



Consolidated challenge to social demand for resilient platforms - Lessons from Uber's global expansion



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ABSTRACT

Many in the industry see the ride-sharing company Uber as the significant advancement through information and communication technology (ICT) particularly of the digital service platform and sharing economy. Uber has been exploring the new frontier of the ICT-driven disruptive business model (IDBM) and succeeded in its global expansion to over 479 cities in more than 75 countries worldwide in June of 2016.

Such rapid expansion provides constructive insights regarding the significance of IDBM, not only in transportation but also in almost all other business fields. While at the same time Uber's legal battles in some cities around the world raise a serious question regarding the rationale of IDBM.

In light of such a question, this paper examined the institutional sources contrasting success and failure in Uber's global expansion.

By the comparative empirical analysis, it was identified that the contrast could be attributed to a bipolarization nature of ICT-driven logistic growth, and the success can be attributed to a co-evolutionary acclimatization that harnesses the vigor of counterparts.

This analysis suggests the significance of IDBM with a consolidated challenge to social demand (CCSD); it demonstrated that a co-evolutionary acclimatization played a transformative role in this accomplishment.

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1. Introduction

Uber, a high-tech ride-sharing platform company, was founded in March 2009 and is regarded as the highest-valued venture-supported firm. It is seen as the significant advancement through information and communication technology (ICT) particularly of the digital service platform and sharing economy as it brilliantly connects the transportation industry with ICT via its ride-sharing application and it leverages the sharing revolution (Belk, 2014 [3]). Consequently, it fully enjoys the benefits of collaborative consumption characterized by (i) selling use of a product rather than ownership of a product, (ii) supporting customers in their desire to resell goods, (iii) exploiting unused resources and

capacities, (iv) providing repair and maintenance services, and (v) using collaborative consumption (Matzler et al., 2015 [14]).

Uber is currently one of the fastest growing start-ups worldwide and has been exploring the new frontier of the ICT-driven disruptive business model (IDBM) (Watanabe et al., 2016 [28]). Based on this model, it has succeeded in its global expansion to over 479 cities in more than 75 countries worldwide in June of 2016. Its value exceeds the value of the full US taxi and limousine industry.

Such rapid expansion provides constructive insights regarding the significance of IDBM not only in transportation but also in almost all other business fields, including goods, professional services, space, and money (Cohen et al., 2014 [6]). In China, they have developed a sharing economy model for transport like Didi.

However, this rapid expansion resulted in the emergence of legal battles in some cities around the world (Arvind et al., 2014 [1]). Unlike licensed taxi drivers, private citizens providing ride-share services do not necessarily carry driver licenses, take licensing exams, purchase commercial insurance or even be required to honor all ride requests. For such reasons a German court, for example, banned Uber's basic service throughout the

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nation. Licensed taxi drivers are saddled with greater costs; that hampers their ability to compete with ride sharing (Arvind et al., 2014 [1]).

These battles raise a serious question regarding the rationale of IDBM.

To date, some studies have examined the rationale of the foundation of IDBM. Cannon et al. (2015) [4] pointed out that some characteristics inherent in the design of sharing economies lead to negative externalities. Arvind et al. (2014) [1] claimed that ride sharing is growing due to the circumvention of costs and regulations that govern incumbent businesses. They also claimed that, ride sharing could exploit loopholes to avoid rules and taxes, when this occurred, the sharing economy became the skimming economy. As legal battles explode worldwide, it shed the light on both the potential and shortcomings of IDBM. Many people identified problems and challenges as tax confusion, liability, and economic dependence (Cheng, 2014 [5]). Mastroiolo (2016) [13] contended that Uber and its business practices are epitomizing the white collar crime as they took advantage of vulnerable customers, no licensed drivers, basic employee rights and violated numerous industry laws and standards.

Contrary to these negative views, Rogers (2015) [18] expressed his dissatisfaction that public debate surrounding Uber had so far generated more heat than light, revealing little about the company's net impact on important public goods and values. Cusumano (2015) [8] pointed out that, while some startups had already run into legal and regulatory hurdles from city governments, courts, traditional unions or lobbies wanted to restrict or shut them down, the big question was really how traditional companies should compete with startups in the sharing economy.

By considering both of light and shadow effects of the ride sharing business, European Parliament (2015) [11] has summarized both aspects of social and economic consequences of Uber, as compared in Table 1.

It pointed out the challenge posed by governments including employment issues, internal market regulations, environment, taxation, and consumer protection.

