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In view of a growing “transactive economy,” which enables real-time transactions among multiple market participants by connecting the economic entities at the demand and supply sides (firms and individuals), Hitachi Research Institute has been conducting studies on the transactive economy with regard to how business models and supply chains have transformed.

1. Background of the Transactive Economy

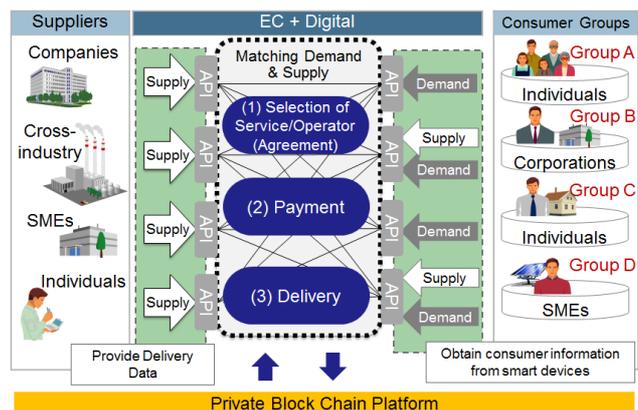
The factors that accelerate the growth of a transactive economy are technological innovation as well as system innovation including those on contracts related to the technological innovation.

With regard to technological innovation, there is more widespread use of IoT (Internet of Things) and AI (Artificial Intelligence) in EC (Electronic Commerce), which helps to enhance the sharing of demand-supply information and demand-supply matching. Providers of an EC environment, known as “platformers,” make use of smartphones and sensors to collect data on users’ demand for services, while gathering information on suppliers’ services and requirements through media such as EC sites and SNS. Such demand and supply-related information is then made visible to enable automatic matching of the services offered. AI plays an important role in this series of processes.

As for contracts, enabling digital management of processes for establishing and implementing rights such as property right contributes to advancements in the automatic coordination among contract conclusion, billing and delivery of services. By digitally managing the establishment and implementation of rights on a platform based on the terms of transaction, transactions from the conclusion of contracts to billing and delivery of services can be performed seamlessly and completed digitally.

To do so, smart contract technology is fundamental for the safe execution of contracts. A smart contract uses encryption technology to perform ledger entry electronically. By including in the smart contract the terms and conditions for executing the procedures from conclusion to billing and provision of services and linking them to the business flow, cash flow and logistics systems, it is possible to automate the processes from contract conclusion to delivery (Figure 1).

Traditionally, transactions that involve a middleperson required higher cost and more time, and the consumers and suppliers that could take part in the transactions were also limited. In comparison, a transactive economy is able to offer services that are more affordable and customized in real time among a larger number of consumers and suppliers. Such a trend is projected to grow in the infrastructure sectors including finance and energy, and there is also an increase in the number of small-volume transactions as well as the frequency and diversity of transactions.



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Figure 1: Conceptual Diagram of a Transactive Economy

2. Growth of the Transactive Economy Started in the Finance Sector

In the finance sector where FinTech is developing, there has been a rapid growth in P2P financing services for

matching money lenders and borrowers, as well as P2P payment services for matching multiple remitting parties. These services are low in cost, small in volume and high in frequency (Table 1).

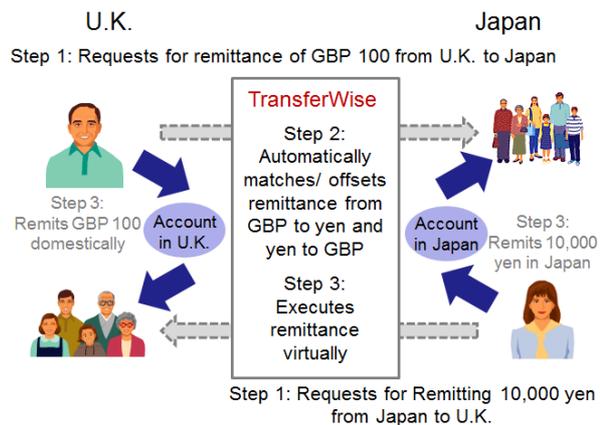
Table 1: Examples of Transactive Economy Services

	Company	Services
Financing	Lending Club	P2P financing for matching lenders and borrowers
Payment	TransferWise	International P2P remittance services for matching remitting parties
Insurance	InsurETH	P2P insurance with automatic payout of claims when an incident occurs

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In the payment services, the international remittance services used to be a costly mode of payment, but now providers offering them at a low cost are growing. TransferWise (U.K.), for example, offers their end users affordable services for remitting small amounts of money in over 40 currencies by gathering data on remittance demand from multiple users and offsetting them to eliminate the need for foreign currency transaction, which is required during international remittance. Their services are becoming more widely used, with the monthly transaction amount exceeding GBP 500 million (approximately 96 billion yen) as of May 2015 (Figure 2).

