2nd Conference on Production Systems and Logistics

The Acceptance Of The Blockchain Technology In Food Supply Chains – A Literature Review

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Abstract

The blockchain technology has been increasingly applied in industrial use-cases in recent years. Although the food industry fits in particular with the requirements for blockchain applications, since the actors barely know each other and trust plays a crucial role, it is not widely established in the food industry. There are efforts to increase transparency and enable traceability in food supply chains by applying blockchain technology to share data in a trustworthy way across companies and to ensure food quality standards. This technology can be further used to enable the identification of inconsistencies in sensor data and more efficient handling of food recalls across the food supply chain. The success of a new technology depends to a large extent on its acceptance by companies and their employees. This paper deals with the acceptance of such a blockchain application and presents a systematic literature review to summarize the methods and results of acceptance analyses of the blockchain technology in food supply chain s. Particular attention has been devoted to traceability. For this objective, research is analysed based on scientific methods and the results are systematically analysed.

Keywords

Blockchain; Acceptance analysis; Food supply chain; Literature review

1. Introduction

Blockchain technology is increasingly being applied in a variety of industries. Many different participants in a supply chain lead to distinctive transactions between them. These transactions can be reflected very well by a blockchain.[1] Blockchain technology offers several important benefits especially for the supply chain, such as traceability, efficiency, and transparency.[2]

Especially in food supply chains, the previously mentioned properties have a major role to play. Here, blockchain technology can be used to comply with food standards. Thus, it can help to achieve more control over the heterogeneous, complex and dynamic food supply chains. This control is now also desired by more and more consumers in order to obtain more safety and quality. [3] Furthermore, there are some regulatory and social constraints to provide a transparent supply chain. This can avoid possible scandals that have occurred in the food industry in the recent past and create more trust between the different parts of the food supply chain and especially the customer. [4]

Despite these clear benefits, blockchain technology has almost no practical application. In fact, many projects have been discontinued. [3] Similarly, in a survey by Statista, only 36% of decision-makers surveyed said that they had so far investigated the topic area of blockchain technology. [5]

Most research on blockchain technology to date has been related to technical implementation. However, it is also important that there is a certain level of acceptance so that the technology that has been developed is also used. [2]

Therefore, the purpose of this paper is to summarize the methods and results of the acceptance analysis of blockchain technology in the food supply chain to this point. It is important that projects and companies involved in blockchain technology know which models and factors they need to consider in order for the technology to be accepted from the market and companies. Otherwise, more and more projects will not continue. However, if they know what models to use, they can analyse their own market well and can respond to the particular needs of the market to create more acceptance. In addition, this paper already provides the first factors that can have a positive or negative impact on certain markets.

For this purpose, a systematic literature review is conducted below. In the following the exact procedure of the literature research is described. Subsequently, the results are categorized, and a part is further analysed to finally come to a summary and discussion of the results.

2. Research Model

To identify the methods and results of an acceptance analysis of blockchain technology in the food supply chain, a systematic literature review has been conducted. The detailed process of this search is presented in the following. Several databases were searched to obtain a more comprehensive search scope. It has been decided to choose the databases "Web of Science"[1] and "Scopus"[2]**.** This database was chosen in order to obtain the most scientifically sound results possible. In addition, special setting options are included in the mentioned databases.

2.1 Implementation

For "Web of Science" the following search settings have been defined. First, it has been determined that all databases are searched to achieve the most comprehensive result as possible. Secondly, it has been specified that the total available time period is to be searched, this refers to the period from 1926-2021. No restrictions have been made for the language, whereby there were only English language search results because of the English keywords. In addition, the search setting "topic" was selected, in which the papers were sorted according to the specified search criteria in the title, abstract, author keywords, and more were scanned according to the given search criteria. Furthermore, only open accessible literature was included in the research.

Similar settings were used for "Scopus". There were no settings for database selection or language, whereby there were also here only English-language search results. In addition, the available total time period for “Scopus” was considered again, what includes the period from 1960-2021. The type of database search was defined for “Scopus” as well. The settings "Article title, Abstract, Keywords" were chosen to receive a search result as accurately as possible and to have a similar search algorithm as in "Web of Science".