Rudmin (2016) [19], from consumer science perspective, pointed out that distributed inventory accessed by digitally mediated sharing as with Uber, should be examined as an alternative inventory behavior.

While these works have shed light on the broad transformative problems of IDBM, inherent to newly emerging businesses, little attention has been paid to the inherent characteristics of ICT, on which IDBM is based and its subsequent solutions thereon.

Authors identified that Uber's disruptive business model can be attributed to a transformative shift in business design by constructing an ICT-driven platform ecosystem (Watanabe et al., 2016 [28]). Cusumano (2015) [8] pointed out that the sharing-economy startups threaten established companies to the extent that peer-to-peer networks could grow exponentially through the power of platform dynamics and network effects (Cusumano, 2015 [8]).

Oreg et al. (2015) [16] in their "Resistance to Innovation" warned

that "People do not always choose the latest innovations. Many people find it more productive to keep using an old, familiar technology than rapidly adapt to a new technology." Becker (2008) [2] suggested a possible function of organizational routines as a part of the family of concepts such as institutions, norms or conventions that can be the source of both stability and change. Davis (2009) [9] identified that the highly dynamic environments require flexibility to cope with a flow of opportunities that typically is faster, more complex, more ambiguous, and less predictable than in less dynamic environments. Mella (2014) [15] postulated that the dynamic interconnections among systems of organizational routines could be the sources of endogenous organizational innovation.

These analyses provide a reasonable explanatory base in understanding the contrasting features of Uber's global expansion, with and without legal battles. The exponential growth of Uber supported by the dramatic advancement of ICT might be non-adaptive to the institutions without flexibility and insufficient time for routinization while it could be adaptive to institutions with flexible and sufficient time for routinization. Also, this contrast could be changeable depending on the dynamic interconnections among systems of organizational routines.

Given a bi-polarization nature of ICT-driven logistic growth (Watanabe et al., 2015 [25]) on which Uber depends on in its global expansion (Watanabe et al., 2016 [28]), this postulate prompts a hypothetical view that the foregoing contrast can be attributed to a bi-polarization nature of ICT-driven logistic growth and that success can be attributed to a co-evolutionary acclimatization that harnesses the vigor of counterparts. Furthermore, attainability of this target can be subject to the optimal velocity of expansion on the donor side and institutional elasticity of the host side.

This paper focused on the inherent characteristics of ICT on which IDBM is based. Using a comparative empirical analysis, this hypothetical view was demonstrated. A possible solution based on a concept of a co-evolutionary acclimatization satisfying the above conditions in both donor and host sides were also demonstrated.

Section 2 reviews ICT's indigenous functions that are driving ICT-driven disruptive business models (IDBM). Section 3 reveals pitfalls of the ICT advancement resulting in the emergence of conflicts in Uber's global expansion. Section 4 extracts lessons from Uber's global expansion success model. Section 5 briefly summarizes noteworthy findings, implications, and suggestions for future works.

