

MARIA CARDENAS

MARTIN GERARD

Blockcerts

Maria Cárdenas and Martin Gerard

Aeres University of Applied Sciences

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Preface

This report is created by Martin Gerard and Maria Cardenas, students of the food supply chain management minor at Aeres University of Applied Sciences. The main objective of this report is to research blockcerts as component of the blockchain, to define what are its advantages and if it is helpful to use it for sharing organic certifications among stakeholders.

Summary

This report is based on Blockchain and more particularly on Blockcerts. The aim of this report is to introduce Blockcerts and figure out how it can be used for the organic certifications. A survey has been conducted to understand the requirements of the farmers' in order to fulfill their expectations. Through the survey it was found several challenges for the organic farmers including the extensive process they need to go through in order to achieve being organic certified. This procedure includes time, paperwork and different tests that needs to be developed through the year. Nonetheless to say, that this concerns several costs for the farm whom does not have a choice and needs to work with It. However, during this report its been analyzed how the new technology of blockcerts should facilitate this process not only for farmers but also for the others stakeholders of the supply chain.

Blockcerts is here to enable the communication within the supply chain and in this report the focus was more focused on the farmers. Through analyzing their problems and looking for some possible solutions, it has been found some strategies that might facilitate the process such as the PGS, the participatory guarantee system where many small farmers join to create an alliance that is able to certified trough an easier procedure, the only cons of this is that this is mostly used in developing countries where they lack of institutions for this but that is not the case for The Netherlands and France which are the countries being studied in this report.

Also, a TELOS theory was used to explain whether the project was feasible and through the research it has been found that the technology in both countries and Europe itself is sufficient for the use of this app, the developing of the app economically speaking is doable and the use as well. Moreover, the legal aspects benefit the idea due to this app is meant to verify certifications to see their reliability and their operation and scheduling would depend on how good will the people get used to the app and which would be the tools such as training videos for them to learn.

Through a MoSCoW it has been added several features the app should have such as an scanner option, a notifications system and a digital signing system and further on some risks have been analyzed such as the privacy of the company's information and the possibility of loosing some documents through the system.

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1. Introduction

In the last few years, blockchain has become a familiar word throughout the business world. (Mearian, 2019) stands that blockchain provides "the ability to create secure, real-time communication networks with partners around the globe to support everything from supply chains" basically meaning that companies could be able to share important information to strengthen their business strategy and at the same time to provide valuable information for their consumers. Therefore, the idea of implementing this technology in the food business keeps constantly increasing.

Nonetheless, it does not stay only as an idea, but it has been developing further into implementation. However, the concept needed to fulfill certain capacities such as verifying the veracity of its documents to be a trustable system by its users and this is when blockcerts becomes a matter of interest in this topic.

In this report there will be discussed a series of concepts and definitions that will help to explain in detail what a blockchain is and what is its purpose in the food business. Moreover, a small introduction to blockcerts will be given and this one would explain how this concept can be used for the main objective of this report which is certification of organic vegetables. Also, it would be discussed what are the main objectives of this report which it would be discovered through the research of the supply chain and an interview with the company's owner.

Moreover, there would be conducted a research methodology to find out what are the necessities of the farmers regarding the process of getting an organic certification. This research would lead to a problem diagram, and analysis of the problem and some possible solutions, through out the TELOS theory and the MoSCoW method where there will be discussed some features that the blockcerts app might contain. Moreover, a risk analysis will be done to assess the possible risk of implementing this technology at the production part of the supply chain.

2. Background and related research

2.1 Blockchain in food supply chain

Blockchain is a shared ledger system where all stakeholders have access to the same information at the same time which lead to transparency. (Leng K, 2018) The food supply chain is a complex supply chain where the data share is extremely important and transparency as well to limit food waste and have a good communication within the chain. Therefore, implementing blockchain in this supply chain will lead to several improvements, traceability, growth conditions, batch numbers and expiry dates will be available for everyone at the same place. (F.Galveza J.C.Mejutob J.Simal-Gandarac, 2018)

Table 1: Blockchain use cases (101 Blockchain, 2021).

| | |
|----------------------|---|
| Anheuser Busch InBev | Anheuser Busch InBev is one of the largest beer companies using blockchains in the supply chain. Together with BanQu, they want to increase the overall transparency of their systems. Regardless, it really follows and increases the transparency of your cassava crop chain. Therefore, it also gives strength to more than 2,000 farmers in Zambia. |
| Unilever | Unilever is also on the blockchain-using companies on the supply chain list. In reality, Unilever currently uses technology to run its tea industry. With the help of technology, they track all your transactions in the supply chain. In addition, they can track vendors to maintain quality every step of the way. |
| Walmart | Walmart has been a blockchain aficionado for a long time. In fact, the company uses IBM's supply chain technology - the Hyperledger Fabric platform to support the supply chain process. In addition, they also plan to track their food directly from their farmers and offer their customers to verify the origin before purchasing. |

2.2 Introduction of Blockcerts

There are many implementations of blockchain in the food supply chain, an application was created known as Blockcerts. Blockcerts is the application of the certification in the food industry. Indeed, it is a system that can be used by all parts of the supply chain where you can find all certifications files. The principle is to upload some records, academics certificate and every file concerning certification in an app and where you can share that information with all the stakeholders. And Blockcerts is secure thanks to the

blockchain technology that protects your data and allow everyone part to comment and give feedbacks on the different element that is posted. (Blockcert, 2020)

3. Literature review

3.1 Organic certifications in The Netherlands

The organic food production has become a trend in the last few year in most of the west European countries. This one has been mainly pulled by consumers who consciously get informed about their food source and the advantages that represents to eat organic for the human body, nonetheless, the financial viability of organic food farms have been impulse and subsidized by the western European governments as is stated by (Bostan, Onofrei, & Florentina, 2019) without this support, starting and organic farm would be close to unfeasible due to the whole process that the farm needs to go through. To develop into a functional organic farm there are several requirements such as 2 years of soil management/enrichment, new machines and equipment, proper seeds, adequate certifications, storage facilities without even mentioning the pursuit of new clients (USDA Foreign Agricultural Service, 2018) however, a hard and dedicated work it does reward with better profits and this is one of the main driver for farmers to go organic, beside ideological reasons.