Subsequently, the databases were searched for specific search criteria. At "Scopus" no further adjustments of the search criteria are audible. At " Web of Science" however, there is the opportunity to put words that stand together in quotation marks, these are then seen as a total phrase. However, to have the same search conditions in both databases, this setting was not used in this paper. The found papers are then sorted by citations, so that scientifically relevant papers are always analysed as part of the search.

[1] www.webofknowledge.com
[2] www.scopus.com

After all formal configurations have been completed, the first search term "Acceptance Blockchain food supply chain" has been specified. This is the first search term, as it suits the problem best. The term "acceptance" refers to the acceptance analysis as defined in the problem, "blockchain" defines the utilization of the blockchain technology and "food supply chain" describes the area of utilization.

Since the previously described search is a very specific application area, a second search was subsequently conducted. This search is no longer concerned with the specific application area of the food supply chain, but only looks at the supply chain as a general area. Therefore, the new search term will be " Acceptance blockchain supply chain".

2.2 Findings

With the first mentioned search term, five papers could be found each at "Web of Science" and "Scopus". After removing the duplicates, six papers remained. Whereby it can be assumed that with other databases it would not have been possible to find many more papers, since there were already so many duplicates in the two databases which were considered.

After a closer look at the abstract and the conclusion, there were only two papers left that matched the given research problem. The others discussed the blockchain technology, but not necessarily in a food supply chain and were not concerned with an acceptance analysis at all. Since this is a too small number for a comprehensive literature review, the search has been repeated with a new defined search term. In order to be able to make a well-founded analysis of the papers and to scientifically evaluate the applied methods as well as the results, the search was repeated with a newly defined search term.

By screening the databases with the second search term, 43 papers have been found at "Web of Science" and 46 papers have been found at "Scopus". This time, only papers that have already been cited at least once have been analysed, so that only papers that have already been scientifically recognized are analysed. Therefore, 28 papers from Scopus and 35 papers from Web of Science have been analysed.

Again, the abstracts and conclusions were evaluated to determine the relevance of the paper for this literature review. The same problem occurred as in the previous search, that not all papers address an acceptance analysis. Some of them do mention that possible acceptance needs to be considered, but do not address this issue further. Due to this problem, after a closer analysis, only 14 papers are left that are worth to be analysed further in the next chapter.

Table 1 shows an overview of the papers found during the search. The papers from the first search are greyed out. Here, the following content criteria have been considered: "Blockchain Technology", "Acceptance Analysis", "Supply Chain". This means that it must be mentioned in the abstract or in the conclusion that the paper deals with the given topics. So that in the next chapter only the relevant papers are analysed in more detail. All three topics must be covered in one paper in order for it to be evaluated further.

Table 1: Results of both Searches

Author	Year	Paper	Blockchain Technology	Acceptance	Supply chain	Used	Database	Citations
Abu-elezz et. al	2020	The benefits and threats of blockchain technology in healthcare: A scoping review	x				Scopus, Web of Science	10
Alazab et. al	2021	Blockchain technology in supply chain management: an empirical study of the factors affecting user adoption/acceptance	x	x	x	x	Scopus, Web of Science	5
Alkhodre et al.	2019	A Blockchain-based value added tax (VAT) system: Saudi Arabia as a use-case	x		x		Scopus, Web of Science	7
Amin& Zuhairi	2021	Crowdfunding Smart Contract: Security And Challenges	x				Scopus	0
Astill et. al	2019	Transparency in food supply chains: A review of enabling technology solutions			x		Scopus, Web of Science	39
Busse et. al	2019	A response to the united nations cites blockchain challenge: Incremental and integrative poa-based permit exchange	x		x		Scopus	1