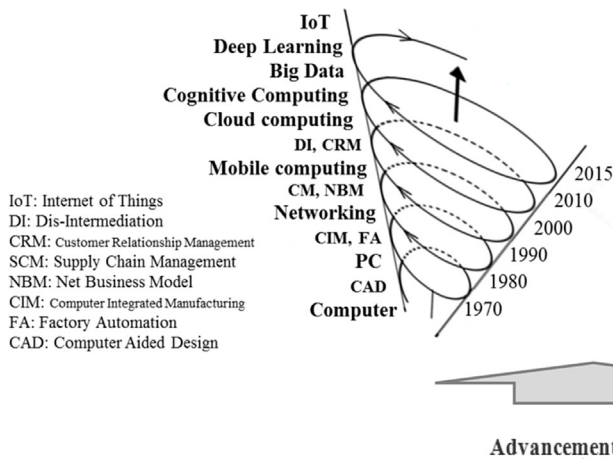
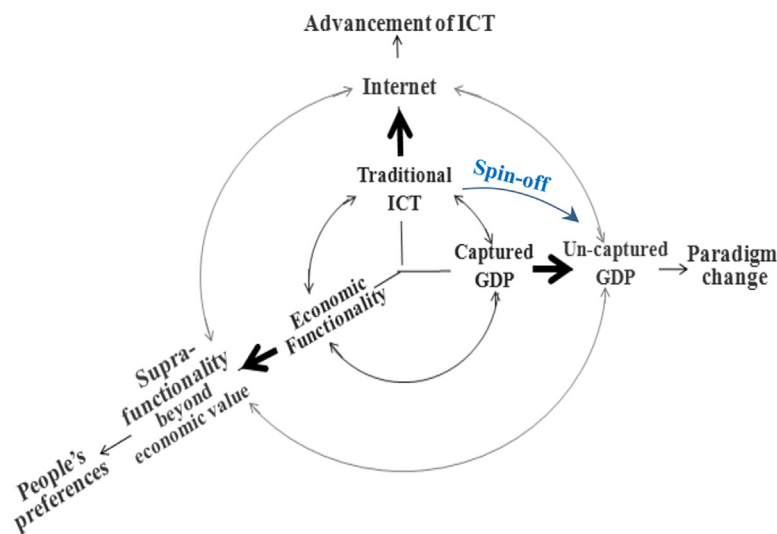
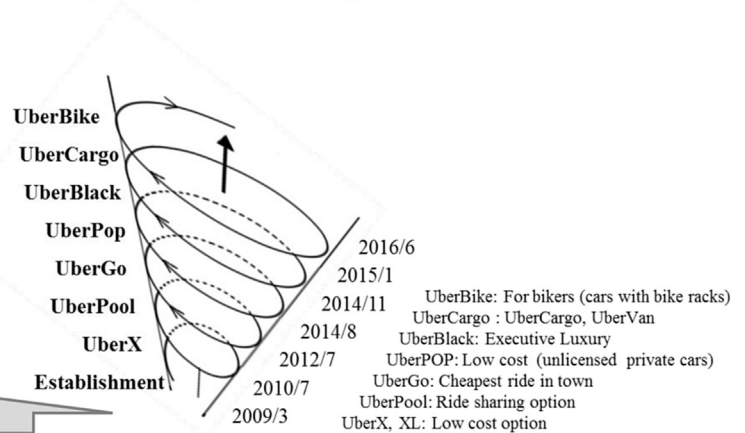
2. Uber as the jewel of ICT

2.1. Two-faced ature of ICT and subsequent un-captured GDP emergence

Uber's global expansion can be attributed to its glory as the crown jewel of ICT. Authors demonstrated that current ICT-driven global development depended on a trend shifting from traditional co-evolution of computer-initiated ICT, captured GDP, and

Table 1
Social and economic consequences of Uber.

Efficiency gains	Allegations against Uber's business
Reduction of search cost	Unfair competition without following regulations/fare
Better overview of quality and prices	Could aspire to become monopolies
Provide ICT services assisting drivers	Cars/drivers could be unsafe/underinsured
Allow for better utilization of assets	Invade customers' privacy
	Discrimination by drivers/passengers
	Undermine working standards/poor compensation
	Present challenges related to taxation

Fig. 1-2. Spiral Development of ICT.**Fig. 1-3. Spiral Development of Uber.****Fig. 1-1. Scheme of Spin-off Dynamism.****Fig. 1.** Shifting trends in the Co-evolution of the 3 mega-trends leveraging spiral development of ICT and Uber.

economic functionality to new co-evolution of the Internet, un-captured GDP,¹ and supra-functionality beyond economic value as illustrated in Fig. 1-1 (Watanabe et al., 2016 [27]). Authors insisted that Uber's system success can be explained by this shifting co-evolutionary trend (Watanabe et al., 2016 [28]). They demonstrated that un-captured GDP was a key factor identifying the state of these shifting trends, and that two-faced nature of ICT was behind the emergence of un-captured GDP.

2.2. Spin-off from traditional co-evolution to un-captured GDP oriented new co-evolution

Uber's rapid expansion worldwide along with emerging legal battles in some cities recalls the rapid spin-off from a traditional captured GDP based cycle to an un-captured GDP based new cycle which accomplishes a spiral development similar to that of ICT from computer to IoT over the last four decades as demonstrated in

¹ Un-captured GDP can be defined as added values providing utility (satisfaction of consumption) and happiness beyond economic value to people but cannot be measured by traditional GDP accounts (captured GDP) that measure economic value. Supra-functionality beyond economic value can be the typical example.

Figs. 1–2 and 1–3. Authors demonstrated that Uber's conspicuous spin-off can be attributed to its ICT inherent self-propagating function incorporating new functionality development during its diffusion process (Watanabe et al., 2016 [28]).

