Digital Industrial Revolution and an Index of Transaction Cost

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Abstract

Innovation of ICT has reformed economic as well as social systems. Large corporations that propel the digital industrial revolution tend to perform systems of centralized governance. However, the new industrial revolution brings reconstruction of stakeholders. It is essential to explore the structural changes of stakeholders brought by the new industrial revolution. To achieve sustainability in global communities we need to restore vital decentralized systems partially. This paper classifies the stakeholders into inside, outside and external stakeholders and aims to obtain an efficient index of global communication mechanism. To explore sustainable system, this paper proposes a theoretical approach of integrated transaction cost. Investigation on transaction cost presents that digital industrial revolution grows outside stakeholders by moves from other two stakeholders.

Keywords: Digital industrial revolution; Global communities; Communication capability; Inside; Outside; External stakeholders; Transaction cost of communication

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Mini Review

The digital industrial revolution has reformed a whole economic and social systems. Innovation of ICT does not change markets and economies but also public services and daily life. New businesses grow in many fields and restructuring social foundations such as transactions and communications greatly reform social systems. To explore the integrated transformation of the two systems we should develop the reliable measure to evaluate transformation of economic and social structure at the same time. Tanaka [1] provides a theoretical model composed with corporations and stakeholders to explore digitalized economies and societies by using an approach of the stakeholders performance. The corporation expresses profit as well as non-profit organization including governmental institutions. To exhibit structural change of economies and societies, stakeholders are classified into inside, outside and external stakeholders. Inside stakeholders, such as regular customers, business partners and employees, are connected firmly or share common interests with the corporation. Inside stakeholders are likely to obtain monetary benefits based on trusty relation with the corporation. They require beneficial relationship with it rather than to obtain actual monetary payment for every transaction. The outside stakeholders can transact more occasionally and freely with the corporation than the inside stakeholders. This paper supposes to explore the digital industrial revolution where the outside stakeholders behave as consumers and suppliers in the digital network of the corporation. Digital certification systems improve digital transaction. In this paper outside stakeholders are assumed to involve in the digital transaction and to be due to monetary payments. The usage of internet increases outside stakeholders for many corporations. The digital revolution in industries and societies makes the corporation immediately take more outside stakeholders than before. The greater

outside stakeholders grow, the larger opportunities for profits the corporation could obtain. External stakeholders are involved in neither network of inside nor outside stakeholders.

Indifferent residents to the corporation consist external stakeholders. Some NPOs and NGOs actively perform as outside stakeholders. However, social inclusion initiatives aim to decline the external stakeholders who are raised by the digital divide [2]. To explore the social impact by the digital revolution, it is necessary to define an extending communication system in global communities. Tanaka [3] argues that the digital industrial revolution reforms structure of stakeholders as well as communication mechanism of global societies. The enhancement of communication scheme promotes the sustainable global communities. The reconstruction of communication systems presents a structural change of stakeholders. Tanaka [1] supposes that three types of stakeholders take distinct transaction cost functions. Tanaka [1] states transaction costs for inside, outside and external stakeholders by C_1, C_2, C_3 and defines the costs by the expressions (1-3).

$$C_1 = 1 - \beta(x) \quad (1)$$

$$C_2 = 1 - \gamma(y) \quad (2)$$

$$C_3 = 1 \quad (3)$$

$\beta(x)$ is an increasing function with production of the corporation x and indicates cohesion with network of inside stakeholders. Communication capability of global community y increases with the contribution of inside, outside and external stakeholders y_1, y_2, y_3. This relation is simply expressed by $y = y_1 + y_2 + y_3$. $\gamma(y)$ is an increasing function of y and implies that improvement of digital technologies declines transaction costs of communication. Differentiations of (1,2,3) regarding y exhibit $\frac{dC_1}{dy} = 0, \frac{dC_2}{dy} > 0, \frac{dC_3}{dy} = 0$.

The improvement of digital technologies lowers only the transaction cost of outside stakeholders. As outside stakeholders raise relative advantage in the costs, other stakeholders have monetary merits to move into the outside stakeholders. The numbers of inside, outside and external stakeholders are expressed by n_1, n_2, n_3. The total number n is written by $n_1 + n_2 + n_3 = n$. Tanaka [3] also demonstrates the structural change of stakeholders that is exhibited by $\frac{dn_1}{dy} < 0, \frac{dn_2}{dy} > 0, \frac{dn_3}{dy} < 0$. The changes in stakeholders raise the efficiency of the communication system.

This paper explores the efficiency of communication by using transaction costs. It is assumed that the weighted summation of the three transaction costs indicates features of communication systems. If transformation of inter stakeholders is possible in the digital revolution, an index of efficiency with global communities is presented by integrated cost

$$C(x,y) = n_1 C_1(x) + n_2 C_2(y) + n_3 C_3 \quad (4)$$

The new industrial revolution is not supposed enough to make effects. When the structure of stakeholders is not possible to alter, the letters to be constant for y are noticed by over bars.

$$\bar{C}(x, y) = \bar{n}_1 \bar{C}_1(x) + \bar{n}_2 C_2(y) + \bar{n}_3 \bar{C}_3 \quad (5)$$

Differentiations of (4) and (5) with y bring the inequality indicated by (6).

$$\frac{\partial \bar{C}}{\partial y} = \bar{n}_2 \frac{dC_2}{dy}(y) > \frac{dn_1}{dy} C_1(x) + \frac{dn_1}{dy} C_1(x) + \bar{n}_2 \frac{dC_2}{dy}(y) + \frac{dn_3}{dy} C_3 = \frac{\partial C}{\partial y} \quad (6)$$

(6) implies that digital industrial revolution lowers marginal integrated cost of transaction. If the marginal transaction cost is decreasing, global communities raise spends on information and communication.

References

1. Tanaka H (2019) Innovation on the digital economies and sustainability of the global communities. Annals of Social Sciences & Management Studies, Juniper 4(2): 1-10.

2. Choudrie J, Tsatsou P, Kruria S (2018) Social inclusion and usability of ICT-enable services. Routledge, Abingdon, UK.

3. Tanaka H (2020) Digital economic and social systems to be featured by stakeholders. Annals of Social Sciences & Management Studies, Juniper 5(4): 86-94.

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