Caldarelli& Ellul	2021	Trusted Academic Transcripts on the Blockchain: A Systematic Literature Review	x				Scopus	1
Choi et. al	2020	Factors Affecting Organizations' Resistance to the Adoption of Blockchain Technology in Supply Networks	x	x	x	x	Scopus, Web of Science	3
Choo et. al	2020	Blockchain Ecosystem—Technological and Management Opportunities and Challenges	x				Scopus, Web of Science	2
Clohessy et. al	2020	Antecedents of blockchain adoption: An integrative framework	x	x	x	x	Web of Science	2
Durach et. al	2020	Blockchain Applications in Supply Chain Transactions	x	x	x	x	Web of Science	11
Falcone et. al	2020	Understanding Managers' Reactions to Blockchain Technologies in the Supply Chain: The Reliable and Unbiased Software Agent	x	x	x	x	Web of Science	1
Ferri et. al	2020	Ascertaining auditors' intentions to use blockchain technology: evidence from the Big 4 accountancy firms in Italy	x	x			Web of Science	3
Gökalp et. al	2019	Acceptance of Blockchain Based Supply Chain Management System: Research Model Proposal	x	x	x	x	Scopus	1
Gupta et. al	2020	Prioritizing intentions behind investment in cryptocurrency: a fuzzy analytical framework		x			Web of Science	2
Jain et. al	2020	Blockchain in logistics industry: in fizz customer trust or not	x	x	x	x	Scopus, Web of Science	2
Jovic et. al	2020	Improving Maritime Transport Sustainability Using Blockchain-Based Information Exchange	x	x			Web of Science	5
Kamble et. al	2021	A machine learning based approach for predicting blockchain adoption in supply Chain	x	x	x		Scopus, Web of Science	2
Kamble et. al	2019	Understanding the Blockchain technology adoption in supply chains-Indian context	x	x	x	x	Scopus, Web of Science	129
Karamchandani et. al	2020	Perception-based model for analyzing the impact of enterprise blockchain adoption on SCM in the Indian service industry	x		x		Scopus, Web of Science	16
Kouhizadeh et. al	2021	Blockchain Technology and the Sustainable Supply Chain: Theoretically Exploring Adoption Barriers	x	x	x	x	Scopus, Web of Science	36
Min	2019	Blockchain technology for enhancing Check for updates supply chain resilience	x		x		Web of Science	95
Nawaz& Thowfeek	2020	Blockchain technology adoption by chain professionals	x	x	x		Scopus	2
Park	2020	A Study on Sustainable Usage Intention of Blockchain in the Big Data Era: Logistics and Supply Chain Management Companies	x	x	x	x	Scopus, Web of Science	1
Queiroz et. al	2020	Blockchain adoption in operations and supply chain management: empirical evidence from an emerging economy	x	x	x	x	Scopus, Web of Science	13
Queiroz& Wamba	2019	Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA	x	x	x	x	Scopus, Web of Science	173
Rainero& Modarelli	2021	Food tracking and blockchain-induced knowledge: a corporate social responsibility tool for sustainable decision-making	x		x		Scopus, Web of Science	0
Sander et. al	2018	The acceptance of blockchain technology in meat traceability and transparency	x	x	x	x	Web of Science	40
Schuetz& Venkatesh	2020	Blockchain, adoption, and financial inclusion in India: Research opportunities	x	x	x		Web of Science	34
Srivastava	2019	Blockchain and transaction processing time using M/M/1 queue model	x				Scopus	1
Supranee& Rotchana-kitumnuai	2017	The acceptance of the application of blockchain technology in the supply chain process of the Thai automotive industry	x		x		Scopus	10
Tan& Sundarakani	2021	Assessing Blockchain Technology application for freight booking business: a case study from Technology Acceptance Model perspective	x	x			Scopus, Web of Science	2
Thiruchelvam et. al	2018	Blockchain-based technology in the coffee supply chain trade: Case of Burundi coffee	x	x	x		Scopus	15
Tribia et. al	2018	Supply chain management based on blockchain: A systematic mapping study	x		x		Scopus	22