2.3. ICT-driven disruptive business model

Thus, the dynamism of Uber's ICT-driven disruptive business model (IDBM) which can be the locomotive of its rapid global expansion resulting in a contrasting development between successful co-evolution with host institutions and legal battles are identified as illustrated in Fig. 2 (Watanabe et al., 2016 [28]).

Uber's co-existing development trajectory with taxis corresponds to the two-faced nature of ICT that is behind the emergence of un-captured GDP as mentioned earlier. This emergence can be attributed to a strong substitution from taxi to Uber accelerated by contrasting vicious cycle between price increases and trip decreases in taxis and a virtuous cycle between price decline and trip increases in Uber.

Uber's virtuous cycle can be attributed to ICT's self-propagating function that enhances the level of functionality as its diffusion proceeds. This self-propagating function plays a vital role in spin-

Table 2

Adaptability of Taxi and Uber's Development Trajectories to LGDCC (NYC).

LGDCC: Logistic growth with dynamic carrying capacity,* $Y = \frac{N_k}{1 + be^{-at + \frac{b_k}{1 - a_k} e^{-a_k t}}}$.

		N_k	a	b	a_k	b_k	adj. R^2
Taxi	(Jan. 2004 – Jun. 2013)	2247.12 (6.42)	0.017 (12.61)	6.364 (6.63)	0.439 (0.00*)	10.30 (0.00*)	0.976
Uber	(Jun. 2013 – Sep. 2015)	119.27 (41.41)	0.121 (36.67)	49.650 (11.13)	0.016 (2.42* ³)	0.200 (1.43* ⁵)	0.999

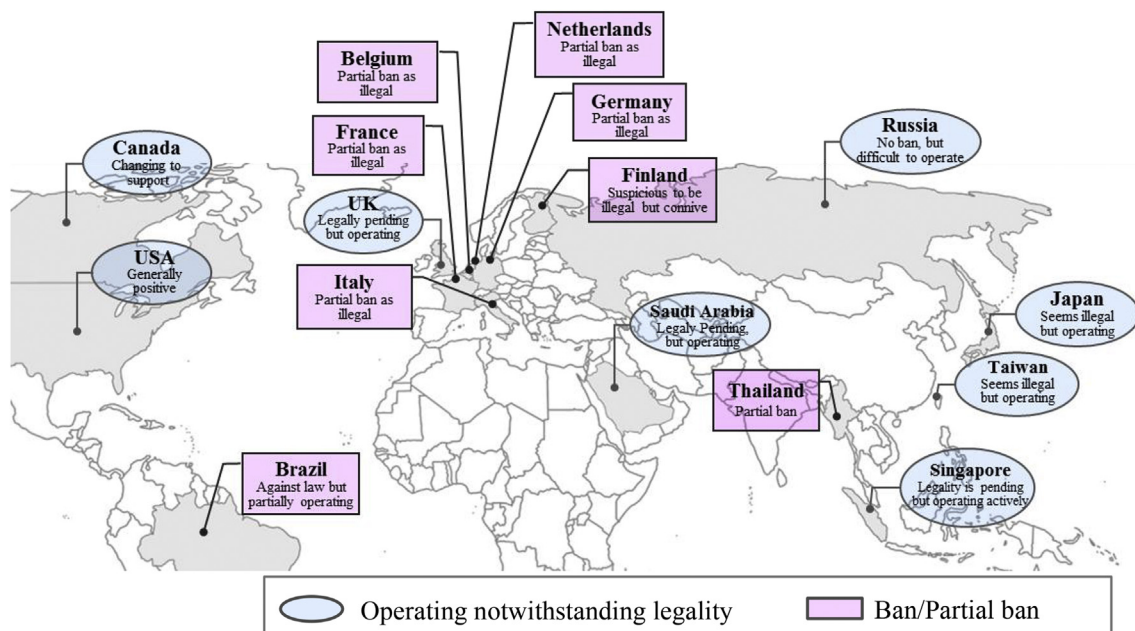
Y: trips; N_k : carrying capacity; t: time; a, b, a_k , b_k : coefficients.

Taxi: based on medallion prices, Uber: based on trips with spline interpolation (see Watanabe et al., 2016 [28]).

SPSS software was used for this nonlinear regression analysis (Watanabe et al., 2016 [28]).

* Figures in parenthesis indicate t-statistics: all significant at the 1% level except *³: 5%, *⁵: 12%, *: non-significant.Third term of the denominator indicates magnitude of dynamic carrying capacity formation, without which Y is simple logistic growth (SLG). a: velocity of diffusion, and b: initial stage of diffusion. a_k and b_k play similar function in dynamic carrying capacity formation.**Fig. 3.** Uber's expansion in 479 cities in the world (as of June 2016).