An organic farm needs to have the appropriate certifications to be a trustable supplier for wholesalers, supermarkets, or end consumers. The Dutch laws and regulations for the organic production of food products, animal foods, plants, and flower bulbs are the followings:

- **European organic regulation**

The European organic legislation is focused on having a limited environmental impact due to organic farming is an agricultural method which its main objective is producing food with natural substances and processes (European Commission, 2020), the responsible use of energy and natural resources, the maintenance of biodiversity, preservation of regional ecological balances, enhances of soil fertility and maintenance of water quality are essential the aim of lessening environmental impact from the European commission.

It is also being mentioned that there are several strict systems of control and enforcement to guarantee the organic regulations aiming that in this way the consumers will trust at the time of buying any organic product around all the European Union.

Among the several articles of the European organic regulation there are quite some topics which call in attention such as the prohibition on the use of GMOs and the use of ionizing



Figure 1: Logo of the EU produced organic products.

radiation. Moreover, there are articles dedicated for each agriculture field including one for the starter farmers, also, a criterion for the authorization of certain products and substances, criteria for labeling and emphasis in the control systems, among others. (Council regulation (EC) No 834/2007, 2020)

Dutch Agricultural Quality Act

Is the Dutch entity (government) who oversees implementing the EU regulations in The Netherlands. The quality act can be found as Landbouwkwaliteitswet, the law is available in Dutch online (Landbouwkwaliteitswet, 2019)

The regulations of Skal Biocontrol

Is another Dutch entity with its own rules for organic certification. Mostly, this entity in charge of performing supervisions and is the one who provides the certificates to the farms or companies. Skal has the power of issuing the certificates but also to either suspend and withdrawal it which it can lead to a ban (depending on the severity of the default) within several Dutch and European entities.

The following documents explain how it is the law applied and what does imply its rules (Skal Biocontrole, 2020)

- Skal Regulations for Certification and Supervision (R11)
- Skal Certification Principles for Organic Production in the Netherlands (R21)
- Skal Standards (R22)
- Skal Subscription Regulation (R13)
- Skal Rate Sheet 2020 (R16)
- Skal Objection Regulation (R17)
- Skal Disciplinary Regulation (R13)
- Disciplinary Powers Decree for Agricultural Quality.
- Skal Sanction Regulations (R14)
- Skal Appeals Regulation (R18)
- Articles of the Skal Foundation (R01)
- Skal Exemptions for Organic Production in the Netherlands (R23)
- Skal Regulation for reimbursement requests under the Government Information (Public Access) Act (R25)

3.2 Blockchain and blockcerts

In the previews chapter, a definition of blockchain was given along with an explanation of how this one works within a supply chain, moreover a small introduction to blockcerts was provided. At this point of the project, the aim is to combine these two concepts to find out how they work together and how would it be valuable within the organic food supply chain.

The main idea of blockcerts is that the recipient does not need to require a third-party intermediary to verify and validate a certification (Osman & Omar, 2019). For example, in the Massachusetts Institute of Technology (where blockcerts was created) they use this system to share their student's certificate with the student a prospect employer.

One of the advantages of using blockcerts is that it is not only help full to get certificates but also to create them and then after, managing the full process (Prado & Henriques, 2020) which would include the following steps:

1. Key pair generation
2. On-block cert generation
3. On-block cert query
4. Certificate revocation
5. Message signing
6. Message signature confirmation.

The on-block certificate is a transaction from the certification authorities address to the user's address which include user's information in the data field as well as other information according to (Prado & Henriques, 2020), due to this structure, the signature and the public key can be omitted from the data of the transaction.

3.3 Blockchain analysis tools in Blockcerts

Blockcerts is an open standard for building apps that issue and verify blockchain-based official records (Decentralized-ID, 2020), in order to use this application, several tools can be employed for verifying the certifications properly.

The blockcerts page gives two available options, the verifying system could be either directly used cloning the blockcerts-verifiers repo or if it is desired to have an own system as blockcerts tooling for verification this one can be developed through the cert-verifier-js project (Blockcerts, 2020). The possibility with these tools is that they are provided under an MIT free and open-source software which it means that is free for everyone to create their own applications for verifying certificates (Smolenski, 2018).

In summary, these are the tools available at the blockcerts org page (Blockcerts, 2020) which can help developers to use it for their own company or just for developing more open systems that any company could make use of:

- cert-schema: The schemas and specifications for Blockcerts. Includes a python library for verifying schema & JSON-LD.
- cert-tools: Python library for creating customizable Blockcerts for a list of recipients.
- cert-issuer: Python library for issuing Blockcerts onto the Bitcoin or Ethereum blockchain.
- cert-verifier-js: Javascript library for Blockcerts verification that can be used in a Node.js app or a browser.
- blockcerts-verifier: A standalone universal viewer & verifier for Blockcerts credentials.
- wallet-ios: iOS wallet for adding Blockcerts issuers, maintaining keys, and holding Blockcerts.
- wallet-android: Android wallet for adding Blockcerts issuers, maintaining keys, and holding Blockcerts.

4. Supply chain overview

4.1 Overview of the shared information in the supply chain

The figure below represents the different members who shares information in the supply chain.

At the center of the supply chain there is Lamb Weston which have special requirements to select the farmers. Indeed, the farmers need to be in the food safety program which is audit by Isacert. (lab, 2020) Then Isacert send by mail a list of the different certified farmers to Lamb Weston. Lamb Weston shares limited information with is suppliers and customers, there is a kind of intranet where all the quality controls are published and those information are only for the suppliers.

