

Digital Transformation (DX) and Stakeholders Transformation

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Abstract

Innovation to promote digital industrial revolutions brings serious changes on global communities. The innovation of digital technologies brings many social structural changes in institutional organizations, market structures, medical and health services and others. In the worst-case scenario, this structural change anticipates to trigger great social problems in the future. To prevent and mitigate global crises we should explore sustainable frameworks of digital transformation. The article discusses that a theoretical exploration of multi stakeholders contribute to improving sustainable global communities.

Keywords: Communication coefficients; Innovation of digital technologies; Outside stakeholders; Sustainable global communities

Introduction

Innovation of digital technologies is possible to bring a dominant oligopoly (Hindman (2018). Baecker (2019), Paus (2018) and other discussants argue that digital industrial revolution might not lead us to optimistic future. Tanaka (2018) and (2019a) explore a decentralized scheme to achieve sustainable global communities in digitalized social mechanisms. Coase (1937) and flowing researchers of law and economics explore solutions for innovation of digital technologies by using legislative initiatives. Tanaka (2004) provides a theoretical investigation on corporate social responsibility (CSR). Tanaka (2017), (2018) develop a theoretical model of sustainable governance for corporations and organizations as explained in the flowing section. Corporations bring net private net profit $\Pi(x)$; $\Pi'(x) > 0$, $\Pi''(x) < 0$, from production x . Corporations offer payment t_i ; $t_i \geq 0$, in the transtion with stakeholder i . Total payment for a corporation is

denoted by $t = \sum_{i=1}^n t_i$ for all stakeholders. Stakeholder i presents evaluation $V_i(x, t_i)$ for the corporation.

Tanaka(2019b) explores that digital industrial revolution reforms structure of stakeholders. Stakeholders are classified into 3 types. Inside stakeholders $i = (1, \dots, n_0)$, such as regular employees and customers, obtain stable and long-term relationship with corporations. Outside stakeholders, $i = (n_0 + 1, \dots, n_1)$ have occasional or temporal relationship with corporations and illustrated by irregular customers. External stakeholders, $i = (n_1 + 1, \dots, n)$ obtain no social and economic transaction with corporations and include some residents, NGO and monitoring agencies. Considering that stakeholders might have external economies or external diseconomies, stakeholders are classified into positive stakeholder, $\frac{\partial V_i}{\partial x} \geq 0$ and negative stakeholders $\frac{\partial V_i}{\partial x} < 0$ However, any stakeholder is supposed to raise evaluation of corporation with payment

$t_i, \frac{\partial V_i}{\partial t_i} \geq 0$ Corporations and stakeholders contribute $y_o \geq 0$ and $y_o \geq 0 (i = 1, \dots, n)$ improve communication of communities. Total investment $y = y_o + \sum_{i=1}^n y_i$ presents to be induced by innovation on digital technologies. Corporations are assumed to raise efficiency of communication with outside stakeholders $\beta(x)$ as production increases; $\beta'(x) > 0$. Total investment raises communication efficiency $\beta(x) > \gamma'(y) > 0$. Because corporations are likely to obtain opportunity to contact with stakeholders in order of inside, outside and external stakeholders, we suppose an inequality $\beta(x) > \gamma(y) > 0$. Incentive regulation is exhibited by

$$NB = \pi(x) - y_o + \beta(x) \sum_{i=1}^{n_0} \{V(x, t_i) - y_i\} + \gamma(y) \sum_{i=n_0+1}^n \{V(x, t_i) - y_i\} - \gamma(y) \sum_{i=n_1+1}^n y_i - t - \sum_{i=1}^n \varphi_i \{\alpha_i - V_i(x, t_i)\}. \tag{1}$$

Payments for inside, outside and external stakeholders are presented by Equations (2) – (4). Equations (2)–(4) indicate that marginal evaluation of is equilibrated with social marginal costs of payment which is defined by the reciprocal number of the summation of efficiency of communication and gap between target and present value. Communication coefficients $\beta(x), \gamma(y)$ and 0 take three types of stakeholders present different optimal conditions for payments. After stakeholders change the contract with corporations, they easily move from one to another type of

social cost function $\varphi_i(\alpha_i - V_i(x, t_i))$. When stakeholder i defines standard, increasing function $\varphi_i, \varphi_i'(\alpha_i - V_i(x, t_i)) > 0$, defines social costs such as penalties.

