After conducting these steps, 63 contributions remain to be evaluated fully. The relevant literature is analysed and synthesised as presented in the following chapter. The last step of the guideline for literature reviews in information systems according to vom Brocke et al. (2009) is the research agenda, which is presented in the discussion.

### **3.0 Literature Analysis and Synthesis**

First, fully analysed papers that are evaluated as not relevant are outlined shortly to expose what the full literature set consists of; these papers are grouped by the organisational perspective they address, i.e. BM, VC, BP.

Blockchain-related papers that focus on the perspective of business processes either describe how BCT improves specific aspects of a process (e.g. security (Carminati et al., 2018), trust (Weber et al., 2016)), or analyse a BCT fit for concrete processes (e.g. service selection in Industry 4.0 (Viriyasitavat et al., 2018), supply chain tracking processes (Chang et al., 2019), logistics processes (Dobrovnik et al., 2018; Pervez and Haq, 2019), real estate management processes (Dijkstra, 2017)). Only Migliorini et al. (2019) argues that the support of inter-organisational process models by BCT is not convenient yet. Reasons are contract incompleteness and the immutability of Blockchain-based Smart Contracts (Migliorini et al., 2019), which are code snippets that are stored and executed on a Blockchain.

Regarding the business model concept, on the one hand several papers refer to companies offering BCT (Beinke et al., 2018; Kazan et al., 2015; Chong et al., 2019). As this study focuses on the application of the technology, these papers are relevant regarding the addressed customer segment and value proposed to customers. Unfortunately, the description of these aspects is rather high level and does not answer when to apply the respective services or products. On the other hand, BCT business model patterns are outlined. These refer to either values of the technology (e.g. transparency by design, security by design (Šalehar, 2017)), or individual use cases (e.g. crowdfunding (Šalehar, 2017), smart property, micropayments, time stamping (Dutra et al., 2018)). The decomposition of complex use cases into less complex ones is already suggested by Witt and Richter (2018).

Papers referring explicitly to the value chain concept are rare and case specific (e.g. forest value chain (Nikolakis et al., 2018), pharmaceutical manufacturing value chain

(Liu and Cai, 2018), financial inclusion (Dragoş, 2017), healthcare value chain (Woodside and Amiri, 2018)).

The resulting contributions that suggest when BCT is suitable are synthesised. By analysing how the assessment of the BCT fit is conducted, independent of the organisational perspectives, three categories turned out; illustrated in Figure 2.

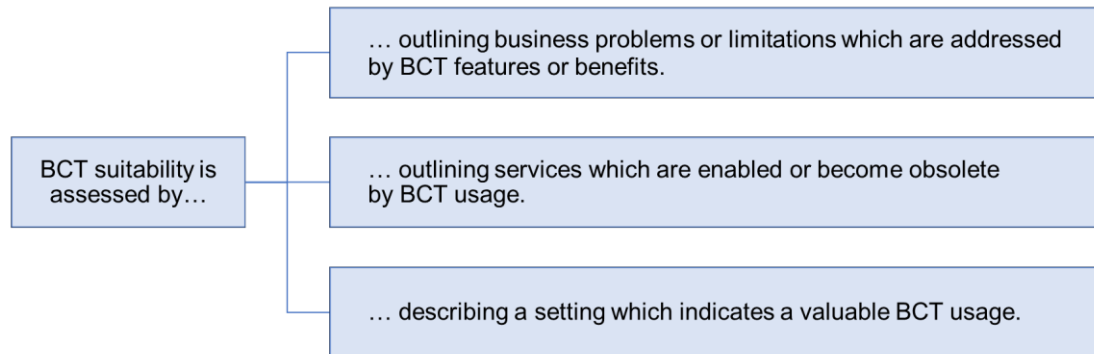


Figure 2: Categories of contributions which assess when to use BCT

Papers in the first category raise problems (also mentioned as limitations, pain points, or formulated reversely as aims or needs to achieve) and evaluate whether BCT fits these. Often mentioned problems solvable by BCT are:

- Numerous independent stakeholders needed (Nowiński and Kozma, 2017; Bauer et al., 2019; Madhwal and Panfilov, 2017), causing
- Information asymmetries (Liu and Lin, 2018; Bauer et al., 2019; Nikolakis et al., 2018).
- Complexity of industries/ workflows/ goods (Nowiński and Kozma, 2017; Nikolakis et al., 2018),
- Reliability of customer/ enterprise data is critical; immutability is required (Liu and Lin, 2018; Holotiuk et al., 2017; Madhwal and Panfilov, 2017),
- Highly regulated sectors, e.g. by politics (Nicolakis et al., 2018; Witt and Richter, 2018; Holotiuk et al., 2017),
- Paper-based/ manual audits or tracking of goods (Bauer et al., 2019; Nikolakis et al., 2018; Madhwal and Panfilov, 2017),
- Lack of trust between involved parties (Downey et al., 2018; Witt and Richter, 2018),
- Authenticity is required/ cannot be validated immediately (Nowiński and Kozma, 2017; Witt and Richter, 2018).

The fact that BCT addresses these problems, is argued on the basis of technological features (also functionalities, characteristics and capabilities) (Bauer et al., 2019; Nikolakis et al., 2018; Korpela et al., 2017; Meironke et al., 2019) or benefits (also implications, values) a Blockchain offers (Pundir et al., 2019; Chang et al., 2019). Thereby, business problems and BCT benefits are outlined in the context of processes (Viriyasitavat et al., 2019; Mendling, 2018; Deubel et al., 2017), for business process management (Mendling et al., 2018; Milani et al., 2016), in business models (Nowiński and Kozma, 2017), and supply chains (Wang et al., 2019). Mostly, problems and benefits are not matched explicitly. An exception are Nikolakis et al. (2018) who match pain points in the forest supply chain with solutions enabled by BCT. A rather general comparison of BCT characteristics with process characteristics is done by Viriyasitavat and Hoonsopon (2019), whereby the suitability of BCT to support processes in general is argued, rather than outlining process characteristics that are more or less suitable.

Services (also applications) which are enabled by BCT or become obsolete due to BCT usage are discussed in two papers. Holotiuk et al. (2017) outline services originating from the payment industry. Obsolete services are third-party trust services, reconciliation, clearing (also underpinned by Deubel et al. (2017)), and settlement. Enabled services are direct, cross-border, and cross-currency transactions (Holotiuk et al., 2017). Grover et al. (2018) list applications offered by BCT which are classified as business-to-consumer (B2C), business-to-business (B2B), and business-to-government (B2G) applications. B2C applications are trusted user interfaces, instant (micro) payment facilities, incentive receiving systems, and traceability of goods. B2B applications are storing of records, snapshot sharing in the go, autonomous execution, accounting, market disintermediation, business process management, provenance tracking, and rapid internalisation. B2G business opportunities are land registries and property rights, identity management and authentication, law and legal enforceability, financial inclusion, cross-border activities, and borderless commerce. Furthermore, impacts due to applying these are outlined (Grover et al., 2018), comparable to benefits BCT provides.

Category three contains papers that describe a setting that indicates a valuable BCT usage. Some studies just name individual characteristics of a setting (i.e. lessons learnt from projects they have analysed), e.g. the ability to break a process down into a series of transactions in an ordered sequence (Kumar et al., 2019). Others combine such setting characteristics with problems that are solvable by BCT (cf. first category),



captured in a framework. These will be introduced briefly to enable a profound discussion of current research problems in this field in the next chapter.

Two of the frameworks rely on flowcharts (also decision trees). Chowdhury et al. (2018) suggest a decision tree to determine whether a database or a Blockchain should be used for a certain case. Based on this, the following criteria should be fulfilled to apply BCT for a case: (1) multiple parties involved, (2) trust deficits among involved parties, (3) no trusted third party given, (4) record of transactions should be immutable, (5) scalability is no critical requirement (Chowdhury et al., 2018). In contrast, Maull et al. (2017) use the following criteria in a flowchart to assess the suitability of BCT: (1) no very rapid transactions, (2) contractual relationship given, (3) no need for a trusted third party, (4) need for shared write access, (5) writers are not known/ trusted and writer's interests are not unified. Furthermore, both flowcharts include characteristics to assess what type of Blockchain should be implemented, i.e. public vs. private, permissioned vs. permissionless, on-chain storage vs. off-chain storage.