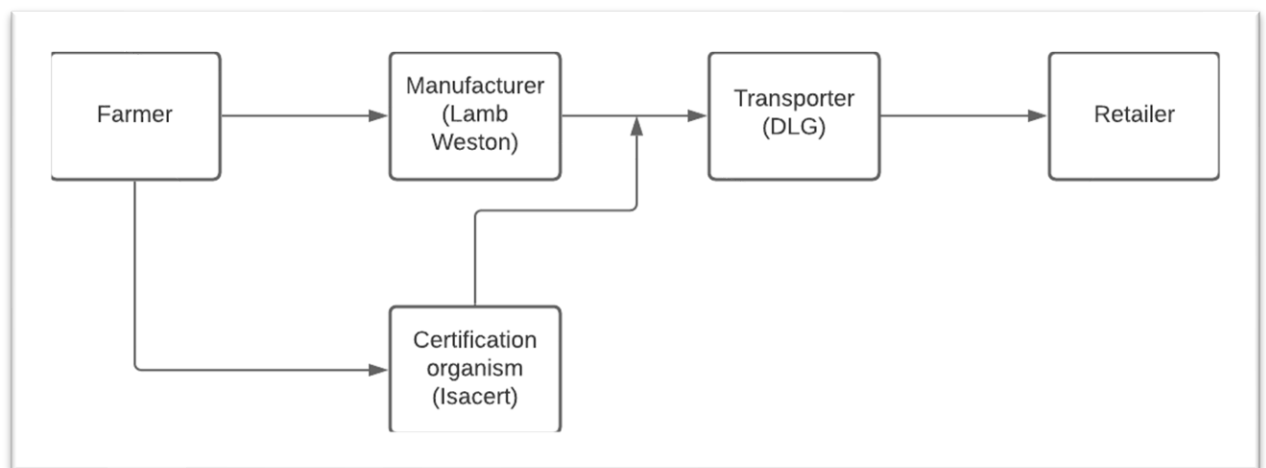


Figure 2: Supply chain

4.2 Needs from stakeholders in the supply chain.

The stakeholders all have several and different needs concerning the information within the supply chain therefore they can be defined as follow:

- Instant information concerning the certification requirements for the farmers.
- Develop transparency between all the suppliers.
- Share all the different quality test more easily and faster.
- Inform the customers on the certification provided.
- Submit more information on the traceability of the products.

4.3 Solutions to improve stakeholders needs.

There are two main solutions to improve those needs. Both solutions are implementation of blockchain technology.

The first solution is to implement blockchain to share all the information between the stakeholders and which will lead to more transparency within the suppliers and the customers. In fact, Blockchain allows the customers to track and trace their products and all stakeholders are able to share all possible information.

The second solution is the implementation of Blockcerts an application which allows the users to share and watch all information about certification. Indeed, the certification organism will be able to provide all the requirements needed for the certification. Then it is very useful to the farmers to meet all requirements on the good delay.

4.4 Highlight all stakeholders in the supply chain:

The most important stakeholders of the supply chain would be first, **the seed provider**, because this one need to certify that the seeds are organic, that means that would be the first paper procedure implied for the product. Then after, the responsibility would fall in hands of the farmer, **the producer**, this one needs to take care that every procedure complies with the organic regulations for their products, at the same time they need to be on time with the renovation of their certificates.

The next important stakeholder would be **the distributor or wholesaler**, this one would ask for the organic certifications before buying any product from the farmer, and last but not least **the consumers**, these ones need to be able to see the organic logo in the products they have interest to buy and with a set up blockcerts for the supply chain the consumer should be able to check the organic certifications trough a QR-code with their phones.

4.5 Supply chain mapping

In figure number 3, it can be seen a small overview of the most important procedures throughout the supply chain represented with a flowchart. The model finish at the distributor because until now, the organic certifications are mainly just shared through the string shown.

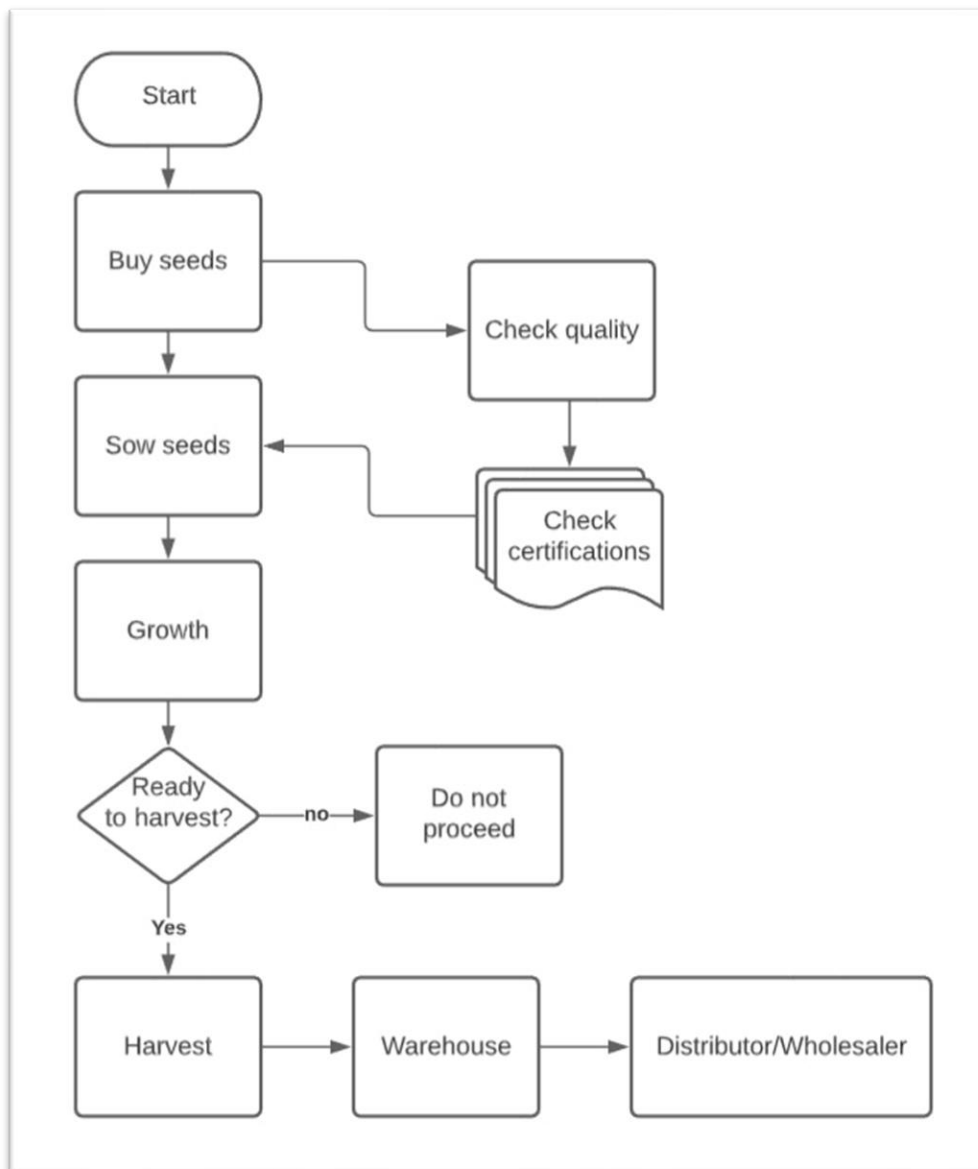


Figure 3: Supply chain mapping

4.6 Collected information from stakeholder.

The research presented in this project has been carried out on a Dronten farm called Eems-Hoeve. The farm is purely organic, and they produce a variety of vegetables including beetroot, sprouts, chicory, peas, parsnip, Spinach, shallots, pumpkins, leek. The objective of the interview is to find out whether they are familiar with the blockcerts concept and if they are willing to use it, besides discussing how are they currently sharing the information.

