



The Problems of The Barter System in Turkey and The Solutions with Blockchain Technology

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Abstract: Problems arising from the intermediary role of fiat money and confirmation mechanisms in the exchange of goods and services and the crises in the fiat money-based financial system have led to the search for alternatives. It has revealed the organized barter system at the end of these searches. However, the fact that there are some problems in the organized barter system in general and in Turkey prevents the system from spreading and using it effectively throughout Turkey. The age of digitalization and the newly developing blockchain technology have required a level up in the barter system. The aim of this study is to reveal how a new barter system can solve the problems, taking into account the latest developments. In this way, it is to ensure that the barter system is used more effectively and widely in Turkey. In this context, the Blockchain Barter (BB) system, which has not intermediary but is much safer confirmation mechanism and allows trading without using fiat money, is offered as a suggestion. The method of the study is literature review. Using the information obtained here, the BB system for problem solving was developed and demonstrated on a sample application. In addition, the relative advantages and disadvantages of fiat money, barter and BB systems were compared. As a result, it has been understood that the proposed BB system solves many problems and is quite superior to other systems. It is believed that the study will shed light on new BB system research to be developed in terms of software.

Keywords: Barter, Blockchain, Digitalization.

JEL Classifications: F13, F30, M10, M15

1. Introduction

Before the use of money, people were realizing their needs in the form of mutual goods exchange. This system, which can be called the primitive barter system, necessitated the invention and use of money due to various difficulties in practice. After the development of the use of money and the transition to the fiat money system, various problems were experienced in this system, which negatively affected the world economy and businesses. These problems have led businesses that trade in goods and services to seek various systems that will keep them away from using cash. At this stage, the primitive barter system, in which trade is made without using money, has been developed by eliminating the problems in practice as much as possible and has been widely used as an organized barter system in the world. But, in the implementation of the organized barter system, the problems arising from the limitations of the system and the legal regulations on a national basis showed themselves. For this reason, the organized barter system could not become widespread in countries such as Turkey. It is considered that with the realization of digitalization and blockchain technology, it will be a solution to the problems experienced in the barter system as in many areas. Thanks to the blockchain infrastructure, it will be possible to transform the existing barter system into a new system without intermediaries, where mutual needs can be met more quickly, less costly, does not require bureaucracy, transactions are controlled



and recorded more securely, and fiat money is used much less. It is considered that with the realization of digitalization and blockchain technology, it will be a solution to the problems experienced in the barter system as in many areas. Thanks to the blockchain infrastructure, it will be possible to transform the existing barter system into a new system without intermediaries, where mutual needs can be met more quickly, less costly, does not require bureaucracy, transactions are controlled and recorded more securely, and fiat money is used much less.

2. Fiat Money System and Problems Experienced

Fiat money is the local currency monetized by the government. It derives its value not from a physical asset such as gold or silver, but from the reputation of the issuing state (Chen, 2021). Fiat money are put into circulation with the legal regulations of the states. It is also based on the monopoly of the states to print money (Evlimoğlu, 2018). The monetary and interest policies implemented by the central banks of the states, the performance of the economy management on issues such as inflation, unemployment, growth; factors such as the fiscal policy implemented, the budget and the country's borrowing level closely affect the nominal value of money (Kızılkaya, 2010). It can be used both physically in paper and metal form and virtually in digital environment.

Fiat money has important advantages such as facilitating and accelerating trade, being easily transported with the value it represents, high liquidity, and being used as an effective tool in ensuring economic stability. In addition, fiat money also has its disadvantages. Since the money that can be put into circulation in the fiat money system is unlimited, it can cause financial bubbles in the country's economies and consequently financial crises. The mortgage crisis in the USA in 2007 had a negative impact on the whole world. The financial collapse experienced after this crisis has deeply shaken the confidence in the fiat money system (Ilgaz, 2018).

There are also some disadvantages in the banking system, which plays an important role in the fiat money system (Molina 2020):

Intermediary trade: By nature, fiat money is mediated by the central bank and commercial banks. There are mostly banks as intermediaries in the supply and use of money, and a third party enters the trade between the parties.

Transparency: The intermediary role of the banking system jeopardizes transparency. Transaction records are considered private data and only banks can store and access these records. Transaction information stored by banks is deleted after a certain period of time.

Privacy: During the transactions, many private information belonging to the customers are entered into the bank records.

Delays: Banking transactions are causing significant delays today. An international wire transfer, in particular, can take several days to complete.

Fees: Bank services are costly in many transactions.

Customer discrimination: Banks can change the level of service they provide according to their customers' status such as the amount of deposits they have in the bank, their financial and legal status, age, etc.