In the insurance industry, P2P insurance is on the rise particularly in Europe. This model pools money from the policyholders without going through a traditional insurance company, and uses it to pay out claims by the insured parties. In 2015, InsurETH (U.K.) released a demo P2P flight insurance scheme, which uses a smart contract to automatically process payouts in real time whenever there is a flight delay or cancelation. The automation of complex payout processes enables suppliers to perform transactions at a low cost. With such P2P insurance schemes gaining more popularity, real-time and high-frequency insurance services will become more widely used.



Note: Based on the exchange rate of GBP 1 = 100 yen.
Prepared by Hitachi Research Institute based on data from TransferWise

Figure 2: Conceptual Diagram of Services by TransferWise

3. Expansion into Energy, Logistics and Healthcare Sectors

Efforts to introduce a transactive economy have also begun in the energy sector.

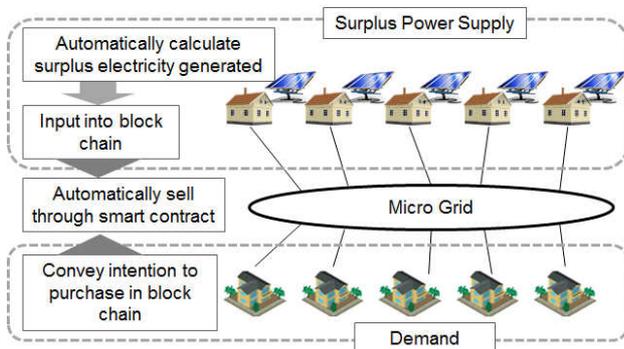
In the past, demand and supply of electric power used to be adjusted mainly through system operators such as power companies instructing suppliers to increase or decrease power output according to the demand. Now, experiments are being conducted to test the operation of transactive grids to maintain the demand-supply balance of the entire power system based on market mechanisms through direct exchange of electric power and information between consumers and suppliers.

In an experiment carried out by TransActive Grid (U.S.) on households in New York, where electric power generated by the solar panels of individual households is sold directly to other households, information on the amount of electricity in demand and the surplus electricity generated are shared and matched among the consumers and suppliers via a network. Through the utilization of smart contracts, a sales contract is automatically concluded and power is automatically supplied based on the terms and conditions determined through the matching process. The system is also designed to support an additional payment feature that enables automated payment according to the

power consumption (Figure 3).

TransActive Grid currently operates on a small scale. However, further developments in its collaboration with smart contracts are expected if the number of market participants increases following the liberalization of the retail market and the more widespread use of smart meters among consumers. Consequently, negawatt transactions and demand-response services such as ancillary services can be carried out automatically and in real time between a large number of consumers and suppliers without the need to go through an electricity retailer.

In the logistics sector, a platform has been developed that automatically matches cargo owners with logistics companies without the use of a forwarder. Meanwhile, in the healthcare sector, services to match doctors with patients are also expected to grow with remote medical care becoming more common. As with the other sectors, automated and high-frequency trading from contract conclusion to delivery of services is likely to become more widespread in these sectors.



Prepared by Hitachi Research Institute based on data from TransActive Grid website

Figure 3: Conceptual Diagram on Testing of “Transactive Grid”

4. Future Outlook

With an increasing number of market participants as a result of regulatory reforms as well as innovations in service delivery, the concept of a transactive economy is becoming more widespread in the finance, energy and other infrastructure sectors, and is expected to expand into other social and industrial services.

In order to ensure broad implementation of a transactive economy in society, it is crucial to develop ICT infrastructure that allows for exchange of information between industries and between firms as well as

high-frequency trading. Specifically, the key lies in putting smart contracts into practical use and standardizing APIs (application program interfaces).

Hitachi Research Institute will continue its research on how the trends of a transactive economy will influence business activities.