Interview to Eems-Hoeve owner:

1. How is information shared in your company?

“The information is mainly sent by regular email, every time they ask me for a certification, I sit down in the computer and attach the certificate in PDF format required by the buyer.”

2. Is the information quickly shared?

“It takes me some time to find the appropriate documents whenever they request it, but that is the long part of it, then after I just redact an email and send it.”

3. Do you know a faster way to share the certifications?

“So far I do not”

4. Do you know what Blockcerts is?

“No, I do not have any knowledge about it.”

After explaining to the owner, a small definition of what Blockcerts is and how this one is a free available App

5. Would you be willing to use it?

“Well, maybe, if it is secure and faster I would, but certainly I would need to have more knowledge of it, since until now it has worked for us to do it the other way, we will need to see if it is worth it.”

After speaking with the owner of Eems-Hoeve it has been found that their main issue so far with sharing the information is the repetitive action of sending the same documents to different wholesalers. This is a problem that could be solved with Blockcerts, yet the question of it is going to be worth it to change the whole system of sending documents remains unsolved without putting this information on practice.

5. Project planning

Table 1 contains the project planning for the following steps to be taken regarding this research. Includes the interviews to be done with the farm owners. Also, it contains a settled date to make the Ishikawa diagrams to analyze the problems and another date to show the results of every interviewed company. Moreover, it would be analyzed the feasibility of blockcerts for organic certifications and there would be some recommendations given.

Table 2: Project planning for Blockcerts project

| Activity | Description | Date |
|----------|--|------------|
| 1 | Prepare the interview questions | 02-12-2020 |
| 2 | Do the interview in Dronten, The Netherlands | 08-12-2020 |
| 3 | Do the interview in Tain l'hermitage, France | 28-12-2020 |
| 4 | Analyze interview results by focusing on the problem (Ishikawa diagrams) | 05-01-2021 |

| | | |
|----------|--|------------|
| 5 | Make a description of the results | 08-01-2021 |
| 6 | Analyze the feasibility of Blockcerts in the production (TELOS) and MoSCow | 13-02-2021 |
| 7 | Conclusion and recommendations | 20-01-2021 |

6. Research Methodology

The research method used for this report is the interview. According to (Boyce & Neale, 2006) the interview method is a “qualitative research techniques that involves intensive and individual interviews with a small number of responders” the aim of the interview is to explore their perspective on a particular program and situation.

This was the method that best fitted with the aim of this report, being the main idea to analyze whether is possible to adapt blockcerts as an organic certification tool that can be used by farmers. The best way to achieve this was to find a farm owner who could give us insight on their point of view about this technology and how would be if this one becomes a helpful tool for them in the near future.

✓ Application of Method

Two farmers were interviewed for this research, the first one owner of an organic farm in Dronten, The Netherlands called Eems-Hoeve. The farm is purely organic, and they produce a variety of vegetables including beetroot, sprouts, chicory, peas, parsnip, Spinach, shallots, pumpkins, leek. The second farm is in France and Yann Chave a burgundy organic wine producer was the interviewed.

The questions prepared for the interview are the followings.

Interview questions

1. What are the main issues that you had face, or you are facing to become organic certified?
2. Which type of information would you be willing to share from your company? For example: certifications, production batch, crops, lab results...
3. How do you think the App can be useful to your farm? Do you see any advantage when using it?
4. If there was anything to be changed regarding organic certifications, what would that be for you?
5. Would you be ready to change your way of being certified and sharing your information?
6. Do you think blockchain would help you to save some costs, time-management speaking?

7. Do you feel comfortable using new software technologies?
8. How much time do you think you will need to adapt to this new technology?

Both extended interviews are to be found in appendix 1.1 and 1.2.

✓ **Modelling Results**

In the following table a small summary will be shown of every answer provided by the farmers including key words to facilitate the interpretation of the interview and the analysis of the pros and cons of blockcerts regarding organic certifications.

Table 3: Description of the answers provided by the interviewed farmers.

| N. | Question | Farmer in The Netherlands | Farmer in France |
|----|---|--|---|
| 1 | What are the main issues that you had face, or you are facing to become organic certified? | A lot of paperwork and long procedure | No main issues in general |
| 2 | Which type of information would you be willing to share from your company? For example: certifications, production batch, crops, lab results... | All certifications (organic included) | Description and cultivation of the wine |
| 3 | How do you think the App can be useful to your farm? Do you see any advantage when using it? | Faster information flow | Communication and transparency with customers |
| 4 | If there was anything to be changed regarding organic certifications, what would that be for you? | Too much printed papers, they want all digital | To put in label “organic grapes” instead of “organic wine” (more realistic) |
| 5 | Would you be ready to change your way of being certified and sharing your information? | It happened already due to Covid-19, more online interaction | Hard to keep reliable results |
| 6 | Do you think blockchain would help you to save some costs, time-management speaking? | Save time | Save time when sharing info. |
| 7 | Do you feel comfortable using new software technologies? | Open to new technologies | After training yes |
| 8 | How much time do you think you will need to adapt to this new technology? | It would not take long | Quick, all workers have good skills |

✓ **Analysis of Results**

This survey is focusing on the farmer. Indeed, organic certification is a real cost for the farmer because of the conversion. Then, to understand in a best way the needs and the requirements that are needed the survey was the perfect way to do so. The analyze of the results of this survey shows that the process of being organic certified can be improved in various ways. Consequently, the amount of paperwork and files to give to the organic organism are huge and it is the main problem that face those farmers. Their needs are mainly to share the files to the certification organism. They feel quite comfortable to use a new technology if it can help them into sharing files for the certification. Moreover, the

app of blockcerts is interesting for the farmers in term of time saving because they always have to share the same information.

Here blockcerts, would be a great tool to let suppliers and customers have access to the information in relation with the certification.

Ishikawa diagram is a cause analysis tool which highlight the main causes of a problem. By defining the general parameters and finding some elements that have an impact on the problem. And by analyzing this diagram you can find some kind of solutions.