These problems created by the fiat money system have led to new searches in trade and payment systems. In particular, payment and shopping systems without intermediaries, whose supply is limited, have started to come to the fore. These searches have caused the current organized barter system to be reviewed.



3. The Barter System

Barter and organized barter are different concepts. In the ages before money was used; Barter is the direct exchange of goods and services of the same value between two parties without an intermediary. On the other hand, organized barter is an organization with many members and complex transactions. Organized barter is the indirect exchange of goods and services of the same or different value by many member companies within the organization of a barter company (Cakir, 2001). Some sources define organized barter as a financial exchange. In this respect, organized barter can be defined as the developed and organized version of the primitive pre-money barter system (Ozeroglu, 2014). The most important feature of barter is buying and selling goods and services without money. Barter system is a financial and trade system in which an enterprise pays for the goods or services it buys with the goods or services it produces or owns (www.globalbarter.com.tr). The word barter used in this study refers to the organized barter system.

In the barter system; Businesses that want to buy and sell goods and services without using money have the opportunity to sell their goods and services free of charge to the members of the organization by becoming a member of a barter company. They collect the receivables arising from their sales by procuring the goods and services they need from other members. In this respect, the barter system can be expressed as a common market where the goods and services sold and bought by the member enterprises without using money meet. The more members in the Barter organization, the easier it will be to find demand for the goods and services produced by the enterprises in the organization, and to obtain the type of goods and services that will meet their needs (Tandogan and Altun, 2018). Organized barter is a common market where many member buyers and sellers come face to face. This market is created by the barter company. Barter company gathers buyers and sellers within the framework of certain rules and according to certain criteria, and regulates mutual relations within the system. Barter management protects the rights of both the buyer and the seller and follows their responsibilities (www.globalbarter.com.tr).

When two barter members exchange goods and services, the selling party becomes a creditor from the system and the buyer becomes a debtor to the system. The member who is a creditor from the system is given a barter check with the value of the amount owed by the member who purchased the product. The member who receives the check uses this check to obtain a goods and service he needs from other members and collects his receivables in this way. The member who is indebted to the system, on the other hand, is obliged to pay his debt by selling goods and services to the system within a certain period of time. Barter management monitors and records all purchases in the system and ensures that the activities are carried out according to the rules.

Member companies sometimes want to enter the barter system to make a single transaction (buying or selling), and sometimes they make entries for long-term purchases and sales. The barter company opens a current account for the company that is a member of the system and follows the supplies and demands of the member company through this account. Member companies notify the barter company about their supplies and demands, and pay the member fees and commissions corresponding to their transactions. In addition, the members are obliged to fulfill the other conditions specified in the contract (Kırlioğlu, 2016). According to the information obtained, approximately 30% of the world trade is done without money, 70% of the 500 largest companies in the world use the barter system, according to the International Barter Association (IRTA) estimates. According to the report, approximately 400,000 businesses in the United States are bartering. It shows that WIR, the oldest barter company centered in Switzerland, has reached 20% of Swiss commercial activity with approximately 80,000 members (Ormita, 2018).



4. Advantages That Barter System Provides

Barter company is a guarantor intermediary for companies that are members of its system. It provides a collection guarantee for the company that sells through the system, and follows the purchasing company in fulfilling its sales responsibility to the system. Since it provides buying and selling opportunities without using money, it can help member companies with high stocks to quickly dissolve their stocks. Because companies that will buy these stocks will make payments by selling goods or services to the system, so there is a tendency to make bulk purchases within the system (Kırlıoğlu, 2016). Barter offers important solution alternatives for increasing sales, selling excess stocks, using idle capacity, providing appropriate financing, providing marketing and advertising services, avoiding crises and saving cash. In addition, it is stated that barter is an alternative system that removes the interest burden and risk from businesses, and that it is a type of trade and finance that contributes to the country's economy by relieving companies even in times of crisis (Uyan, 2013).

The following advantageous aspects of the barter system are mentioned in many sources (Erkan, 2000; Oz and Guler, 2011; Simsek, 2004; Tetik and Oren, 2018): Melting stocks, increasing sales, finding new customers and markets by activating idle capacity, free and effective advertising, increasing profitability, increasing marketing efficiency, reducing financial costs, securing collections, providing international trade opportunities, providing protection from inflation and foreign exchange price increases, paying debts by selling goods and services, collecting receivables by purchasing needed goods and services are counted as seen.

In particular, the fact that there is no obligation to pay in the short term for the goods and services purchased with barter, there is no interest payment for these debts, reduces the cost of the payment made in shopping and provides a more risk-free and comfortable payment environment for businesses (Saka, 2017). In addition, the fact that cash is not used in debt and purchase price payments significantly relieves businesses in terms of their liquidity needs.

