

A Transaction Cost Approach to the Effects of Network Growth on Cost and Price¹

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ABSTRACT

Modern society contains many transaction relationships that are supported by information and communication technology. Therefore, the evolution of information and communication technology extends the potential applications of transaction cost theory. This paper also contributes to the extension. This paper aims to examine the role played by information in transactions from the standpoint of transaction cost theory; as a result, this paper will describe the effects of information and communication technology on transactions in accordance with transaction cost theory and describe the simultaneous achievement of cost economizing and higher prices as an application of transaction cost theory. Using information and communication technology can help to economize transaction costs. However, it is also worthwhile to mention that rising costs of transactions become apparent simultaneously, particularly when network growth facilitates an increase in the number of new potential transaction partners. Even more important is the fact that when we attempt to return to the criteria for determining efficiency in transaction cost theory, we find the possibility of increasing the price of a good or service.

Keywords: Transaction cost, Network, Price, Information, Communication

INTRODUCTION

The purpose of this paper is to approach the role played by information in transactions from the standpoint of transaction cost theory, and thereby describe the

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effects of information and communication technology on transactions in accordance with transaction cost theory, and at the same time, describe the simultaneous achievement of cost economizing and higher prices as an application of transaction cost theory.

When making a transaction, it is necessary to gather, process and evaluate information for determining whether the transaction is possible or not, with regard to the good or service involved in the transaction, and with regard to potential transaction partners with whom the transaction will be done (Coase, 1937; Williamson, 1975). Therefore, such information is indispensable when attempting a transaction. The information is something which intervenes in the process of concluding a transaction relationship, and thus using information and communication technology in that process can help to economize transaction costs (Picot, Ripperger, & Wolff, 1996; Toyama, 2002).

The basic relationship--whereby information and communication technology contributes to economizing transaction costs--is based on changes in communication methods. With the evolution of information and communication technology, it becomes possible to select methods different from conventional communication methods, and in some cases it becomes possible to achieve communication independent of the geographical distance of the parties involved, and therefore it becomes possible to achieve communication using methods which further economize transaction costs. This also contributes to the creation of new business methods (Lucas, 2002).

Thus, with regard to the basic relationship between information and communication technology and transaction costs, active use of information and communication technology contributes to economizing transaction costs. More specifically, transaction costs can be classified into fixed transaction costs and variable transaction costs, information and communication technology has different effects on the two types of costs, and thus it is important to understand fixed transaction costs and variable transaction costs separately. A fixed transaction cost is a cost which arises independent of the transaction frequency or amount involved in a single transaction. A variable transaction cost is a cost which varies according to the transaction frequency or amount involved in a single transaction--i.e. a cost of the type which increases together with the transaction frequency or amount involved in a single transaction. Variable transaction costs which increase in this way can be understood as a function of the amount of data exchanged between the parties involved, the price for communicating that data, and the distance between the parties involved. Transaction costs described by such functions can be further economized by evolution of information and communication technology,

thereby making it possible to process large volumes of data more quickly and at a lower price. If we decide to find the factor whereby information and communication technology has different effects on fixed transaction costs and variable transaction costs, it is possible to find that factor in specificity. With regard to the basic relationship between information and communication technology and specificity, transaction costs are economized because, as specificity increases, the necessary information increases and information and communication technology provides support for mediating this information (Picot et al., 1996; Toyama, 2002; Williamson, 1986, 1996).

THE BASIC STRUCTURE OF ECONOMIZING TRANSACTION COSTS: APPROACH FROM THE STANDPOINT OF SPECIFICITY

Specificity indicates the characteristic where the productivity of a certain asset shows a marked drop when this asset is used as a substitute in another application. There are various types: physical asset specificity, human asset specificity, and site specificity. Specificity affects transaction costs. Transaction costs increase when specificity increases, and decrease when specificity decreases. A transaction where no specificity exists is simple, due to the possibility of a spot contract in the market. The fact that a transaction is possible with a spot contract means that it is easy to achieve a replacement transaction for the current transaction. That is, the transaction cost decreases due to the high degree of substitutability. Conversely, if specificity is high, it is difficult to use the market, and it is difficult to achieve a substitute transaction for the current transaction. If we consider the relationship between the coordination mechanisms and the transaction costs associated with each mechanism, we can say that the transaction cost economizing mechanism is the market when specificity is low, and the firm when specificity is high (Williamson, 1975, 1986, 1996).