Two Ishikawa diagram have been developed to find some causes to two problems that farmer could face using blockchain technology and more specifically blockcerts. Those two diagrams focus on the farmer.

The first diagram has for subject the adaptation of blockcerts technology for farmer.

Four dimensions have been taken into consideration to find causes for this problem. The methods, the measurements, the manpower and the environment.

It shows that most of the cause are related to the new technology. Therefore, knowledge is the main word for this problem. Also, it illustrates that blockchain and Blockcerts can be a good technology in order to save time and doing saves. So, in definitive this diagram manifest that blockcerts can have good cause for the farmer.

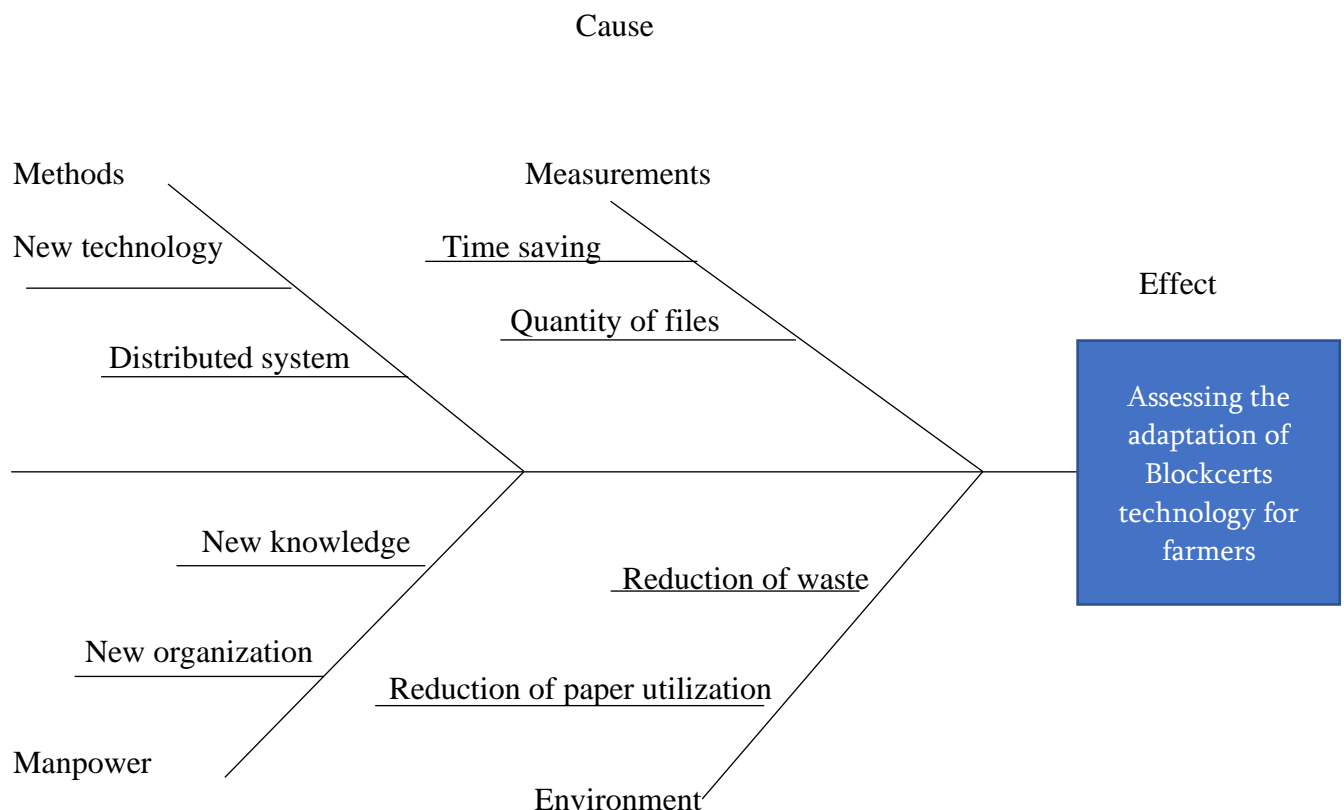


Figure 4: Ishikawa diagram for assessing the adaptation of Blockcerts technology for farmers.

The second diagram focus on the challenges of organic certifications for producers. Here the parameters for the cause are manpower, measurements, materials, and methods.

The causes that are find here shows that the farmer have to do lots of changes to become organic certified and also knowledge is very important.