Businesses or households have some materials that deteriorate and thrown away before they can be used within a certain period of time, and some tools that are discontinued and remain in their possession. Thanks to the barter system, before these unused materials deteriorate and the tools waiting in the warehouse will be replaced with other needed materials and tools. These assets hold a significant amount. According to a study conducted in the UK in 2017, on average, every household wastes £470 worth of food stuffs per year because they cannot consume it (Efracom, 2017). Again, in England, there are vehicles such as bicycles, books, gardening materials, which are not used and kept in storage, with an average value of 1784 pounds in every household (Molina, 2020).

It is seen that the barter system, which is stated to provide many important advantages in theory, has some problems both within itself and in its applications in our country.

5. The General Problems of Barter System and Its Problems in Turkey

The general problems experienced in the barter system can be listed as follows: Someone who wants to exchange a product (good or service) with another product has to find another person who is ready to give a product he needs and who wants to buy the product he offers. For this, a situation which is called "double coincidence" in the literature is essential to take place. Naturally, this will be a waste of time and effort, sometimes even requiring the help of third parties (www.mintdice.medium.com). For example, an accommodation facility that wants to sell its rooms needs renovation work. For this, it is necessary to find a renovation firm that wants to spend a holiday in the accommodation facility. Barter organizations undoubtedly facilitate this task by trying to match buyers and sellers among members. However, as it can be seen, the paid assistance of a third party such as the barter firm is received, and



the products subject to double coincidence are limited to the products of the member firms in the barter organization. In other words, it will be difficult to find the products needed in the required quantity and on time, or it may not be available at all.

The absence of a unit to determine whether the values are equal to each other among the exchanged products can lead to dissatisfaction between the parties. In addition, due to the absence of a common medium of exchange (money) in shopping, the inability to divide products is also an important problem. For example, a phone might equal the cost of 12 pairs of shoes. However, a person who only wants to buy 2 pairs of shoes and buy a phone worth it will not be able to divide the phone into smaller parts (www.mintdice.medium.com). In a system where money is used, individuals or businesses save or invest some of their monetary earnings for their future needs. However, since there is no monetary gain in the barter system, a wide variety of goods will have to be stored to be exchanged for future needs (www.doubtnut.com). Because when a product is to be purchased by exchange, it will be difficult to decide which goods should be stored since it cannot be known in advance which goods the other party will need. Therefore, it will be necessary to store large quantities of various goods unnecessarily. Among these, there will be perishable products, and the cost of storing such a variety of products will be quite high.

Since there is a wide variety of products exchanged in the barter system, it will be very difficult to determine how the payment of a credit purchase or loan installments will be made. Likewise, in the barter system, it will be very difficult to get loans with goods or transfer wealth. Because the quality and value of the goods and services subject to barter may change in the future (www.mintdice.medium.com). In every barter transaction, the cost and difficulty of moving goods and services from one place to another instead of money will be considerably higher than money transfer (www.doubtnut.com).

The problems experienced in the barter system in Turkey are also related to many of the general problems mentioned above. The following are the main researches conducted with Turkish businesses on this subject.

According to Erkan (2011), the fact that member firms buy and sell goods only through the barter system of which they are members may cause some inconveniences. For example; member businesses mostly try to sell the goods that have a short shelf life or are outdated, and the buyers have to collect their receivables from the system by purchasing these goods; Disadvantages such as inability to evaluate price and quality properly, deterioration of the balance in the cash flow of the member business, deterioration of the balance of supply and demand in the system, the increase in the interdependence of the businesses in the system in shopping, the fee and commission paid by the member businesses to the barter firm to be a deterrent for the businesses, the absence of special legal regulations for barter transactions can be counted.

Although there is no legal regulation regarding barter transactions, the system in our country operates in accordance with the Turkish Commercial Code. However, for example, there is a special law regulating the barter system in the United States (Bilir, 2010). The absence of a special legal regulation regarding barter in our country, the lack of legal infrastructure, the implementation of the system according to the provisions of the current laws cause the system to be questioned and some gaps to be created (Sarak, 2019).

In his study, Uyan (2019) determined that the barter system is not well known in Turkey, the barter industry is not institutionalized, and national and international barter transactions are not widespread enough. It has been concluded that legal regulations are needed for the effective, safe and widespread implementation of barter. According to a study covering tourism business managers in Kuşadası and



barter firm managers operating close to the region, the barter system is not sufficiently recognized and applied by tourism businesses in Kusadasi. The main reason for this is based on both tourism businesses and barter firms. As a result of the study, Barter firms are insufficient and uninterested in promoting the system to tourism businesses in Kusadasi, on the other hand, it has been determined that tourism businesses in this region do not do enough research-to-research alternative financial methods such as barter (Tandogan, 2018).