Beside these flowcharts, four further papers present frameworks to assess a BCT fit. Bettín-Díaz et al. (2018) suggest a step by step methodology to integrate BCT in a supply chain. As the first step is the selection of a product and the definition of its characteristics, criteria how to choose a product, which is promising for BCT usage, are not revealed. Instead, a detailed analysis for a BCT fit is conducted after selecting a product as a starting point.

Scriber (2018) suggests “10 architectural or blockchain characteristics that can help determine blockchains' appropriateness for an application” (Scriber, 2018, p. 70). Based on these characteristics (e.g. immutability, visibility and transparency, trust) the paper outlines questions that an organisation should include in the discussion whether to use a BC for a certain case. These characteristics are used as a rough guideline which aspects to deal with, rather than defining when BCT explicitly is a suitable option.

Another framework by Angelis and Ribeiro da Silva (2019) proposes three key principles to identify whether BCT is appropriate for a case, namely (1) value drivers and value opportunities, (2) feasibility and viability to adopt the technology, and (3) technology selection. Value drivers and opportunities again relate to the benefits BCT offers (e.g. data immutability). The second principle refers to aspects that should be considered when analysing the technology fit (e.g. legal obligations, performance). The technology selection captures the way BCT is implemented (Angelis and Ribeiro da Silva, 2019). Hence, the suggested framework offers an approach to evaluate a certain

case for BCT suitability, again based on the value the technology offers. Criteria which indicate that a case is promising for a deep dive into the suitability of a Blockchain, are not mentioned.

Finally, Klein et al. (2018) outline two frameworks, i.e. the use case identification framework and the use case canvas. The latter is not introduced further as it evaluates the BCT usage for a case in detail based on BCT characteristics. In contrast, the use case identification framework offers a methodology to quickly and easily assess for several use cases if a detailed evaluation is promising. The framework includes three categories: (1) intermediary (replace one, establish one due to a lack of trust, being the intermediary that is replaced), (2) data (permanently and transparently saved, prevention from modification), and (3) process (potential to automate). Only if a change regarding the intermediary is given and the categories data and process are rated as high, BCT is said to be suitable for a use case. Even if the assessment by Klein et al. (2018) enables a fast high level evaluation, users need to have specific cases in mind to evaluate its BCT fit.

Quekel (2018) conducts interviews that aim for situations when Smart Contracts on a Blockchain can be applied in order to optimise inter-organisational business processes. The main finding is a list of seven situations based on process data (e.g. data requires trust and transparency), or stakeholders (e.g. multiple stakeholders that do not trust each other, not know each other, or have conflicting interests) (Quekel, 2018).

Situations (i.e. required setting and problems) in which it is valuable to apply BCT, based on individually named criteria, flowcharts, or frameworks are named below. Some are already mentioned as problems before, i.e.:

- Multiple parties are involved (Chowdhury et al., 2018; Scriber, 2018; Kumar et al., 2019; Fridgen et al., 2018), and do not trust/ know each other, or have conflicting interests (Quekel, 2018),
- Third parties are needed (Maull et al., 2017; Klein et al., 2018), not available (Chowdhury et al., 2018) or become replaced (Klein et al., 2018),
- Immutable data record and traceability are required (Chowdhury et al., 2018; Klein et al., 2018; Scriber, 2018; Kumar et al., 2019; Quekel, 2018),
- Paper-based, manual processes/ auditing including multiple documents or checking objectives manually (Fridgen et al., 2018; Quekel, 2018),
- Trust is a deficit between stakeholders (Chowdhury et al., 2018; Scriber, 2018; Kumar et al., 2019).

