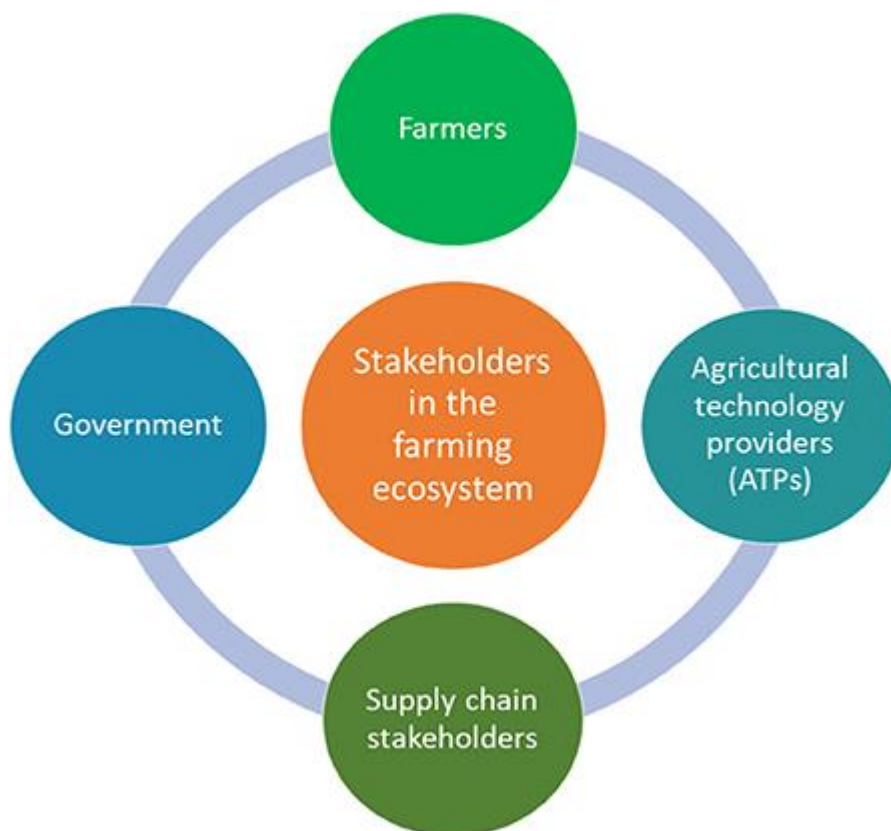


SOCIAL OR BUSINESS IMPACT

Abstract:

- ❖ Blockchain technology is a disruptive technology that changes business and supply chain models.
- ❖ Using distributed software architecture and advanced computing, blockchain can change the way information is exchanged between actors in the chain.
- ❖ Blockchain technology provides a platform for solving the problem of tracking product information in supply chain management.
- ❖ Accordingly, the present study aims to provide a model for evaluating the maturity of blockchain technology in the agricultural supply chain.



- ❖ The present research is applied that has been done in three stages. In the first phase, the dimensions of the blockchain are ranked by agricultural experts using the SWARA method.
- ❖ The research experts are 13 faculty members of the department of agriculture active in the field of technology application.
- ❖ In the second phase, a model is designed to evaluate blockchain maturity using each dimension of blockchain technology and maturity dimensions.
- ❖ In the third phase, the proposed model is tested using data collected by a questionnaire in the supply chain of a company active in the agriculture sector.
- ❖ The research findings show that smart contracts, Internet of Things (IoT), and transaction records are of the highest importance among the blockchain dimensions.
- ❖ Also, the supply chain under study is in a good condition in digital documents.
- ❖ Theoretically, the originality aspect of the research is that it determines the importance of blockchain dimensions in the field of agriculture and from an applied point of view, it introduces the maturity model of blockchain in supply chain management.