In the study conducted by Sarak (2019), it was revealed that many Turkish firms that were put into practice do not know the barter system well. Barter member firms considers that barter is inefficient because products that are outdated and not in demand are sold in the system. In addition, high guarantees, dues and commissions paid in the system are other deterrent factors. When a firm that sells products in the system collects its receivables by purchasing a product, it is also an important problem that it cannot find the product it needs within the system in a short time or at all, or that it cannot get the product it wants from outside the system with a barter check. The lack of knowledge and interest of the personnel working in barter firms does not give enough confidence to the existing members and the firms that will become members.

Since this study seeks solutions to the problems in the barter system with blockchain technology, it would be appropriate to focus on the problems mentioned in the above sources. These problems seen in barter application can be grouped into the following five groups:

*Distrust of barter firm and transactions: Distrust of both barter firms because they are not sufficiently relevant and knowledgeable; and distrust in solving problems experienced in barter transactions, since there are no special laws regarding barter,

* High cost of barter transactions: High brokerage fees such as membership fees, transaction commissions and collateral.

*Market constraint created by Barter firms: Since it is not possible to purchase outside of the barter system, there is not enough product variety that will do the same job, not enough price and quality comparisons can be made, and there is no demand for the sold product in the system.

*Barter members' product purchase and payment restriction: Inability to meet the requirements on time and at the desired level, as the product cannot be purchased by paying the firms outside the system with the barter check, which gives the right to purchase to the members.

*Collection restriction of barter members: Sometimes having to buy products that are not needed in order to collect receivables in the barter system that is a member. For the required products, it is necessary to make purchases from outside the system with cash payment. Thus, unnecessary product purchase and cash loss due to barter.

Barter system in Turkey is working with difficulty in some sectors due to monopolies and hesitations about innovations. For example, according to a survey conducted in Kayseri, the reasons why businesses do not benefit from barter are as follows, in order of importance (Oz & Guler, 2011); not being needed, not having enough information, not having marketed goods in the barter sector, finding it difficult to implement for Turkey, and not being suitable for barter transactions in business volumes.

6. Blockchain Technology

Blockchain is a type of distributed database located on a network of multiple participants (Ko et al., 2016). Data are recorded in blocks sequentially. Each data also has a time record (stamp). Data blocks are limited. When a block is full, a new block is produced and added to the previous one in the form of a chain (Guyen and Sahinoz, 2018). In blockchain, data is recorded in a network and



monitored by all participants through a shared ledger (Andersen, 2016). Blockchain was invented in 2008 by a person (or a group of people) using the name Satoshi Nakamoto to provide the transfer of the cryptocurrency bitcoin and to serve the participants in such a way that their transactions can be audited through an open ledger (Wikipedia, 2020). In Nakamoto's article published in 2008; in order to establish trust between the parties, it has introduced an electronic payment system based on cryptographic evidence, which does not have a third means of validating. In this way, the two parties will be able to trade directly (without intermediaries) with confidence (Nakamoto, 2008). Later, it has been understood that blockchain can be used in all transactions that require accurate data recording and transfer. Blockchain provides fast, traceable and secure transfer of cryptocurrencies, information and digital assets (Ko et al., 2016). We can list the prominent advantages of blockchain technology as follows: Distributing the records of the transactions to all participants, transparency of the transactions, that is, all participants can see them, transactions being decentralized or without intermediaries; it does not require the confirmation of a center and has a protective structure against the change of information (Xu et al., 2019). There are two important functions called public and privatekey in the blockchain system. An account with a cryptocurrency on the blockchain is called a publickey. Whoever owns the privatekey of this account is the owner of the account (Anderson et al, 2016). A publickey can be likened to the account number of a bank account. Knowing this account number is not enough to reach the money in the account. For this, along with the account number, the account password must also be known. The password here is also privatekey. Whoever has the password or privatekey, only that person can access the money in the account. As Onal (2020) stated, in blockchain, public and privatekeys are used not only for cryptocurrency accounts, but also for an account where a digital information, data, contract or certificate is stored and also for accessing it.