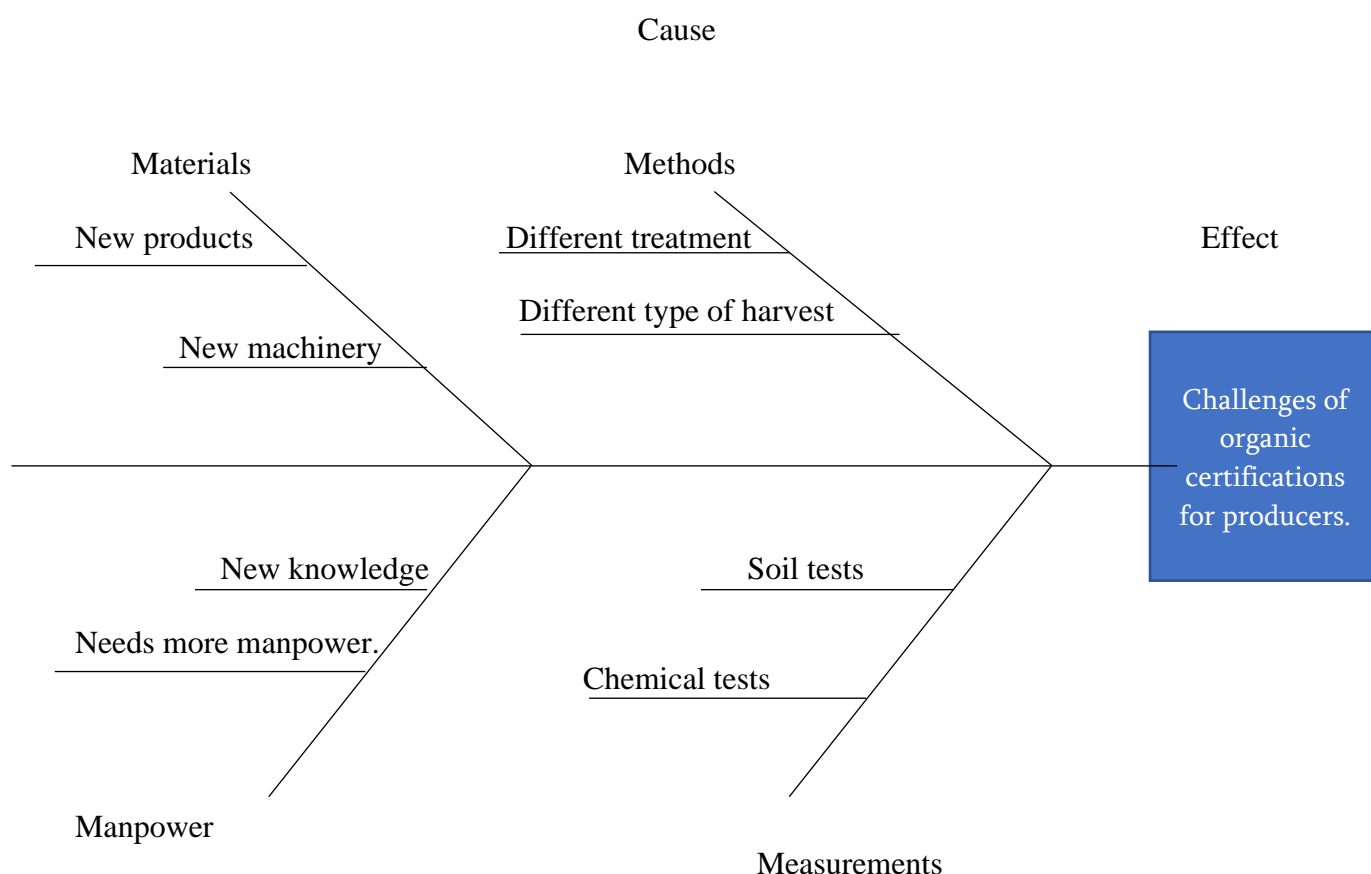


Figure 5: Ishikawa diagram for the Challenges of organic certifications for producers.

✓ Discussion of Results

Possible solutions:

- **Equal distribution of responsibility and cost within the supply chain (Participatory guarantee system)**

The participatory guarantee system are locally focused assurance systems that verify producer's compliance to certain organic standards according to (Home, 2017). This system is based on a direct relationship between the small-scale independent farmers and the consumers who met at the point of sale. This system is helpful to solve out the challenge of becoming an organic certified farmer through regular certifications authorities. Blockcerts could also adapt to system, they could work as the data base for this procedure that is a bit simpler and costs saver than the regular way.

However, The Netherlands and France are countries that has settled organic regulations that mostly farmers use by using the organic certification system. This is also a part of the reliability of the quality and the organic competitive advantage when making business so this might be counterproductive for them. Therefore, the best option would include to use the regular organic certifications but adapting these ones to the blockcerts technology, so the process becomes easier and accessible for all the parties involved.

- Feasibility of this project around producers TELOS

This project is based on introducing the new blockchain technology as a tool to improve the task of being organic certified. It has been founded through the results of the interviews that farmers are open for new technologies to help them in the development of their business, either on field or (as in this case) in-office. However, it needs to be verified if there is a possibility to make this project real and for that there is going to be used the TELOS theory.

This framework consists of improving the design of a product to make it more successful according to (Hancock, 2021), its main due is to test the viability of an idea before investing time and money.

TELOS is an acronym for five different areas called Technological, Economic, Legal, Organizational and Scheduling.

Technological: The aim of blockcerts is to make certificates easily accessible for anyone, including farms, organic certificate companies, distributors and even consumers. For this speed of flow the use of technology is essential. A smartphone should be sufficient for using all the features that the service should offer (later in this report there will be discussed essential features that the app should have). The project of blockcerts has already started, it can be visited at blockcerts.org, and you can download the app from Apple store or Google play, yet this one is not completely developed but they are working on it.

Anyhow, the aim of this is to use it through a smartphone, a technology that is well known in The Netherlands as 70% have access and uses it and in France an 81% of the total populations according to (Statista, 2017). Thus, they have enough skills to make this work, of course an initial course or preparation should be offered in order to guarantee the success of this app.

Economic: Once the app is developed there is no problem expected regarding the cost of this service to be used by the farmers and certification organizations. The main idea is that this one would be accessible for anyone to facilitate the process of getting certified, it should not have any extra costs. On the other hand, it should actually save costs by cutting time invested in the long certification process and making it a smooth and quick process that besides helping people, it would also save paper.

Legal: The project is completely legal and is in fact developed to verify the reliability of legal documents. Blockcerts registers the digital records in a blockchain which is cryptographically signed, tamper-proof and shareable according to (Blockcert, 2020).

Operational: Blockcerts can be a success first with the support of the certification companies by agreeing to issue their certificates through the platform and second by the correct use of the stakeholders of the supply chain. There need to be a training available for businesspeople to be able to adapt quickly to this technology. This training should be available online as for any other interested person. It would be even more efficient if the certification companies intrude their clients to use it and facilitate the work for all the people involved.

Scheduling: The largest time gap would be presented after the app is completed and the people begins to understand the system, this process will require adaptation time and for some people will be easier to work with it than others. As it has been mentioned earlier in this report, the farmers are wide open for new technologies but the need some time to get use to it. Once this stage is finished, this might become a simple and normal procedure for everyone as is online shopping these days for example.

- Features that might need to be included in blockcerts for producers through MoSCoW method.

The MoSCow technique is often used by business analysis, software development and project management among others according to (Volkerdon, 2020). Prioritization plays a key role in project management; it means to order the activities or elements with an importance hierarchy. This is created to establish what is most essential for the project, in this case, for the software development. A list of must have, should have, could have and will not have is going to be introduced in the following paragraph.

Must have:

-Must have a good scanner where you could easily take the photo of a document and this will show the information in it with a high-quality (Such as a camScanner app but that it would be implemented in the blockcerts app). This would facilitate the uploading of any document although ideally these documents should be digitally uploaded, but in any case, is good to have both options available.

-Must have an option to sign documents digitally. The name speaks for itself; it would be helpful to forget the need of printing documents just to sign them. This service is available in other apps but once again, it must be available in Blockcerts.

Should have:

-Should have a notification that activates whenever the farm uploads a new document, through this feature it would be possible that their customers get last minute information without the need of sending it to each one of them by separate. This was one of the features that one of the farmers specifically asked for because she is experiencing the success of this service through the Skal biocontrol alarm.