Upadhyay	2020	Demystifying blockchain: A critical analysis of challenges, applications, and opportunities	x		x		Web of Science	11
Wamba et. al	2020	Dynamics between blockchain adoption determinants and supply chain performance: An empirical investigation	x		x		Web of Science	18
Wamba& Queiroz	2020	Industry 4.0 and the supply chain digitalisation: a blockchain diffusion perspective	x		x		Web of Science	8
Wamba& Queiroz	2019	The role of social influence in blockchain adoption: The Brazilian supply chain case	x	x	x	x	Scopus, Web of Science	3
Wang et. al	2019	Designing a Blockchain Enabled Suplly Chain	x		x		Web of Science	3
Wang et. al	2019	Making sense of blockchain technology: How will it transform supply chains?	x		x		Web of Science	96
Wong et. al	2020	Unearthing the determinants of Blockchain adoption in supply chain management	x	x	x	x	Web of Science	18
Wong et. al	2020	Time to seize the digital evolution: Adoption of blockchain in operations and supply chain management among Malaysian SMEs	x	x	x	x	Scopus, Web of Science	53
Wu et. al	2021	An analysis of strategies for adopting blockchain technology in the fresh product supply chain	x		x		Scopus, Web of Science	1
Yang	2019	Maritime shipping digitalization: Blockchain-based technology applications, future improvements, and intention to use	x	x			Scopus, Web of Science	45
Zhou et. al	2020	From traceability to provenance of agricultural products through blockchain	x		x		Scopus, Web of Science	0

3. Results

After the initial classification of the papers into relevant and non-relevant, the relevant papers were analysed in more detail in the following. Particular attention was paid to the methods used in the individual papers and the results they arrived at. The models applied and the corresponding factors are explained in more detail. In order to achieve this, the papers are first briefly summarized before the results are discussed further.

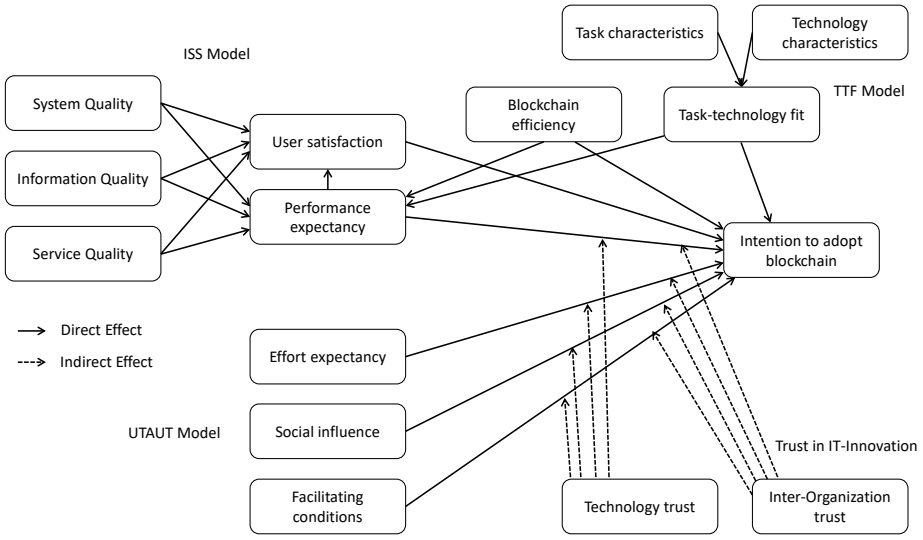
The first paper that was considered in more detail is "The acceptance of Blockchain technology in meat traceability and transparency" by Sander at al. from 2018. This paper will be further just referred to as Paper 1. In this paper, stakeholder acceptance in the meat industry is investigated under the positive influence of traceability and transparency. Hypotheses have been formulated first. To verify the previously formulated hypotheses, 712 questionnaires have been sent by mail, with 141 responses. In addition, 12 semi-structured interviews were conducted with supply chain stakeholders. The study concluded that consumers are overwhelmed by the present situation, as there exist too many different certificates on the market, the true meaning of a certificate is unclear. This is where blockchain technology can significantly improve the situation. In addition, it is also assumed that traceability will increase the quality of food. However, some government representatives have concerns about the financing and feasibility of the system. [6]