In the World Economic Forum, it was stated that blockchain is about an exchange of value, that it does not need a third party to manage transactions during this exchange, and that the system aims to exchange money and other assets with each other (Weforum, 2018). From another perspective, blockchain is a database in a sense. Here, the data is recorded in blocks in time order. When a block is full, the next block can be produced and the blocks are linked to each other in a chain. When the parties in the blockchain network perform their transactions with encrypted identities, each transaction is distributed to all the user computers in the network, which are not connected to a single center. The reason why Blockchain is called distributed ledger technology is that the processing of records is not based on a single center and transactions are carried out at multiple points. In this system, hacking of data is only possible if at least 51% of all computers connected to the network are captured (51% attack) (Guyen and Sahinöz, 2018). However, the large number of computers on the network and the very difficult decryption make it near impossible to hack 51% of them, thus hacking transactions in the blockchain chain. Since a data in a block is both confirmed by all computers on the network and cannot be changed, its accuracy and reliability are very high. Pilkington (2017), states that since some CRM firms collect customer comments about businesses over the blockchain system, the accuracy, transparency and reliability of the information is high.

7. Blockchain 1.0, 2.0, 3.0 and Smart Contracts

A brief look at the phases of blockchain technology will be helpful in understanding what it can do. Blockchain 1.0 is only about virtual currencies such as bitcoin, the first and most widely used digital currency. It is also the first application of blockchain technology (Mainelliand, 2015). In this phase, many cryptocurrency applications have been produced, one of which is Bitcoin. At this stage, blockchain technology has often been used for payment systems based on cryptocurrency ecosystems (Xu et al., 2019). Blockchain 2.0 means that blockchain technology has been moved to an advanced level thanks to the ethereum transmission system. The cryptocurrency transfer feature of Blockchain 1.0 was



developed by Vitalik Buterin in 2015, thanks to the ethereum system, and started to be called blockchain 2.0. Transactions related to smart contracts, smart property, decentralized applications (Dapps), decentralized organizations (DAOs) and centralist companies (DACs) can be made on Blockchain 2.0 (Swan, 2015). The biggest contribution of Blockchain 2.0 has been the idea of using smart contracts as an alternative to traditional and decentralized brokerage and confirmation work (Xu et al., 2019). As a general definition, contracts are written agreements that involve the exchange of certain assets or values between individuals, depending on conditions between people or things. In traditional contracts, a third party confirms or arbitrates the accuracy of the transaction. In smart contracts, there is a software that enables the control of whether the transactions between the parties comply with the terms of the contract and if the conditions are met, the transaction takes place (Marabito, 2017). In this software, a set of instructions to be executed according to the specified conditions is encoded in the computer algorithm. After the preconditions in each step are met, the instruction for the next step is proceeded. The smart contract automatically continues the transaction cycle until the instructions in all steps are completed. Smart contract programs utilizing blockchain technology ensure that all transactions in the contract can be audited and recorded in an unchangeable, verifiable and secure manner by the stakeholders in the system. (Antova, 2019). Smart contracts are agreements between users on the blockchain network and are run and recorded on the Ethereum blockchain platform (Aggarwaland, 2021). In the Blockchain 3.0 phase; blockchain applications are included in monetary and non-financial areas. Applications related to fields such as government, health, science, culture and art can be given as examples (Swan, 2015). In this phase, blockchain technology is integrated with tokens. Tokens are proof of digital rights and assets, or a digitized version of physical assets and rights. Tokens are widely used thanks to the Ethereum blockchain; can serve to verify any right or ownership, including personal identification, academic diplomas, currency, documents, assets, event tickets, discount points, coupons, stocks and bonds (Xu et al., 2019). Token is also a cryptocurrency. The difference from the coin is that it does not have a blockchain of its own. While coins have their own blockchain, tokens are traded on the blockchain of any coin (Güven and Sahinoz, 2018).

8. Related Studies

There are not many studies on the subject of goods and services barter on blockchain. It is seen that Blockchain technology focused on cryptocurrency transactions in the early days, but has started to be used in a wide variety of areas to date. In this period, the issue that it could also be used in the barter system was started to be examined by researchers and a few firms.

Mintdice firm explains the advantages of bartering on the blockchain and announces that it provides barter services to its members with its own blockchain system and its own token (www.mintdice.medium.com). Srivastava (2018) has conducted a study on how to barter goods and services by converting them into crypto assets. IG firm conducted a fictional study on how blockchain technology can be used in commercial activities in 2069 (www.ig.com). Burlum (2018) compared cryptocurrency with the barter system and conducted a study aiming to reveal which system would be more advantageous to use for which type of business. Ibram (2018) describes a model in which software work can be done more systematically and consistently by making it visible to all individuals with the blockchain system. The collaborative information exchange made here is likened to the barter system. Ozturan (2020) designed a smart contract software that enables bartering on the Ethereum blockchain in his study.