Concrete setting criteria which indicate a valuable BCT usage are the following:

- Services are offered to end users via internet compatible devices (Cavaliere, 2018),
- Contractual relationships are given (Maull et al., 2017),
- Writers need shared access, are not trusted, and have no unified interests (Maull et al., 2017),
- Tight integration, standard processes, and data sharing between stakeholders (Cavaliere, 2018),
- Processes/ interactions can be broken down into a series of transactions (Scriber, 2018; Kumar et al., 2019),
- Transactions with the potential for automation, i.e. data can be checked automatically (Klein et al., 2018; Quekel, 2018),
- Scalability is not critical (Chowdhury et al., 2018).

#### **4.0 Discussion and Research Agenda**

In the following discussion of the previous findings, we reflect on assessment criteria from the perspective of the different organisational perspectives, i.e. BM, VC, BP. Furthermore, we reflect on the findings overall, regardless of the three proposed categories of contributions which assess when to use BCT. Based on the literature analysis and synthesis, we draw the following conclusions on five research problems in this field and derive a research agenda from these.

Contributions that refer to the business model perspective are rather high level and focus on organisations that offer BCT applications, but do not use it. Papers referring to the term value chain are rare and address specific value chains. The low number could be explained by two reasons: (1) the original understanding of the concept value chain only focuses on intra-organisational activities, whereby BCT is known to support inter-organisational processes, (2) papers using industrial cases as examples focus on the supply chain perspective instead. In contrast, the perspective of processes is addressed very often in the literature and the understanding of the term is widely spread. On the one hand, authors look at processes from the perspective of business process management by modelling these e.g. in business process model and notation (BPMN) (e.g. Mendling et al., 2018). On the other hand, the term is used on a more strategic level, e.g. modelling stakeholders instead of activities (e.g. Liu et al., 2018).

Even if these concepts offer different perspectives on organisational activities that create value, the findings are all together high level and overlap partially. For example, the elimination of trusted third parties is outlined from the perspective of processes (e.g. Deubel et al., 2017) as well as business models (e.g. Quekel, 2018). Also, facilitating disintermediation is captured on the supply chain level (e.g. Wang et al., 2019) and from the business model perspective (e.g. Nowiński and Kozma, 2017). This conclusion results in the first research problem in this field.

- i. *It is unclear on which organisational level to assess (e.g. business model or business process) as evaluation criteria stay the same level.*

Several papers outline problems that are solvable by BCT, and partially also BCT benefits that address these. Some papers solely focus on that (e.g. Witt and Richter, 2018), others address these by evaluating BCT for a specific case or industry (e.g. Holotiuk et al., 2017). Beside one paper that explicitly connects problems and technology capabilities (Nikolakis et al., 2018), these two aspects are rarely connected in an abstract way to be applicable to other cases. Apart from a missing connection between problems and benefits, it seems unclear when to apply the technology based on solvable problems. Neither these are weighted, nor combinations of certain problems are suggested to be solved by a certain type to Blockchain. Based on the Blockchain type (e.g. access open or restricted), the BC characteristics differ, and therewith also the offered value (Kannengießer et al., 2019). Therefore, it seems plausible that not all problems are addressed by every Blockchain implementation. Nevertheless, problem patterns that describe which kind of BC implementation should be used, are still missing.

The same applies for services that are offered or become obsolete by using BCT, which in addition widely differ in their level of abstraction. On the one hand, services on the level of business model patterns are suggested; they are comparable to use cases (e.g. smart property (Dutra et al., 2018)). On the other hand, specific transactions are outlined (e.g. cross-border and cross-currency transactions (Holotiuk et al., 2017)). Regardless of the level of abstraction, it stays unclear how these should be combined to create a whole business case, which results in the second research problem.

- ii. *Patterns of outlined assessment criteria are missing (i.e. which combinations/how many of them have to occur).*

This gap of problem patterns is addressed by some papers by providing frameworks to assess whether a given setting is promising for BCT. In this case a combination of setting characteristics is determined; sometimes these are ordered in a specific sequence (e.g. Maull et al., 2017; Chowdhury et al., 2018). Nevertheless, these are rather high level, even if an evaluation of processes is targeted. For example, Klein et al. (2018) argue that their framework is used to “find the right processes that are suitable for and can benefit from blockchain technology and understand how blockchain can support these processes” (Klein et al., 2018, p. 2). The perspective of processes is aimed, while the evaluation of processes in the use case identification framework is only one criterion to assess. Furthermore, it is neither described what exactly should be evaluated to find valuable processes (i.e. evaluation criteria), nor how this should be evaluated (i.e. values for a criterion that indicate a suitable/ not suitable BCT usage). Klein et al. (2018) as well as others (Angelis and Ribeiro da Silva, 2019; Scriber, 2018) outline criteria to evaluate a BCT fit, but do not describe what exactly to assess or how to assess it, which results in the following two research problems.