The 2nd paper, "Blockchain Technology and the Sustainable Supply Chain: Theoretically Exploring Adoption Barriers," by Kouhizadeh in 2020, deals with the potential issues that may occur during the adoption of blockchain technology. For this purpose, the Force Field Theory is considered together with the TOE model. TOE is a theory that describes how 3 factors influence the acceptance of a new technology with the T represents Technology, the O represents Organization, and the E represents Environment. The selected sample includes 47 interviewees. They have been given a questionnaire, which has been previously prepared with experts. The created questionnaire aims to compare the factors: "Organizational Barriers, Internal Supply Chain Organizational Barriers, Technological Barriers, External Barriers" in pairs. The result of the questionnaire indicated that the Technological Barriers and the Internal Supply Chain Organizational Barriers were evaluated the highest. However, it can also be concluded that there is a correlation between the two barriers. Therefore, it can be assumed that the Technological Barriers must be solved before the

Internal Supply Chain Organizational Barriers. In addition, it can be observed that the External Barriers also need to be solved before the other barriers in order to successfully adopt the blockchain technology. [2]

The next paper of the search is "Blockchain technology in supply chain management: an empirical study of factors affecting user adoption/acceptance" by Alazab et al. from 2020, this paper is further named Paper3. This paper focuses on the most important influences of the acceptance analysis. For this analysis, hypotheses have been formulated regarding the factors of Figure 1. To investigate these hypotheses, a questionnaire was created. For this purpose, the hypotheses have been categorized in the unified theory of acceptance and use of technology (UTAUT), information system success (ISS) and task- technology fit (TTF) method. Thus, the model shown in Figure 1 is created. The questionnaires were then sent to 2000 managers from 184 companies in Australia. The authors received 449 responses from 104 different companies. After analysing the results, the authors concluded that employee perspectives or other experiences of other users do not influence the decision of utilizing blockchain technology. Instead, what matters is interorganizational and technical trust. Additionally, trust between different actors in the supply chain also matters a lot. [7]

Figure 1: Model with UTAUT, ISS and TTF [7]



In the next section, we will look at the paper "Factors Affecting Organizations Resistance to Adoption of Blockchain Technology in Supply Networks" by Choi at al. from 2020, which will be referred to as Paper4 later in this paper. This paper considers the barriers to blockchain technology adoption based on the TOE model. Hypotheses are designed using the TOE model, which are to be verified. To create a questionnaire, additional information from different papers and publications of well-known companies are also included. The Hypotheses are designed utilizing the TAM model. The TAM model, like the previously mentioned models, describes factors that affect a decision to adopt a new technology. The designed questionnaires are disseminated via social media so that 92 questionnaires are completed. These are then analysed, and the authors concluded that technical maturity, cost, compatibility, and scalability are the biggest barriers to the successful adoption of the blockchain solution. There are also security and privacy concerns. However, the reduced time required to collaborate with other companies is perceived positively. In addition, a high level of expertise has a positive influence on the acceptance of blockchain technology. [8]

The Paper 5 "A study on sustainable usage intention of blockchain in the Big Data Era: Logistic and Supply Chain Management Companies" by Park from the year 2020 focuses on the acceptance of blockchain technology in the supply chain based on the UTAUT and TOE model. The UTAUT model considers gender, age, experience, and voluntariness of use in addition to performance expectancy, effort expectancy, social influence and facilitating conditions, although the first factors are not considered further in the paper. The TOE model has already been explained in more detail in the previous summaries. Based on these models,

several hypotheses were formulated. These have been subsequently investigated by reference to a literature review and a questionnaire survey. The survey included 800 questionnaires, which were distributed, 172 were returned completed. After analysing the results, it was found that the factors of the UTAUT model as well as the TOE model show a significant positive impact. [1]