Source: Uber.

**Fig. 4.** Contrasting features of Uber's global expansion in 16 countries (as of June 2016).

Sources: Authors classification based on, NY Times, HuffPo, Reuters, WSI, CNN and local news reports.

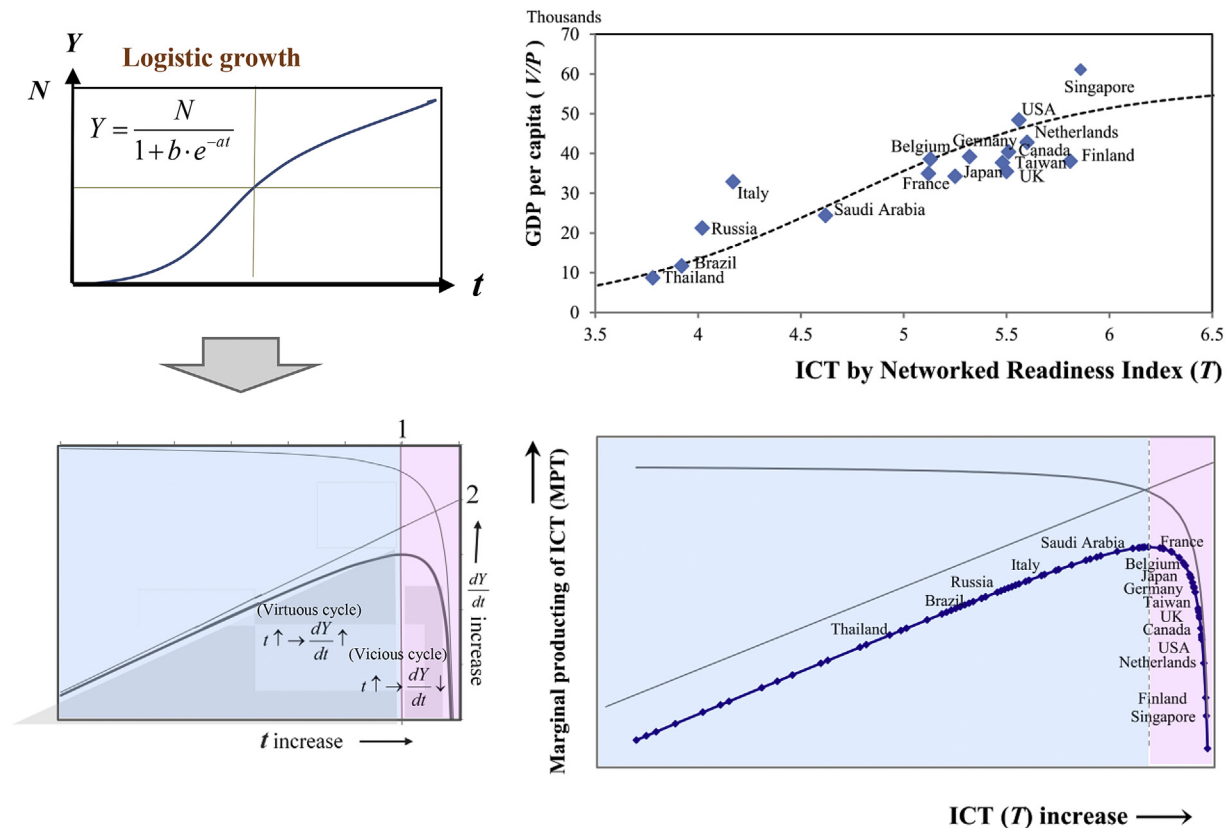


Fig. 5. Scheme of the Bi-polarization fatality of logistic growth.

another ICT's indigenous function, the bi-polarization nature of logistic growth that demonstrates ICT-driven development can be split into a virtuous cycle and a vicious cycle.

3.2.1. Bi-polarization fatality

Logistic growth trajectory (upper left figures in Fig. 5) can be developed to a bi-polarization trajectory as demonstrated in the lower left figures in Fig. 5 (Tokumasu and Watanabe, 2009 [20]) (see the details of mathematical development Appendix 2).