The situation where the market is selected as the coordination mechanism means that the situation is such that it is possible to rely on the information provided by price (Hayek, 1945). If the necessary information is not consolidated, as in a market, then a large amount of information must be handled. If the market is not selected as the coordination mechanism, this is because diverse types of information are required, and thus the amount of data exchanged between the parties involved becomes large. Therefore, if support from information and communication technology makes it possible to process large volumes of data, then the larger the amount of handled data, the more transaction costs can be economized. The same effect of economizing transaction costs

can also be achieved from any of the following: the amount of data exchanged between parties involved, the price of communicating that information, or the distance between parties involved. Having higher specificity and a larger volume of data means that even greater transaction cost economizing can be achieved with information and communication technology, and as information and communication technology evolves, the price of communicating decreases further, and transaction costs are economized. With regard to the distance between the parties involved, a longer distance means that the transaction cost economizing effects due to information and communication technology and its evolution become even larger (Picot et al., 1996; Toyama, 2002).

The important thing, when looking at specificity in this way, is that the transaction cost economizing effects due to information and communication technology differ between the cases when specificity is high and low--i.e. if we look at the situation regarding reduction of transaction costs with each coordination mechanism, transaction costs do not uniformly decline regardless of specificity; rather, even greater transaction cost economizing can be achieved as specificity increases. Even more important is the fact that coordination mechanisms which economize transaction costs differ from what they were previously depending on the degree of specificity. In other words, as specificity increases, the comparative advantage of the market with respect to other coordination mechanisms weakens, but the degree of that weakening becomes smaller than before. As a result, there is an expansion of specificity which assumes that the market performs best in economizing costs. In addition to this effect, information and communication technology also has an effect where it reduces specificity itself. That is, active use of information and communication technology increases the ease of sequential procedures relating to the acquisition of information, and it also accordingly increases the ease of conducting replacement transactions for the existing transaction. In particular, information and communication technology greatly relaxes geographical constraint conditions, which have been an important constraint condition for previous transactions, and it thereby enables smooth development of new transaction relationships different from the conventional type (Picot et al., 1996; Toyama, 2002; Williamson, 1986).

EFFECTS OF NETWORK GROWTH ON TRANSACTION COSTS

These are the effects, already considered, which the evolution of information and communication technology has on transaction costs, but when we reconsider the situation by returning to the framework of transaction cost theory, we can find effects which go

beyond these. Improving the ease of the series of procedures relating to information acquisition definitely contributes to the reduction of transaction costs, but other effects of network growth on transaction costs are also conceivable. That is, the number of potential and overt parties involved becomes extremely large. This will become an even greater problem, particularly in the process whereby the effects of evolution in information and communication technology become pervasive.

If the evolution of information and communication technology will make it possible to exchange information more smoothly between involved parties, then it will certainly be possible to find situations where transaction costs are economized, because information is necessary for transactions. It is necessary to gather, process and evaluate the goods or services involved in the transaction, and the potential transaction partners for conducting the transaction, in order to determine whether a transaction is possible, and if it is possible to use information and communication technology in this process, it becomes possible to economize transaction costs (Coase, 1937; Picot et al., 1996; Toyama, 2002; Williamson, 1975).

However, we must recognize that there are factors (in the process of evaluating parties involved) which cause a rise in transaction costs, particularly when new potential transaction partners increase due to network growth. This is also a problem related to opportunism (Williamson, 1975). When a network expands due to the evolution of information and communication technology, the number of potential transaction partners also increases dramatically. The costs of searching can be reduced by actively using information and communication technology, but there is also something which we should consider at the same time--namely, the reliability of the potential transaction partners who have the potential of concluding a new transaction relationship.

Reliability has multiple meanings, such as: Can the involved parties supply sufficiently reliable goods and services? Can they complete the transaction without a problem? Can they handle the information involved until the completion of the transaction, using methods which are sufficiently reliable, even after the transaction? According to the transaction cost theory, all of these can be handled as transaction cost problems due to the possibility of opportunism. Therefore, when network growth leads to an increase in the number of involved parties, and we consider the possibility of opportunism by those involved parties, we can see the rising costs of transactions. In a situation where potential transaction partners are increasing due to the growth of a network, because the partners are potential, there is little information regarding the

involved parties. Therefore, it is difficult to properly decide whether or not a transaction is possible. Even so, the judgement of whether or not the conclusion of a transaction relationship will lead later to a dispute must be made beforehand for all the increasing number of involved parties. Problems involving transaction costs arise here.