Sustainable Schemes

Tanaka (2019a) argues that sustainable schemes formalize corporations to maximize net social benefits defined by Equation (1). By differentiating Equation (1) with $t_i; i = 1, \dots, n_0$, optimal payment conditions for stakeholders are exhibited by Equations (2)–(4).

stakeholders. DX could not only increase new outside stakeholders, but also promote transfer of stakeholders beyond the border of types. For example, some outside stakeholders appear as activists to achieve their requests. The risk function $\varphi_i' \{\alpha_i - V_i(x, t_i)\}$ means that rising legislative initiatives and governance standards α_i enhance $\varphi_i' \{\alpha_i - V_i(x, t_i)\}$. The rising risk functions indicates a lowering marginal evaluation by stakeholder i , lowering marginal evaluation of stakeholder requires corporations to raise payment of i .

$$\frac{\partial V_i}{\partial t_i} = \frac{1}{\beta(x) + \varphi_i' \{\alpha_i - V_i(x, t_i)\}}, i = 1, \dots, n_0. \tag{2}$$

$$\frac{\partial V_i}{\partial t_i} = \frac{1}{\gamma(y) + \varphi_i' \{\alpha_i - V_i(x, t_i)\}}, i = n_0 + 1, \dots, n_1. \tag{3}$$

$$\frac{\partial V_i}{\partial t_i} = \frac{1}{\varphi_i' \{\alpha_i - V_i(x, t_i)\}}, i = n_1 + 1, \dots, n. \tag{4}$$

The right side of Equations (2)-(4) presents social marginal costs of payment. Considering the inequality $\beta(x) > \gamma(y) > 0$, the inequality $\varphi_i' \{\alpha_i - V_i(x, t_i)\} < \gamma(y) + \varphi_i' \{\alpha_i - V_i(x, t_i)\} < \beta(x) + \varphi_i' \{\alpha_i - V_i(x, t_i)\}$ is obtained. Figure 1 depicts equilibrium solutions of (4), (3) and (2) by intersection points C, F, J. When α_i for all stakeholder i is supposed to be constant, payment of outside stakeholder t_i^0 indicated by intersection point F appears the largest increase of payment among three type of stakeholders. Tanaka (2024) argues that innovation of ICT (Intelligence and Communication Technology) raises and $\gamma(y)$. This article demonstrates that DX promotes social reform to found social innovation. Rising investment of digital technologies raises and lowers curve EG.

Payment for outside stakeholders increases relatively greater than other two types of stakeholders. The enhancing advantage of payment on outside stakeholders increases markets using digital transactions (Figure 1 and 2).

In a scheme for sustainability corporations are obliged to provide payment according to request by any stakeholder. Increasing risk exhibited by $\alpha_i - V_i(x, t_i)$ requires corporations to decrease social marginal costs (2)-(4) and move BD, EG and HK curves downwardly in Figure 1. Payments t_i^e, t_i^0 and t_i^i increase in the same way. Consequently, schemes for sustainability enlarge three type of stakeholders with increasing payments.