- iii. *It is unclear what to assess based on the evaluation level (i.e. variables; e.g. data, stakeholders).*
- iv. *It is stated what to assess, but not how to assess it (i.e. measurement and range of values).*

The paper of Klein et al. (2018) is also a good example for papers that aim for the identification of a suitable setting (i.e. in this case the authors aim for the identification of processes in the end), but evaluate certain potential use cases. Overall, many assessments are based on use cases that have been selected before (Bettín-Díaz et al., 2018; Angelis and Ribeiro da Silva, 2019; Klein et al., 2018). Not elaborated is how those cases, projects, processes, etc. are selected before conducting the suggested analysis. This results in the last research problem.

- v. *Potential cases are required to assess a BCT fit for an organisation.*

The described five research problems, which result from the literature analysis, enable us to derive an agenda for future research in this field. Considering the described gaps, a suggested framework should clearly state (a) the organisational level, (b) what to assess, and (c) how to assess it. Furthermore, the framework should be (d) case

independent, and would offer value if (e) patterns are outlined to assess a BCT fit more easily.

The following leading questions (illustrated in Table 1) are expected to guide future researchers when addressing the revealed problems and putting the research agenda into practice.

*Table 1: Leading questions when addressing the research agenda*

(a) Organisational level	<ul style="list-style-type: none"> <li>• Which organisational level is focused (e.g. business model, value chain, etc.)?</li> <li>• Which stakeholders are addressed (e.g. C-levels vs. project team)?</li> <li>• Can assessment criteria be distinguished with regard to different levels of analysis? Would this be valuable for their application?</li> </ul>
(b) What to assess	<ul style="list-style-type: none"> <li>• Which information is needed to evaluate whether a project/ process/ etc. is valuable?</li> <li>• Which attributes need to be considered to evaluate a BCT fit?</li> </ul>
(c) How to assess	<ul style="list-style-type: none"> <li>• How are the attributes measured?</li> <li>• What is a suitable range of value for each attribute to use BCT?</li> </ul>
(d) Case independence	<ul style="list-style-type: none"> <li>• Is a pre-defined case needed to evaluate BCT suitability?</li> <li>• Which knowledge about BCT is required to conduct an assessment?</li> </ul>
(e) Patterns	<ul style="list-style-type: none"> <li>• How many of the problems/ criteria have to come upon to intend that BCT is useful?</li> <li>• Which combinations of criteria intend to use a certain BCT implementation?</li> </ul>

## 5.0 Conclusion

This study is a state-of-the-art analysis of papers that provide assessments for a BCT suitability. By drawing conclusions on research problems in this field, we derive a research agenda. A potential framework that assesses the suitability of BCT should clearly state (a) the organisational level (i.e. business model, process, etc.), (b) what to assess (i.e. variables), and (c) how to assess it (i.e. measurement and range of values). Furthermore, the framework should be (e) case independent, and would offer value if (d) patterns are outlined to assess a BCT fit more easily.

These results are subject to the following limitations. The number of considered contributions is restricted to the first 500 results on Google Scholar, and further contributions are published continuously. Therefore, we cannot guarantee completeness of the results or the research problems drawn from these. Furthermore, the results are affected by subjectivity as the literature selection and analysis are conducted by a single researcher.

Kumalakov et al. (2019) revealed that decisions to implement BCT in organisations are currently hype-driven and top-down, whereby business cases in the investigated organisations are justified by whitepapers and case studies. Therefore, the relevance of this research is given for practitioners as well as researchers, for whom the literature review can serve as a basis for rigorous research. This is what we aim to support with the research agenda in this paper.

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