The most critical thing here is establishment of a governance structure for economizing transaction costs (Williamson, 1986, 1996). One means of doing this is to use the fact that persons having previous transaction experience with the various potential transaction partners who have increased together with network growth, have also come in with the growth of the network. What increases due to network growth is not just a potential transaction partner. There is also an increasing in persons having past transaction experience with the potential transaction partner. If acquisition of information from such persons is also supported by the evolution of information and communication technology, it becomes possible to control the rise in transaction costs mentioned above by actively using the information for evaluating a potential transaction partner. By creating a situation where it is easy to use evaluations by persons having past transaction experience with a potential transaction partner, it is possible to realize new forms of governance which can economize transaction costs.

EFFICIENCY IN TRANSACTION COST THEORY: EFFECTS OF INFORMATION AND COMMUNICATION TECHNOLOGY ON PRICE

There is something we should confirm about transaction cost theory. Even in transaction cost theory, the criterion of efficiency is not just transaction cost. That is, the determination of efficiency is based on the sum of transaction cost and production cost. This is an extremely important point, and even more important is whether or not it is possible to discuss transaction cost and production cost in a common framework. A response to this is possible, and the important thing here is specificity. An application of the framework can also be seen at the study on modularization (Toyama, 2005).

If specificity is low, various uses are possible, and this means that transaction partners are not limited to a narrow scope. That is, in the case like this, it becomes possible to aggregate the diverse needs, and increasing the scale of production by aggregating these needs makes it possible to economize production costs. Conversely, if specificity is high, aggregation of diverse needs is difficult because transaction partners are limited to a narrow scope, and thus it is also difficult to economize production costs (Riordan & Williamson, 1985).

With regard to criteria for determining efficiency, let us try changing our perspective. If we consider the conclusion of a transaction relationship to achieve cost economizing, we can say that the price presented by the potential transaction partner corresponds to the production costs, in the sense that this becomes the direct cost of procuring the good or service. Therefore, in other words, the criterion for determining efficiency can be regarded as the sum of the transaction cost and the price of the good or service. Here, we shall look at how the changes in the environment surrounding the transaction (i.e. the evolution of information and communication technology) affect the transaction price. Roughly speaking, there are two directions for these effects. One is decreasing price, and the other is increasing price.

First is decreasing price. We have looked at the effects of the evolution of information and communication technology on transaction cost, and simply stated, the evolution of information and communication technology induces economizing in transaction costs. Reduction in transaction costs decreases the friction which arises in the procurement of goods and services, and thus becomes a precondition for enabling reduction in the price of goods and services. Furthermore, through the improved ease of search due to the evolution of information and communication technology--i.e. through the reduction in transaction cost to search for transaction partners--there is the improving possibility of finding a good or service with a lower price. Evolution of information and communication technology relaxes site specificity (Picot et al., 1996; Toyama, 2002; Williamson, 1986). Due to this relaxation in site specificity, there is an expansion of opportunities for learning of replacement products or replacement suppliers. Accordingly, there is the improving possibility of acquiring a good or service with a lower price.

These effects on site specificity also signify the expansion of the trading area. Expansion of the trading area means that competition is stimulated, compared to the previous situation. Therefore, for goods or services where differentiation is difficult, this means that there is pressure to reduce prices. As site specificity relaxes, there is the increasing possibility that a single supplier will receive higher volume orders than before (Riordan & Williamson, 1985), and thus due to the manifestation of economies of scale, there is the increasing possibility of cost economizing and the accompanying reduction in price. In this way, the evolution of information and communication technology induces reduction of transaction costs, and functions as something which can induce reduction in the price of goods and services.

There is a point to be noticed here. As we saw earlier, the criterion of efficiency is

not transaction cost alone. Therefore, higher price can also be accepted, to the extent that it does not cancel the transaction cost economizing effects of evolution in information and communication technology. This is also supported by the fact that the customer acquisition is not led only by a lower price (Brown, 2000).

THE ACCEPTABILITY OF HIGHER PRICES AND COST ECONOMIZING: THE ROLE OF PRICES AS A SIGNAL

We have discussed the structure whereby transaction costs are economized, and the relationship between this and prices, but when we consider these together with the fact that transaction cost is not the only criterion for determining efficiency in transaction cost theory, it is also important that, to the extent that it does not cancel the transaction cost economizing effects, there can be tactical or strategic determination of price, where suppliers increase the price of a good or service. Here, we shall discuss increasing price. In order for this to be possible, this price must be acceptable as appropriate on the demand side. As one example of a situation where this is achieved, we can note the case where differentiation is achieved. However, even in the case where we approach the situation via transaction cost theory (which take cost economizing as the criterion for determining efficiency), it is possible to consider the possibility of accepting higher prices. The framework in this case is as follows. That is, as we saw earlier, the criterion for determining efficiency in transaction cost theory depends on total cost, and decisions on transactions are made on this basis (Riordan & Williamson, 1985). If transaction costs are kept low at this time, then--within the scope where transaction costs are economized--an increasing cash outflow paid as compensation becomes permissible.