9. The Future of Barter Operations: Barter (BB) System on Blockchain

Bartering goods or services using blockchain technology will eliminate the intermediation service under the control of a barter firm and the constraints, difficulties and costs it creates on member businesses. Blockchain platform is a system on which a lot of information is recorded and



all information can be seen by millions of stakeholders on the platform. For Barter, this system can be considered as a large digital marketplace that will bring together peer-to-peer traders of goods and services without intermediaries. Since it is possible to use various software and smart contracts in this digital marketplace, the difficulty of combining double coincidence or multiple coincidences will be eliminated. In addition, parties that barter in this environment will also have been freed from the centralized confirmation mechanisms in the fiat money system, which make them waste time, energy and money.

An organization that enables bartering on the blockchain will facilitate the work of its members in many ways. Such organizations are named as BlockchainBarter (BB) organization in this study. Today, the Ethereum blockchain has the infrastructure that allows its members to trade barter on the blockchain. Because the software (Solidity) on the Ethereum platform allows smart contracts to work today and various projects such as goods and services trade with it. In BB organizations, confirmation, control and registration are not carried out in a single center as in traditional barter organizations, but by all stakeholder computers on the platform. Whether the transactions are carried out under the conditions determined by the parties is controlled and carried out by smart contracts placed on the platform. BB organizations will automate the barter processes of member businesses, enabling them to focus more on their core activities and sales for which they are competent (www.mintdice.com).

It is possible to classify items that can be bartered on blockchain in four groups (Molina, 2020):

Tangible Assets: This category includes physical items such as food and beverage, construction and cleaning materials, buildings and land. Since these items are physical, they cannot be transported over electronic communication channels, only their ownership can be changed easily.

Digital Assets: In this category, there are assets that can be stored and transferred electronically. For example, files, photos, videos, e-books, cryptocurrencies and personal information electronically on the computer can be counted. There are two outstanding features of digital assets. They have a special value of their own and exist only in the digital world. The universe of digital assets is large and includes items with different properties. For example, in addition to digital assets that are identical or similar, there are also digital assets that are unique, such as works of art. In the world where activities and assets are becoming more and more digital every day, the business potential of digital assets in the barter sector is increasing.

Online Services: These are the services that allow the users to meet various needs over the internet connection. Google, gmail and facebook are examples of these services. These services actually perform barter transactions in electronic environment. In return for the various services they provide to users, they have their personal information. Personal information is valuable data sources that can be used in many analyzes at both micro and macro level. Therefore, there is a market among institutions.

Traditional Services: Traditional services that require the physical presence of the service provider are included in this category. For example, repair work by a plumber or accommodation service provided by an accommodation business.

Members participating in the BB organization must first digitize the items or products they will barter to work in the decentralized registration system on the blockchain. Thus, the ownership, value and sale of the products will be announced to all stakeholders via the blockchain. In this way, an extremely low cost advertising and marketing activity will be made real. In order to digitize products, BB organizations must have their own token. Because the tokens will be used to digitize the tangible and intangible products of the members with their economic values. The BB organization will take the assets that the members will barter as collateral and give their members tokens equal to their value. With this process, the products become digital for use in the blockchain system. Since all barter products on



the BB organization are converted to the same token type, the value measurement of the products will be easier. BB tokens can also be split into smaller values. Thus, the value imbalance experienced by the members in the mutual product exchange in the classical barter system and the difficulty of double coincidence will be eliminated. The divisibility of tokens allows an asset to be divided into small parts and sold as much as needed. For example, a high-value real estate that is put up for sale with a total value of 100,000 tokens can be sold in small pieces, such as buying a company's stock, thanks to the divisibility of the tokens. Thus, dividing high-value products into smaller pieces will ensure that each buyer's budget is addressed and increase the sales opportunity. The sale of goods and services subject to Barter will be completed when the conditions on the written smart contracts are fulfilled. In other words, the software in the relevant smart contract will ensure that the product ownership passes to the buyer member when the token transfer of the product value to the seller member takes place. All barter transactions realized in this process, will be approved and registered by all members on the platform. Smart contracts can also be converted into installment payments if the parties deem it appropriate. In addition to these, BB tokens can be carried on the network and used from anywhere in the world as they are a cryptocurrency, thus eliminating the location barrier and promoting international trade. The fact that tokens can be stored and transferred in a wallet also allows for the accumulation of wealth.

For members who want to make mutual product barter, the software that BB organizations include in blockchain systems will enable a large number of supply and demand in the organization to meet quickly and eliminate the double coincidence difficulty (Ozturan, 2020).

10. Blockchain Barter System and A Sample Application

The BB organization being more than an intermediary, in the digitalization of the products subject to barter via blockchain, in connecting with other BB organizations to further diversify the product range that can be purchased, in fulfilling the buying and selling demands faster, in the optional management of their tokens; undertakes the task of a firm that serves its members with the smart contract software it will organize. In this section, a sample application of the working system of an imaginary BB organization will be presented to better understand the BB system. The example shows how the barter request of an Accommodation Business X, which is a member of the BB organization, is evaluated and what processes the transactions go through.