The 2019 paper "Time to seize the digital evolution: adoption of blockchain in operations and supply chain management among Malaysian SME's" by Wong et al. is the 6th paper to be analysed in more detail. This paper is about the adoption of blockchain technology among SMEs in Malaysia. In this paper, hypotheses have been formulated again based on the TOE model. This time, the hypotheses focus not only on the behaviour of the companies but also on how the Technical Effects influence the Organizational Effects. For this purpose, a questionnaire is again created, whereby 194 completed questionnaires can be evaluated. The authors have concluded that the cost savings in working with third parties have a positive effect on the decision to use blockchain technology. In the same way, the total acquisition cost is seen as an attraction. On the other hand, the complexity of the system is a negative factor, as it leads to fear of utilization. Competitive pressure is also seen as a positive factor, as its use can lead to a competitive advantage. However, the support of the management level is still missing. [9]

In the next section the 2020 paper "Understanding Managers' Reaction to Blockchain Technologies in the Supply Chain: The Reliable and Unbiased Software Agent" by Falcone et al. is reviewed, this paper is further named Paper 7. In this paper, the acceptance of software agents in the supply chain is considered. Here to different areas are examined: Cognitive stage, affective stage, behaviour stage. The cognitive stage deals with blockchain design features, the affective stage with perceptions, which in turn are divided into risk, trustworthiness, and justice, and the behaviour stage with the willingness to use. On this basis, hypotheses were formulated, which were tested with 141 fully completed questionnaires. The authors concluded that there is an overall positive attitude toward thist technology. Here, the factors of the affective stage promote the willingness to use blockchain technology. In addition, the new technology is seen as embedded, reliable, and biased. [10]

The paper "Blockchain in logistics industry: in fizz customer trust or not" by Jain et. al. from 2019, attempts to explain the behaviour of an individual regarding to blockchain technology, this paper is further named Paper 8. The TAM model has been utilized as the basis of hypothesises formulated. Here, the following factors have been considered in more detail: Attitude, Perceived Ease of Use, Perceived Usefulness. Based on the previously formulated hypotheses, a questionnaire was created and distributed to 250 online shoppers. The authors returned 240 completed questionnaires. From this, they were able to conclude that the previously defined factors all have a significant influence. In addition, they expect higher business revenues and better customer relations. [11]

Consider the 2020 paper "Unearthing the determinants of Blockchain adoption in supply chain management" by Wong et. al, this paper is further named Paper 9. This paper focused on the decision making regarding blockchain technology by Malaysian companies. For this purpose, hypotheses have been formulated based on the UTAUT model. However, the UTAUT model has been extended by the factors Technology Readiness and Technology Affinity. A questionnaire was then prepared. This questionnaire was then answered by 162 Malaysian companies. The authors concluded that Performance Expectancy and Effort Expectancy are insignificant for the decision. In contrast, the Facilitating condition is significant, as well as the two additional factors. However, the respondents saw difficulties with regulations and guidelines, especially in data protection and consumer protection. However, the respondents also have little experience in blockchain technology. Therefore, the authors believe that greater awareness and expertise of the technology, as well as clear regulations, are helpful and necessary. [12]

The 2020 published paper "Blockchain adoption in operations and supply chain management empirical evidence from an emerging economy“ by Queiroz et. al, focuses on the decision-making process of Brazilian

companies to use blockchain technology, this paper is further named Paper 10. For this purpose, questionnaires were prepared based on the previously mentioned UTAUT model. These were then sent via social media. The authors received 184 responses. From these replies, the authors concluded that facility conditions, trust, and effort expectancy have a positive impact on decision making, and performance expectancy has a negative impact. [13]

Furthermore, the paper "Blockchain-Based Supply Chain Management: Understanding the Determinants of Adoption in the Context of Organization" by Gökalp from 2020 was also examined in more detail, this paper is further named Paper 11. For this purpose, certain factors were clustered with the help of the TOE model. The individual clusters were as follows: Technology: relative advantage, complexity, compatibility, interoperability, standardization, scalability, and trust; Organization: organizations IT resource, top management support, organization size, financial resources; Environmental: competitive pressure, trading partner pressure, government policy, government regulations, inter-organizational trust. Interviews were conducted with 30 experts on these factors to obtain a weighting of the factors. The environment is the most important factor for the exchange of information between organizations. The technical factors are particularly concerned with improving performance and efficiency, and the organizational factors are concerned with the availability of IT resources and finances. It is also about having the support of top management and inter-organizational trust, as well as supportive policy regulations and competitive advantage. [14]