Furthermore, approaching from a different angle, one effective viewpoint is that of information, which is one of the core issues of this paper. As the cause of friction which arises in transactions, we can point to the asymmetry of information possessed by the involved parties (Coase, 1937; Douma & Schreuder, 1991; Toyama, 2002). In the market, price plays a key role as information (Hayek, 1945), and decisions on transactions are made based on the price. As can be seen in some transactions, there are also cases where price functions as a signal indicating the quality level of the good or service. In this case, the higher the price, the higher the quality, and the lower the price, the lower the quality. This agrees well with goods and services which have a grading system.

There are many points which we have discussed, and points which can be traced back to the question of how signals are secured as a criterion for evaluating transaction

partners, whether they are potential or overt. If we also approach this from another angle of transaction cost theory, it can be handled as one aspect of fundamental transformation. In fundamental transformation, a transaction specific investment is done due to a recurrent transaction relationship, and increasing specificity results in a situation where concluding a new transaction relationship with a new transaction partner is more expensive from the standpoint of transaction cost. If it appears there will be a loss at the end of the transaction relationship due to the increase in specificity, this will make it difficult for opportunistic behavior to occur. When we consider the possibility of suppressing this kind of opportunistic behavior, maintaining existing transaction relationships is more likely to economize transaction costs in the end, than groping for and building new transaction relationships (Inoue, 1994; Williamson, 1986). Thus, in the case where an attempt is made to economize transaction costs by suppressing opportunistic behavior, even if there is a high cash outflow paid as compensation, the high cash outflow can be permitted within the scope where transaction costs are economized.

CONCLUSION

In this paper, we have discussed the relationship between information and communication technology and transaction cost. In doing so, we returned to the framework of transaction cost theory, and as an application, we even considered the possibility of accepting higher prices. Information and communication technology contributes to economizing transaction costs. Transaction cost is not the only criterion for determining efficiency in transaction cost theory. This fact leads to the possibility of accepting higher prices. These facts have facilitated new applications of transaction cost theory. The main distinguishing feature of this paper is that it arrives at discussing the possibility of accepting higher prices by returning to the criteria for determining efficiency in transaction cost theory. However, before arriving at this point, further issues that should be discussed were also clarified.

The first issue relates particularly to the previous section. No concrete efforts have been made to study a problem that is closely related to the hold-up problem (Milgrom & Roberts, 1992). Fundamental transformation possesses the following aspect: the weaker its extent, the more advantageous the standpoint, and the easier it is to engage in opportunistic behavior. However, this problem was not considered in this paper, and hence, it remains to be tackled.

Furthermore, among issues that particularly require long-term additional study, some issues pertain to the fact that transaction cost is a comprehensive concept that includes things other than production cost. The discussion in this paper was based on the fact that both transaction costs and production costs play key roles as criteria for determining efficiency in transaction cost theory. However, the question of what kind of cost is specifically included is likely to necessitate long-term thought as the problem of defining transaction costs in transaction cost theory.

The most urgent issue to be addressed is the need for an empirical study of the problems studied in this paper. For example, evaluation systems for transactions, which have been introduced in electronic commerce, are likely to be extremely useful for advancing an empirical study. These systems can be used to alleviate the asymmetry of information.

By advancing such a study, we may be able to demonstrate the effectiveness and limitations of the systems by, for example, considering the possibility of intentionally improving an evaluation by assuming the position of a third party. Thus, this becomes a study of the effectiveness of trilateral governance (Williamson, 1986, 1996), particularly in the case of electronic commerce where it is comparatively difficult for the transaction frequency with a specific transaction partner to become high. Therefore, this sort of empirical study is extremely important from the standpoint of studies on transaction cost theory because it enables an examination of systems for economizing transaction costs through the medium of the actual business world. In particular, we may be able to see that the increase in involved parties interposed in the network will become a foothold for economizing transaction costs and achieving smooth transactions. These are the issues to be dealt with in subsequent studies.

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