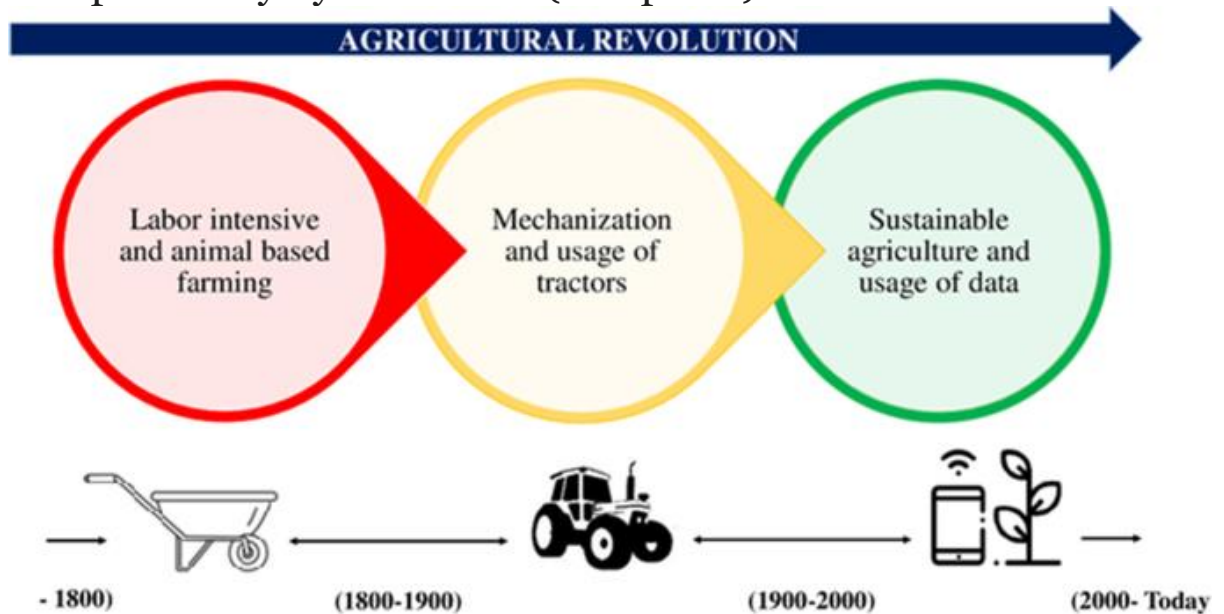
Keywords:

BlockchainAgricultural supply chainMaturity modelSWARA.

Blockchain:

- ❖ The blockchain was first introduced as a platform for the digital currency of Bitcoin.
- ❖ The Bitcoin network is also the largest and oldest blockchain network in the world.
- ❖ Today, blockchain technology is not only a platform for cryptocurrencies, but also has many applications and advantages .
- ❖ The blockchain technology is based on the distributed ledger.

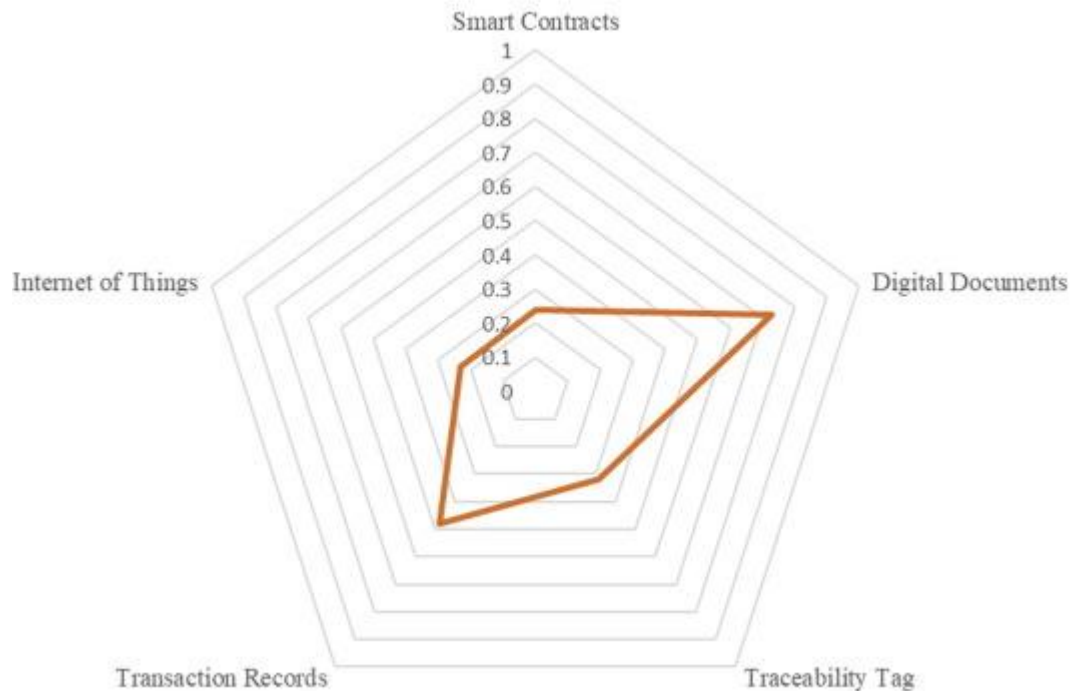
- ❖ A distributed ledger is a database that is updated independently by each participant (or node) on a large network .
- ❖ The distributed database indicates its publicity; In this case, the files are not transferred to different nodes by a central authority, but are created and maintained independently by each node (computer).



- ❖ However, blockchain can maintain security as each transaction is verified by using public–private-key cryptography, and the transaction records on the blocks cannot be modified once they are accepted as parts of the table chain because they are attached to each other .
- ❖ The blockchain technology has played a significant role in a variety of business and social interactions due to transparency, security, and performance improvement.