-Should have all the app display in many languages, starting by English and following with the rest of European languages (to start with). If the app is meant to facilitate the work of farmers or any other stakeholder, is essential that this one will be available in

their language so they would not have to worry about a language barrier and they would feel comfortable when using it.

Could have:

Could have small training videos available in the app to explain the essential features and how to use them. This would facilitate the learning process of this new technology for many people, and it would clarify some issues to other ones who would like to dig deeper into the services.

Will not have:

Access to internal information of the company to other companies if the first one does not permit it. Although they could save some documents in the app it should be important to have an option to share it or not, or maybe to share any document after certain date and time. This idea comes from the farmers interviewed whom would not like to share certain information of their company to everyone in general but perhaps some stakeholders of the supply chain.

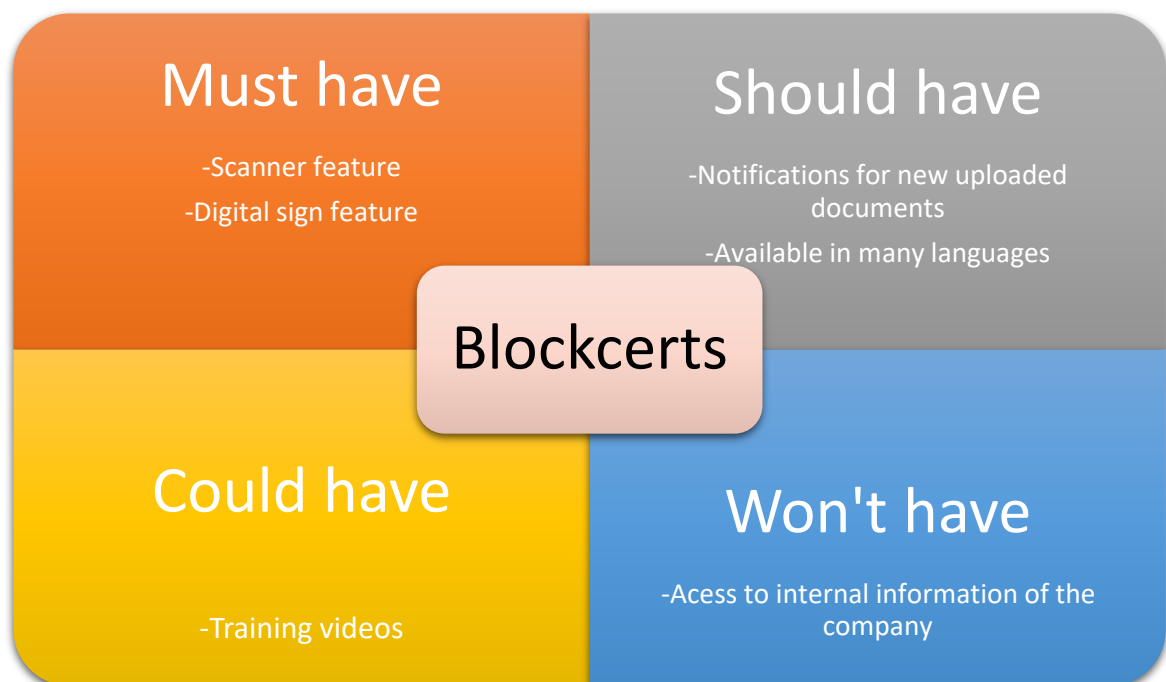


Figure 6: MoSCoW method

7. Perform a risk analysis.

The risk analysis comes to analyze the solution proposal. Indeed, every new implementation leads to some risk that is important to consider in order to keep a company profitable. Then, the implementation of Blockcerts can bring to several risks.

The risk analysis is conducted for farmers which are organic certified or that want to become organic certified.

Blockcerts is an app to share all information about certification then the major risks that could face all users about this app are technological. Here the risks analysis is conducted.

- The loss of data can be a major risk.
- The leak of confidential information, with a bad utilization of the app.
- Too much information shared, because blockcerts is a distributed system then there is a lot of data and it can lead to some confusion.

Blockcerts is a new technology that is difficult to manage then some skills have to be developed in order to use it at 100% and then it can lead to some manpower risks.

- Train the employees to use the technology, then training cost is involved.
- Hire new employees' expert in new technologies to use the app with all its potential.

To conclude, on that risk's analysis the implementation of blockcerts causes low risks. The most probable and important of those risks are the technological risks that focuses on the utilization of the app and the data shared.

Conclusion and Recommendations

Blockcerts is a platform designed for the enabling and acceleration of sharing information between entities. The system is created to create and verify certifications, either for companies such a quality certification or for people such as diplomas. The aim of this report was to see the possibility of adapting blockcerts as an application to help farms to get their organic certificates is an easier, faster, and efficient way.

According to the research conducted in this report, there are several issues presented among the organic farms. Most of these related to the excessive procedures and paperwork to be in line with all regulations of the required certifications in order to become an organic farm.

Blockcerts is a problem solution that can be implemented in either PGS or organic certification organizations. This is a software that can adapt according to the necessities of the farmer. The main idea is that this system can be able to share the information that the company would like to reveal to different stakeholders of their supply chain such as wholesalers, distributors and even consumers.

The app must have certain features that allows the farmer to use it in the easiest way possible, and that would facilitate the communication among their clients. Also, a feasibility study has been conducted where there were found many positives aspects regarding technology such as the ability of this generation to implemented in their daily life, also economic because this app is available to download for free from the app store or google play and some other encouraging qualities regarding legal, operational, and scheduling.

The farmers have many pros on using this technology but in this report, it has been also assessed the different risk they could be affected by such as the lost of important information or the leak of confidential information.

Appendixes

1.1 Interview of an organic farm in Dronten, Flevoland.

1. What are the main issues that you had face, or you are facing to become organic certified?

The change to become an organic producer takes 2 years so during that time, you remain pending, selling your products at a conventional price. This price remains the same for these 2 years until the time is completed. Also, a lot of paperwork due to the trace trust procedure that buyers want to develop.

“Also, we need to keep records of the manure and compost. When we deliver something, everything must have a label on it and a sheet for each type of product. They also check the invoice, they need to see whether you are attaching to the rule of selling the products with a conventional price until you have completed the exact 2 years, from date to date, if you start on March 20, 2020 (the process of becoming organic) you can sell your products as organic after March 20, 2022”.