The figure in the lower left in Fig. 5 illustrates the bi-polarization trajectory of a logistic growth function. The figure indicates that in the normal logistic growth as a function of time t , marginal increase (dY/dt) increases as time goes by as generally anticipated within the time shorter than a certain threshold. However, it changes to reverse upon exceeding this threshold resulting in marginal increase decline against anticipation.

By the preceding review, the figure in the upper right demonstrates ICT-driven logistic growth in 100 countries in 2011 (Watanabe et al., 2014 [25]). Given that ICT advances proportional to time t , ICT-driven economic growth in 100 countries can be depicted by a logistic growth function consisting of ICT advancement (T) and GDP per capita (V/P) as demonstrating in the upper right in Fig. 5 (see 100 countries display Appendix 3).

Since this ICT–GDP per capita logistic growth demonstrates statistical significance (see Appendix 3), this trajectory leads to a bi-polarization between ICT advanced 30 countries and ICT growing 70 countries as illustrated in the lower left in Fig. 5. While the latter 70 countries enjoy ICT's marginal productivity increase as ICT advances, ICT advanced 30 countries suffer a vicious cycle between ICT advancement and its marginal productivity decline resulting in the great stagnation (Cowen, 2011 [7]). This can be attributed to

trapping in ICT advancement derived from the two-faced nature of ICT reviewed earlier (Watanabe et al., 2015 [26]).

3.2.2. Co-evolutionary acclimatization

By the preceding reviews, Fig. 6 illustrates a whole perspective of a bi-polarization of ICT advancement as a consequence of a trap in ICT advancement derived from its two-faced nature.

A vicious cycle in ICT advanced economies can be attributed to a trap in ICT advancement (top in Fig. 6) derived from the two-faced nature of ICT, that is, while advancement of ICT, centered by the dramatic advancement of the Internet, generally contributes to enhanced prices of technology from new functionality development, the dramatic advancement of the Internet reacts to decreases in prices of technology due to its nature of freebies, easy copying, and mass standardization. Given that the firms seek to maximize profit in the competitive market, the marginal productivity of technology corresponds to the relative price of technology which, contrary to new services created by the advancement of the Internet, results in a decrease in ICT's contribution to growth. This can be considered the dynamism in emerging un-captured GDP that the Internet provides utility and happiness to people but cannot be captured through GDP data (Watanabe et al., 2015 [25]).

On the contrary, while ICT growing economies expect their growth increase through the marginal productivity of ICT increase as ICT increases, these economies cannot afford the required additional ICT investment by themselves. While ICT advanced economies enable further advancement of ICT, it results in declining its marginal productivity which can be considered as compensation for un-captured GDP emergence. Thus, such advancement should be shared for the advancement of ICT growing economies which enjoy a virtuous cycle between its advancement