The 2019 paper "The Role of Social Influence in Blockchain Adoption: The Brazilian Supply Chain Case" by Wamba & Queiroz analyses Behavioural Intention Adoption based on the UTAUT Models. This paper will be further just referred to as Paper 12. For this purpose, hypotheses on the factors Social Influence, Facility Conditions, Performance Expectancy, and Effort Expectancy have been formulated first. Based on these hypotheses, questionnaires were created and sent to Brazilian senior supply chain specialists via LinkedIn. The authors received 138 responses. They concluded that Social Influence has the strongest influence. However, Performance Expectancy has no influence, which they explained by the fact that managers in India do not expect any increase in productivity from blockchain technology. [15]

The next paper "Special Topic Forum: Blockchain Application and Strategies for Supply Chain Research and Practice" by Durach et. al is from 2021. This paper will be further just referred to as Paper 13. In this paper, the authors surveyed 151 German managers regarding their attitudes toward blockchain technology. Of particular importance here are the factors that are categorized under the keywords: Initial consideration, Active evaluation, Moment of purchase, Post purchase experience and Loyalty loop. They concluded that the cost of the technology plays a major role. The same applies to the handling and transfer of data. On the other hand, the factors loyalty, competitive pressure and transparency of processes have less impact. [5]

In addition, the paper "Understanding the Blockchain technology adoption in supply chains- Indian context" by Kamble & Gunasekaran from 2018 was analysed in more detail. This paper will be further just referred to as Paper 14. In this, the TAM, TPB (Theory of planned behaviour) and TRI (Technology readiness index) models are used to create hypotheses about the adoption of blockchain technology. These hypotheses serve as the basis for a survey with 150 participants from 150 companies and the design of a questionnaire, which was completed by 181 supply chain professionals. The authors concluded that there are no concerns about implementation or ease of use. In addition, the perceived benefits are also positive. There is a discernible influence of the subjective norm which can manifest itself in the form of peer pressure or a competitive advantage. In addition, personal attitude also has an influence on decisions. [16]

In addition, the paper "Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA" by Queiroz & Wamba from 2018 is also considered. This paper will be further just referred to as Paper 15. This compares the adoption of blockchain technology in the US and India. For this purpose, hypotheses are formulated based on the TAM and UTAUT models. These serve as

the basis for questionnaires completed by 394 supply chain professionals in the US and 344 in India. They show that Performance Expectancy always has an influence. Trust, on the other hand, has a greater influence in India than in the USA. Whereas Facilitating conditions has a greater influence in the US. Social Influence, however, is again stronger in India, where the influence of colleagues or family on decisions is greater.[17]

The last paper, "Antecedents of blockchain adoption: An integrative framework" by Clohessy et al. from 2020, this paper is further named Paper 16, looks at decision making to utilize blockchain technology considering the TOE model. However, this was extended to include the Task and Individual categories. After a literature review, the authors concluded that the categories considered are relevant to decision making. As well as the support of top management. [18]

Taking a closer look at the analysed papers, it is noticeable that mainly 3 models are applied, the TOE model, TAM model and UTAUT model. Table 2 summarizes these models and the corresponding factors.