The seeds need to be organic as well, they all come with a document, we save these, and they check them. They need to see all the papers, they all need to be there available, you cannot miss one. You should also have the seed invoice.

2. Which type of information would you be willing to share from your company? For example: certifications, production batch, crops, lab results...

Not too much really, they do not want to share how the parcels are divided or for what are being used but they would like to share all the certifications, not just the ones for organic products, but all the ones that the company has.

3. How do you think the App can be useful to your farm? Do you see any advantage when using it?

They see that it would be way faster, because is someone ask if they can have a certificate they need to go through the computer, look for it and send it, and usually the person asking for the certification want them quickly, but in this way the certificates could be send or would be immediately available for the customer.

4. If there was anything to be changed regarding organic certifications, what would that be for you?

They manifest having way too many papers, but they would like to have a digital program or platform where they could make photos and save these, so they do not need to scan every document every time a new one comes in.

From Skal BioControle, the buyers get a notification whenever the farmers get a new certification which is a nice system and they like this, but that is just for the organic certification. They would like to have the same notifications for other certifications such as Global gap, and GRASP. Which are not specifically for organic products but just for the company in general.

5. Would you be ready to change your way of being certified and sharing your information?

Due to Corona that happened this year, they had to send all documents digitally, when normally someone comes to see them and check them. They did come later unexpectedly during the summer to take some samples of red beet leaves.

They emphasize that they are willing to share all certifications but nothing else from the business information.

6. Do you think blockchain would help you to save some costs, time-management speaking?

“it would save us a lot of time, costs-wise not much, but well... some people say time is money.”

7. Do you feel comfortable using a new software technology?

They are open to new technology, they use new technologies every year, usually for the development and efficiency in the production of their crops, but they would be definitely open to a new software.

8. How much time do you think you will need to adapt to this new technology?

Depends on how easy or difficult. They are well adapted to new technologies so it would not take too long.

Certifications they use for their farm.

Control union Skal biocontrol,

Global gap

Grasp

1.2 Interview of Yann Chave a burgundy organic wine producer

1. What are the main issues that you had face, or you are facing to become organic certified?

No issues only an apprehension on the technical control because of the use of organic products.

No problems with the conversion.

2. Which type of information would you be willing to share from your company? For example: certifications, production batch, crops, lab results...

The description of the products used and the cultivation practice.

3. How do you think the App can be useful to your farm? Do you see any advantage when using it?

Useful to communicate with the customers and more transparency.

4. If there was anything to be changed regarding organic certifications, what would that be for you?

To come back to the certification on the grapes. Because now is the wine that is organic certified, but it is possible to add some chemical inputs. So, the term organic wine is too generic and it is more real to say that is the grapes that are organic.

5. Would you be ready to change your way of being certified and sharing your information?

Not an easy question, but to simplify the way to realize all the different controls, but it is hard in order to keep serious and reliable results.

More update on the products that are certified or not because at this moment the updates are not frequent enough. So, more transparency on the certification of the products.

6. Do you think blockchain would help you to save some costs, time-management speaking?

It can be good to save time because the information that the winegrower must share is always the same. So, it can be interesting if this information can be available at any time.

7. Do you feel comfortable using new software technologies?

Yes, after a training on using new software technologies.

8. How much time do you think you will need to adapt to this new technology?

Quite quick thanks to the skills of all the workers.

Bibliography

- 101 Blockchain. (2021). Retrieved from <https://101blockchains.com/companies-using-blockchain-technology/>
- Blockcert. (2020). <https://www.blockcerts.org/about.html>.
- Blockcerts. (2020). Retrieved from <https://www.blockcerts.org/guide/quick-start.html>
- Bostan, I., Onofrei, M., & Florentina, A. (2019). Retrieved from file:///C:/Users/Mafer/Downloads/foods-08-00144.pdf
- Boyce, C., & Neale, P. (2006). *Conducting in-depth Interviews: A Guide for Designing and Conducting In-Depth Interviews*. Pathfinder International Tool Series.
- Council regulation (EC) No 834/2007. (2020). *on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91*. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32007R0834>
- Decentralized-ID. (2020). Retrieved from <https://decentralized-id.com/web-standards/blockcerts/>
- European Commission. (2020). *Organics at a glance*. Retrieved from https://ec.europa.eu/info/food-farming-fisheries/farming/organic-farming/organics-glance_en
- F.Galveza J.C.Mejutob J.Simal-Gandarac, s. (2018). <https://www.sciencedirect.com/science/article/abs/pii/S0165993618301304?via%3Dihub>.
- Hancock, J. (2021). Retrieved from <https://www.mindtools.com/pages/article/telos.htm>
- Home, R. (2017). Participatory guarantee systems: organic certification to empower farmers and strengthen communities. *Agroecology and Sustainable Food Systems*.
- lab, H. W. (2020).
- Landbouwkwaliteitswet. (2019). Retrieved from Landbouwkwaliteitswet
- Leng K, B. Y. (2018). <https://www.sciencedirect.com/science/article/abs/pii/S0167739X18304527?via%3Dihub>.
- Mearian, L. (2019). Retrieved from <https://www.computerworld.com/article/3191077/what-is-blockchain-the-complete-guide.html>
- Osman, G., & Omar, S. (2019). *BLOCKCHAIN BASED FRAMEWORK FOR EDUCATIONAL CERTIFICATES VERIFICATION*. Retrieved from <http://www.jcreview.com/fulltext/197-1583403182.pdf>
- Prado, N., & Henriques, M. (2020). Retrieved from On Block certs: blockchain-based lightweight digital certificates: https://sol.sbc.org.br/index.php/sbseg_estendido/article/view/4154/4083
- Skal Biocontrole. (2020). Retrieved from <https://www.skal.nl/en/wetgeving>
- Smolenski, N. (2018). Retrieved from <https://medium.com/learning-machine-blog/top-10-reasons-to-use-blockcerts-ec7d29f2712c>
- Statista. (2017). Retrieved from <https://www.statista.com/statistics/794400/smartphone-adoption-europe/>
- USDA Foreign Agricultural Service. (2018). Retrieved from https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=The%20Organic%20Market%20in%20the%20Netherlands_The%20Hague_Netherlands_2-20-2018.pdf
- Volkerdon. (2020). Retrieved from <https://www.volkerdon.com/pages/moscow-prioritisation>