Trap in ICT Advancement - ICT's Two Faces

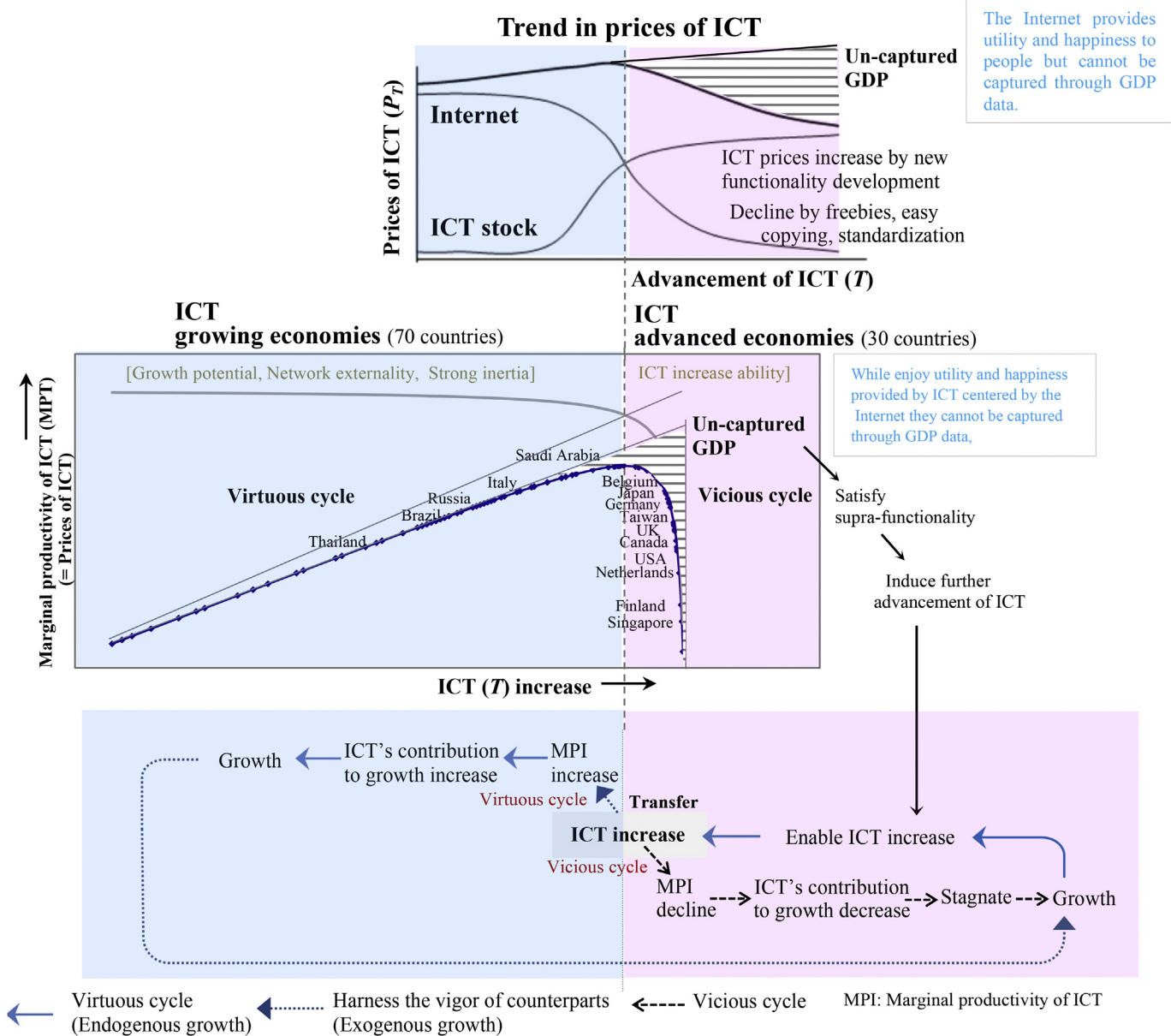


Fig. 6. Co-evolutionary Acclimatization against Bi-polarization (A case of 100 Countries in 2011).

and marginal productivity increase leading to sustainable growth as illustrated in the bottom in Fig. 6. By harnessing the vigor of ICT growing economies through their sustainable growth, ICT advanced economies can maintain their growth through the marginal productivity of technology increase without falling into a trap in ICT advancement as illustrated in the bottom of Fig. 6 (see details of this mechanism Appendix 4). This maintained growth enables ICT increase which can be shared with ICT growing economies for their sustainable growth as reviewed earlier.

These reviews suggest the co-evolutionary acclimatization system that harnesses the vigor of counterparts as illustrated in the bottom of Fig. 6 enables both ICT advanced, and growing economies to maintain sustainable growth. This system can be possible countermeasures to the trap in ICT advancement (Watanabe, 2013 [23]).

Cannon et al. (2015) [4] suggested that “collaborative co-

regulation: designing a co-regulatory scheme that can effectively complement the inherent attributes of the sharing economies being regulated to improve effectiveness, the optimal level of protection of public interests over interest groups, and cost-effective feasibility is essential.” This suggestion corresponds to the concept of the co-evolutionary acclimatization.

Given that Uber's system success depends on the development of ICT, its considerable legal battles proportional to its rapid expansion can be attributed to this bi-polarization feature. Similar to excessive ICT advancement results in a vicious cycle between ICT advancement and productivity decline, rapid Uber expansion results in a vicious cycle.

3.3. Optimal growth rate for self-propagation

Given the understanding that the adaptability of ICT

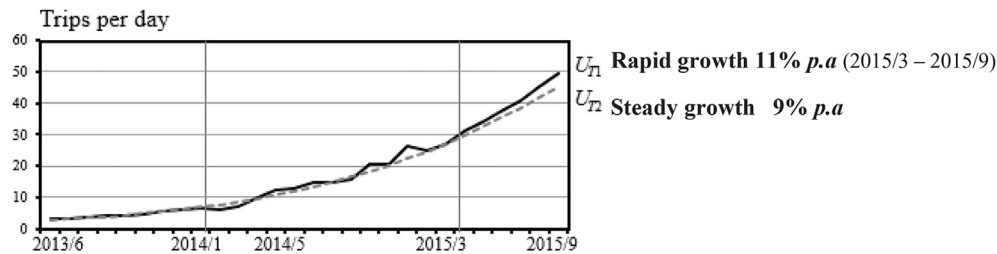


Fig. 7. Comparison of Uber trips estimate in NYC (Jun. 2013–Sep. 2015).

advancement can be subject to sufficient time for routinization and that the functionality of ICT can be developed through the interaction with institutions in a self-propagating manner, it can be postulated that optimal velocity of growth would be crucial to its self-propagating functionality development.