Table 2: Models and Factors

Model	Factors	Meaning
TOE	Technological factors	Availability, Characteristics
	Organisational actor	Formal and informal Linking Structures, Communication Processes, Size, Slack
	Envoirmental factors	Industry Characteristics and Market Structure, Technology Support Infrastructure, Goverment Regulations
TAM	Perceived usefulness	"the degree to which a person believes that using a particular system would enhance his or her job performance"
	Percieved ease of use	"degree of belief that a person will find it easy to use the system"
	Attitude	"an individual's positive or negative feelings (evaluative affect) about performing the target behavior"
UTAUT	Performance expactancy	"the degree to which an individual believes that using the system will help him or her to attain gains in job performance"
	Effort expactancy	"the degree of ease associated with the use of the system"
	Social influence	"the degree to which an individual perceives that important others believe he or she should use the new system"
	Facility conditions	"the degree to which an individual believes that an organizational and technical infrastructure exist to support the use of the system"
	Gender	control variables
	Age	
	Experience	
	Voluntariness	

The TOE model has three main categories under which factors are collected. In the table, some factors are mentioned, but there are no fixed factors that can be added. The TAM model is limited to the final factors that influence the decision. There are also extensions like the TAM2. In this model the factors that influence the performance expectancy, Effort expactancy and Attitude are also listed. The UTAUT model only considers the factors listed in the table, these are not further classified. In this model, however, there are still control variables, which are not always used.

All models have different emphases, which is why it can be useful to use them in combination. Paper 5 and Paper 15 e.g., have considered the TAM and the UTAUT model together. Other authors like Paper 3 and Paper 14 have extended the models by further not so frequently used models. This approach is often useful in order to consider a further spectrum of factors.

4. Conclusion

During this literature review, it was noticed that there are not many papers on the acceptance analysis of blockchain technology in the food supply chain yet. For the acceptance of blockchain technology in the supply chain, there are already a few more papers, but even here there is still a lot of research to be done. The most noticeable thing is that the research is restricted to the last few years. The oldest paper that we have analysed is from 2018 but most are from 2020. This is mainly because the technology used is new,

however, this field of research should not be underestimated. However, it has been noted that new papers have been published on this topic during our research period.

It can be concluded that the acceptance of the blockchain technology depends on a wide range of factors. The possible traceability and transparency are seen as positive. In addition, blockchain technology increases the trust of the various actors in the supply chain and reduces the effort and costs incurred by third parties. Furthermore, social factors and competitiveness play a major positive influence. The age and role of the decision-makers also have a positive impact on the decision. Negative factors are the financing of blockchain technology. In addition, the complexity and compatibility are viewed critically. In addition, despite the high technological standard, security and especially data security are considered. However, one must always pay attention to which market one is in, so it was found that the acceptance factors can differ with regard to the country in which research was conducted. [17] These Factors are also summarised in Table 3.

Table 3: Factors for the utilization of blockchain technology

Paper	Factors for the utilization of blockchain technology	Factors against the utilization of blockchain technology
Paper 1	traceability will increase the quality of food, more transparent than the current situation	financing, feasibility of the system
Paper 2		internal supply chain organizational barriers, technological barriers
Paper 3	Interorganizational and technical trust, trust between different actors	
Paper 4	time required to collaborate with other companies, high level of expertise	technical maturity, cost, compatibility, and scalability
Paper 5	UTAUT model and the TOE model have s significant positive impact	
Paper 6	working with third parties have a positive effect, acquisition cost, competitive pressure	complexity of the system, fear of utilization, support of the management level is still missing
Paper 7	embedded, reliable, and biased	risk, trustworthiness, justice
Paper 8	higher business revenues and better customer relations	
Paper 9	facilitating condition, technology readiness and technology affinity	regulations and guidelines
Paper 10	facility conditions, trust, and effort expectancy	
Paper 11	performance, efficiency, environment. IT resources, finances, top management, inter-organizational trust, policy regulations and competitive advantage	
Paper 12	social influence	
Paper 13	pay for performance, transfer of contracts, bonds, deeds, or stocks, escrow services document-signing processes, token-curated registries	
Paper 14	subject norm, perceived usefulness, attitute	
Paper 15	performance expactancy, trust, social influence, facility conditions	
Paper 16	technik, organisation, environment	

The objective of this paper was to summarize different methods and results of acceptance analysis of blockchain technology in food supply chains. Although there have not been many papers on blockchain technology in food supply chains, we believe that the methods and factors found can be applied to food supply chains to find out whether the technology is accepted or not. And thus, more successful projects can be implemented in this field.

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Biography

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