The Accommodation Business X has become a member of a BB organization in order to receive renovation services in return for the sale of accommodation services. The demand of the accommodation business X in the BB system and the implementation process are shown in Figure 1. BB Tokens are used in the BB organization. The BB Token represents the ownership or right to use the goods and services sold in the BB organization. Each member in the BB organization determines the unit Token value of the goods or services to be sold here, and this information is recorded by the organization on the blockchain in the system. Thus, all products sold on the BB organization can be expressed in Tokens, and all member businesses instantly have this information and new ones. For example, while the 1-hour renovation service of Renovation Business Y from the members is: 2.5 Tokens, all-inclusive 1 overnight service of Accommodation Business X has been determined as: 20 Tokens.



Figure 1. BB Implementation Process in BB Organization: Accommodation Business X

Barter Demand	Tokenize	Smart Contract	BBarter	Balance	Pairing Again
Accommodation business X, as a member of the BB organization, declared its request to receive renovation services in return for the sale of 50 overnight stays between 1 March and 19 April.	50 overnight services were digitized by BB. Its market value is valued at 1000 Tokens and recorded in account Accommodation business X.	Provide the opposite firm with the accommodation service equal to the renovation service value matching the demand. Update balance. If there is still a balance, run the matching program again.	Y Renovation firm has agreed to receive 600 Tokens worth of accommodation services and to provide renovation services of the same value in return. The smart contract software performed the barter operation of Accommodation business X.	Accommodation business X has the right to renovation services worth 600 Tokens. The accommodation service barter demand of business X is still pending in turn for 400 Tokens which is worth of renovation services.	The smart contract ran the rematch program to meet the renovation request of business X for the remaining 400 Tokens via the BB platform.

In Figure 1, the barter demand of the Accommodation business X is to receive renovation services in exchange for 50 overnight accommodation services during the period of 1 March - 19 April, which it demands to sell. For this purpose, the business will keep only one room open for 50 days each day. Firstly, the value of 50 overnight stays determined by the business X was digitalized (tokenized) with BB Tokens and transferred to the asset account records of the Accommodation business X on the blockchain platform of the BB organization as 1000 Tokens. Then, with the smart contract software, the renovation qualifications and other conditions requested by the Accommodation business X were automated on the blockchain. Thus, the amount of barter transactions that comply with the terms of the contract will be carried out automatically. Among the firms applying for the barter request of the Accommodation business X, Renovation firm Y complies with the renovations in the contract. However, firm Y wants to receive 600 Tokens worth of accommodation services. Thereupon, the smart contract software in the BB organization recorded 600 Tokens worth of accommodation service to the account of Renovation firm Y and 600 Tokens of renovation service to the account of Accommodation business X in return. Here, Tokens digitally represent the mutually obtained service rights of both businesses. In the continuation of the transaction process, it was determined in the balance account that only 600 Tokens of the Accommodation business X renovation request were realized and the 400 Tokens renovation request was still ongoing. The smart contract software will then act to meet the ongoing renovation request of 400 Tokens as per the terms of the contract. For this, it will continue to match other potential renovation firms on the BB platform with the request of Accommodation business X using the rematch program written in the contract. The renovation request to be bartered against the accommodation service worth 400 Tokens in the BB blockchain records can also be shared with other crypto barter organizations operating on other blockchains by the software in the BB organization. Thus, thanks to the expansion of the market, the barter demand of Accommodation business X will be met much faster. The BB platform offers its members another service that is an alternative to barter. This service also allows the direct purchase of the accommodation service right in the example with other cryptocurrencies. For this process, the buyer must first purchase a cryptocurrency (e.g. Ethereum) that allows trading of BB Tokens on the Ethereum blockchain from cryptocurrency exchanges. Then,



the BB organization will be able to obtain the right of accommodation service by paying the Ethereum corresponding to 400 BB Tokens to the Accommodation business X on the platform. Accommodation business X can use the cryptocurrency from direct sales in its payments. It can save the amount in its wallet either as BB Token or cryptocurrency for investment purposes. Possible increases in demand for BB Tokens or cryptocurrencies could raise their market price, providing an investment return for Business X. In the pessimistic scenario, the opposite can also happen. Since the accommodation service means to sell the time, the shelf life of the overnight product is the overnight date. Any overnight stay that is not sold or bartered with other products after that date is a loss for the business. In the example, when the go-to-sale period (March 1 - April 19) begins, each day that cannot be sold from March 1 means that Accommodation business X loses an overnight item. During this period, he will lose 20 (1000/50) of 1000 Tokens in his account for each unsold overnight stay.