Materials and methods:

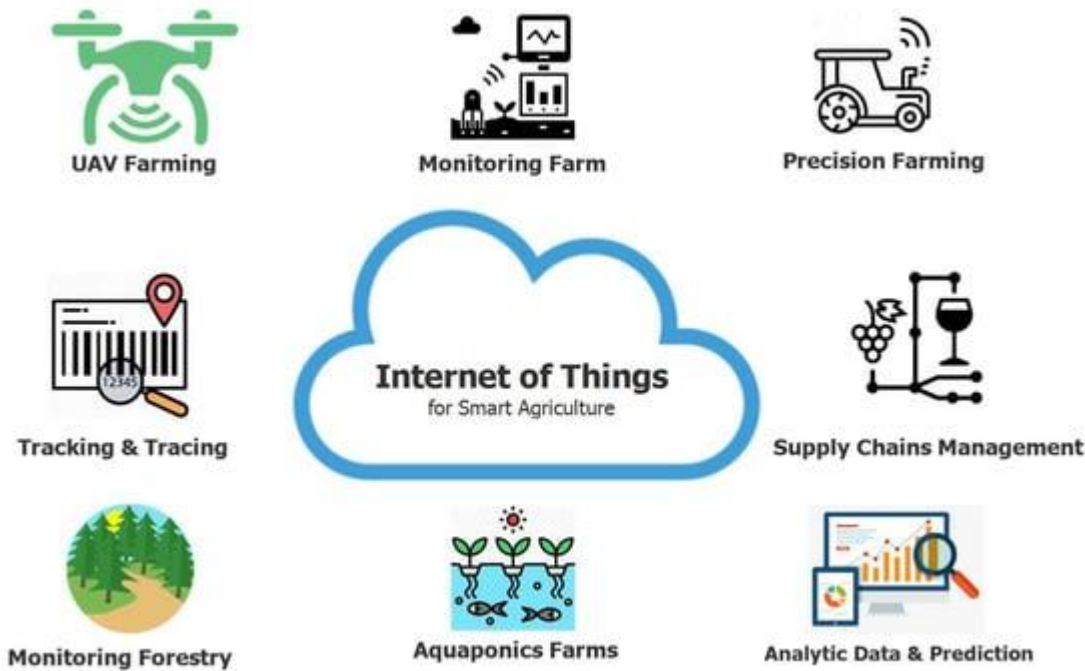
- ❖ This research is applied. Blockchain has different uses in the agricultural industry.



- ❖ Therefore, in the first phase, the dimensions of blockchain technology were ranked based on their application in the agricultural supply chain.
- ❖ The SWARA method was used to examine the opinion of experts to rank the five dimensions of the blockchain in accordance with Kshetri's study.
- ❖ The SWARA method is presented by Keršulienė et al and enables the decision maker to select, weight, and evaluate indicators.
- ❖ The most important advantage of the SWARA method is the evaluation of experts' attention to weighing indicators and expert consultation .
- ❖ The committee of research experts included 13 faculty members from the Schools of Agriculture and food sciences who had a background in smart agricultural research and new technologies.
- ❖ A virtual group was formed to form a panel of experts so that people could express their ideas and opinions.

Results and discussion:

- ❖ The five uses of blockchain were ranked based on expert opinions to identify the importance of each in the agricultural supply chain.
- ❖ The results of the ranking coefficients using the SWARA method are shown in [Table 4](#).



- ❖ Based on the results of [Table 4](#), it is clear that smart contracts, IoT, and transaction records are the most important among the applications of blockchain in the agricultural industry.
- ❖ Table 4. Final results of SWARA method in weighting blockchain dimensions.
- ❖ To design a blockchain maturity assessment model based on Formula , the degree of adoption of each blockchain dimension is calculated.
- ❖ This formula is calculated based on the sum of the values of each dimension.

Conclusion:

- ❖ The use of blockchain technology in the Agri-food supply chain allows stakeholders and consumers access reliable information.
- ❖ Blockchain technology also increases the ability to track goods and reduces the need for a third party to monitor the network and control information.
- ❖ Among the various applications of blockchain, smart contract (0.263), IoT (0.225), transaction records (0.197), traceability tag (0.170), and digital documents (0.145) were the most important elements in the agricultural supply chain in order of priority.



- ❖ Therefore, the use of blockchain technology plays an important role in clarifying contracts between farmers, landowners, manufacturing companies, vendors and government agencies.
- ❖ The use of IoT technology under blockchain technology also provides reliable data on product tracking.
- ❖ The use of digital currencies in the blockchain platform is also a good way to finance the supply chain.

- ❖ The proposed model of this research is a suitable tool for evaluating the maturity level of blockchain, by which an organization can evaluate its progress in using this technology and using its capabilities.
- ❖ Using the blockchain maturity model, individuals and organizations involved in the Agri-food supply chain, such as farmers, gardeners, producers, distributors and sellers of food products, can assess their readiness to adopt and implement blockchain technology.
- ❖ Using the results of the maturity level determination model, managers in each department can plan for the development of blockchain technology adoption so that they can achieve a higher level.