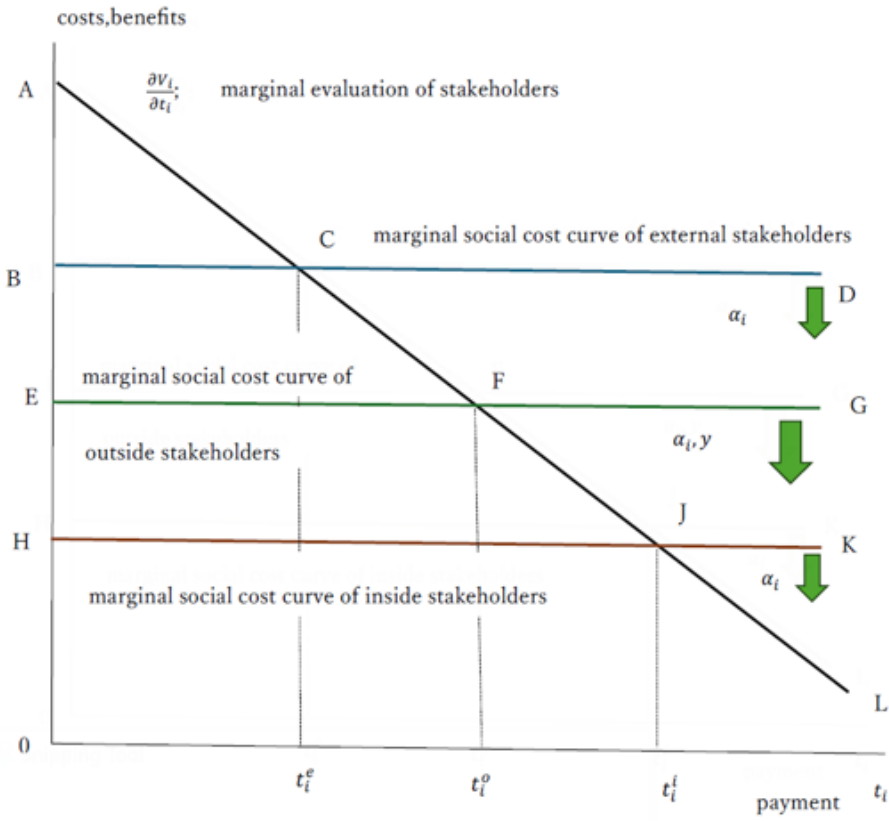


Figure 1: Stakeholders and Payments.

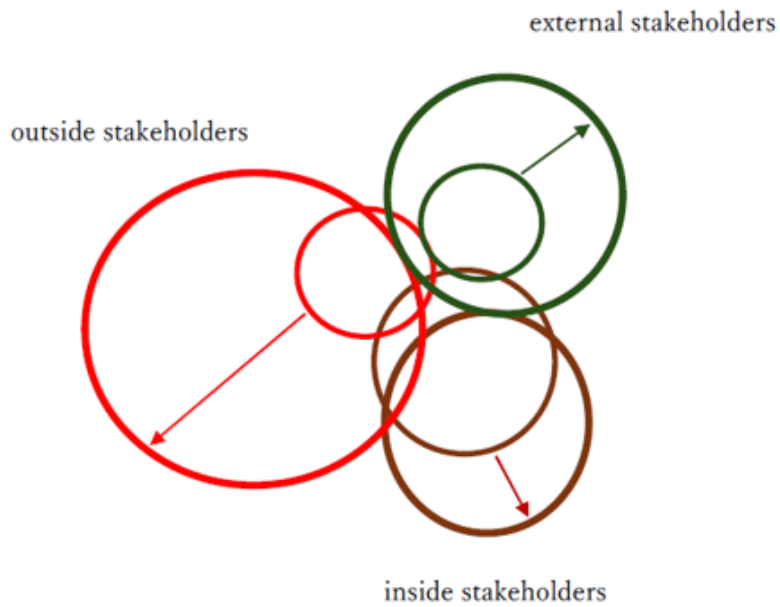


Figure 2: Stakeholders Transformation with sustainable scheme.

This article explores theoretically that DX with sustainable scheme brings expanding stakeholders. Figure 2 illustrates enlarging stakeholders to form sustainable scheme of DX. Figure 2 depicts that red circle of outside stakeholders present most significant growth with DX. According to expanding global communities corporations need to keep sustainable relation with increasing stakeholders. Sustainable governance brings the largest red circle of outside stakeholders as well as enlarging green and brown circles of external and inside stakeholders.

Conclusion

Digital industrial revolutions reconstruct global communities. The theory of multi stakeholders explores appropriately the reconstruction of global economies and societies. Innovation of digital technologies brings remarkable growth of outside stakeholders. Sustainable scheme of global communities enhances suitably inside and external stakeholders.

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Conflict of Interest

No Conflict of interest.

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