11. Results

Based on the information given in the above titles and the sample application, the relative advantages and disadvantages of BB, fiat money and barter systems are given in Table 1 below. Combining the relative advantages of these three systems in the same table reveals the difference, advantageous aspects and importance of the BB system compared to other systems more clearly.

Table 1. Relative Advantage and Disadvantage of Fiat Money, Barter and BB (BlockchainBarter) Systems

Comparison Factors	FM	B	BB	Comparison Factors	FM	B	BB
Ease of exchange of goods and services	A	D	A	Creating a cash advantage	D	A	A
Being a store of value	A	D	A	Protecting the business from financial crises	D	A	A
Transaction without intermediaries	D	D	A	Interest payment	D	A	A
Having restrictions on sales	A	D	A	Collection guarantee	D	A	A
System cost (Guarantee, commission, dues)	D	D	A	Exchange rate risk	D	A	A
Low-cost marketing and advertising opportunities	D	A	A	Creating an alternative to debt repayment	D	A	A
Being a tool of economic policy	A	D	D	Creating an alternative in collecting receivables	D	A	A
Not sharing private information with anyone	D	D	A	Keeping and storing transaction records securely	A	D	A
The user's being able to access all archive information himself	D	D	A	Being an effective legal infrastructure in the system	A	D	D
Multi-witness confirmation security	D	D	A	Redundancy of bureaucratic procedures	D	D	A
The possibility of human error and subjective behavior	D	D	A	Finding the desired product quickly	A	D	A
The probability of creating inflation	D	A	A	Transparency in transactions	D	D	A
Time required for transactions	D	D	A	Ability to benefit from the system individually	A	D	A
Effort required for transactions	D	D	A	Having a double coincidence problem	A	D	A
Possibilities for destocking	D	A	A	The problem that the products cannot be divided	A	D	A
International trade opportunities	D	A	A	Trust in the system	A	D	A
Investment opportunities	A	D	A	Difficulty paying for the product	A	D	A



Not needing money in trading	D	A	A	The problem of buying outdated and obsolete products	A	D	A
Installment payment options	A	D	A	Familiarity and widespread use of the system	A	D	D
Transferring possibilities of unique products	D	D	A	Product value measurement problem	A	D	A
Ease of sale of high value assets	D	D	A	Ability to preserve the originality of unique products	D	D	A

A: Advantage, D: Disadvantage, FM: Fiat Money, B: Barter, BB: BlockchainBarter

When the data in the table are examined, it is seen that the fiat money system has 17 advantages, the barter system has 12 and the BB system has 39 advantages. As it can be understood, the BB system offers much more advantageous opportunities compared to fiat money and barter systems. This is because the BB system combines the advantageous aspects of both the barter system and blockchain technology. According to the results obtained from the table, the fiat money system; it is more advantageous than barter and BB systems in terms of being an economic policy tool, having an effective legal infrastructure, and having a well-known and widespread use. There is no factor in which the barter system is superior to the other two systems. The fact that the barter system is not recognized and widely used, especially in Turkey, can be attributed both to the fact that barter firms do not introduce themselves well and to the insecurity arising from the absence of special laws for barter. However, the barter system provides many advantages over fiat money. These advantages are the features that the barter system presented in the previous parts of the study is superior to fiat money. The aspects where the BB system is superior to the fiat money and barter system are due to the use of both the barter system and blockchain technology. Due to the fact that all barter transactions are carried out in the digital system, with cryptographic transactions and computer software, the BB system comes up with much superior features than both fiat money and barter system. For example, that fact that the use of cash is much less, there is no intermediary in transactions, transaction costs are low, data transfer can be done quickly, anytime and anywhere, records are kept more securely with the confirmation of multiple witnesses, does not allow human error and subjective behavior, intangible and tangible products can be safely stored and transferred in the digital environment by tokenizing them, with blockchain technology, barter matches and transactions can be made much faster, without intermediaries, safely and at low cost, thus reducing marketing and advertising costs, saving and investment can be made with digitalized assets in the system, there is no exchange rate risk and interest payment costs because fiat money is not used can be counted. In addition, the decentralized nature of the blockchain system and the cryptographic information processing system will not need the legal regulations of an authority in terms of the security and good functioning of the system. Because the system management will make its own arrangements with computer programs and smart contracts in the most accurate and secure way.

This study emphasizes that barter activities will keep up with the digital age with the BB system and will have much superior features. With the increase in the use of blockchain in the world and the developments in its technology, the BB system will provide more convenience and advantages to businesses and individuals. It is believed that this study will shed light on further research that will improve the BB system in terms of technical and software.



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