With the understanding that this self-propagating functionality development can be attributed to its adaptability to logistic growth within a dynamic carrying capacity (LGDCC) function, Uber's fit ability to this function subject to growth rates was compared (Fig. 7).

Table 3 demonstrates that while self-propagation can be expected in steady growth by fitting to LGDCC, it cannot be expected to have rapid growth. This supports the hypothetical view that sufficient time for routinization is required for Uber's expansion.

Koopman et al. (2014) [12] pointed out that new ventures should consider to what degree is the sharing economy creating new markets, rather than simply supplanting older forms of transactions.

3.4. Institutional elasticity in accepting Uber

It is postulated that institutional elasticity of the host is required for smooth acceptance of Uber in its global expansion.

As pointed by European Parliament (2015) [11], such institutional issues as employment issues, internal regulations, environment, taxation, and consumer protection are crucial for smooth acceptance of Uber. Analyzing critical points impeding Uber's smooth acceptance into cities with legal battles (see 3.5), internal regulations relevant to protecting the vested interests of incumbent organizations shared a central dimension. This dimension can be vividly represented by the flexibility of wage determination of the host countries/cities.

Warner (2002) [22] in his international survey on wage determination in 19 countries identified that flexibility of wage setting demonstrates negative correlation with dependency on union and collective bargaining agreements (CBA). Secondly, the 19 countries split into two clusters, "flexible setting group" including USA, UK, Canada and Japan, and "less flexible setting group" including western and southern European countries and Nordic countries as demonstrated in Fig. 8. Finland is a country with the lowest flexibility of wage setting and with the highest dependency on union and CBA. This result corresponds to the similar survey on Finland (Tyrväinen, 1995 [21]).

On the basis of the findings of these surveys, utilizing the ranking of flexibility of wage determination in 140 countries published annually by the World Economic Forum (WEF, 2015 [29]). Table 4 demonstrates a correlation between institutional elasticity and Uber acceptance in 16 countries by grouping the countries by those with a positive reaction to Uber and those with certain legal battles with Uber.

3.5. State of conflict in Uber expansion

Aiming at identifying factors contrasting Uber's global expansion, based on Table 4, states of conflict in Uber expansion in selected 16 countries were surveyed³.

3.5.1. Generally positive

- (1) **Singapore** [Legality is pending but operating actively]
 1. Taxi drivers and passengers in Singapore are welcoming taxi app services.
 2. This has led to a highly competitive taxi app market in Singapore, and existing taxi companies as Comfort Delgro and Trans-Cab endeavored to improve their services by introducing their mobile app services.
 3. COE (Certificate of Entitlement) scheme based on the tripartism framework (consists of Ministry of Manpower, National Trades Union Congress, and Singapore National Employers Federation) plays a decisive role in Singaporean's efficient utilization of ride-sharing.
 4. Requirements and complaints can be solved through dialogues with the regulators, employers and employees (drivers) under the tripartism framework.
 5. Uber induced incorporating users (passengers) requirements into the tripartism framework by stimulating better services, thereby consolidation of all stakeholders: company, employee, user and government was constructed.
 6. Government agile reaction to complaints from the incumbent through open dialogue with all stakeholders and by acknowledging new streams of innovation versus resisting played a key role.
 7. The government is secretly* welcoming the taxi app services because:
 - (i) Young people enjoy using services like Uber, and the government must not resist innovation,
 - (ii) They provide job opportunities to Singapore citizens (toward aging society) and increase the overall productivity,
 - (iii) The ride-sharing can be an approach to tackle problems of traffic clog and achieve efficient road usage.
 *Transport Minister urged that "we must always be fair to players, whether incumbent or insurgents and strike a balanced approach".
 8. In April 2016, the government declared to allow Uber to pick up passengers, legally with vocational licenses (by 10 h training program, shorter than 60 h for taxi drivers)
- (2) **Tokyo** [Seems illegal but operating]

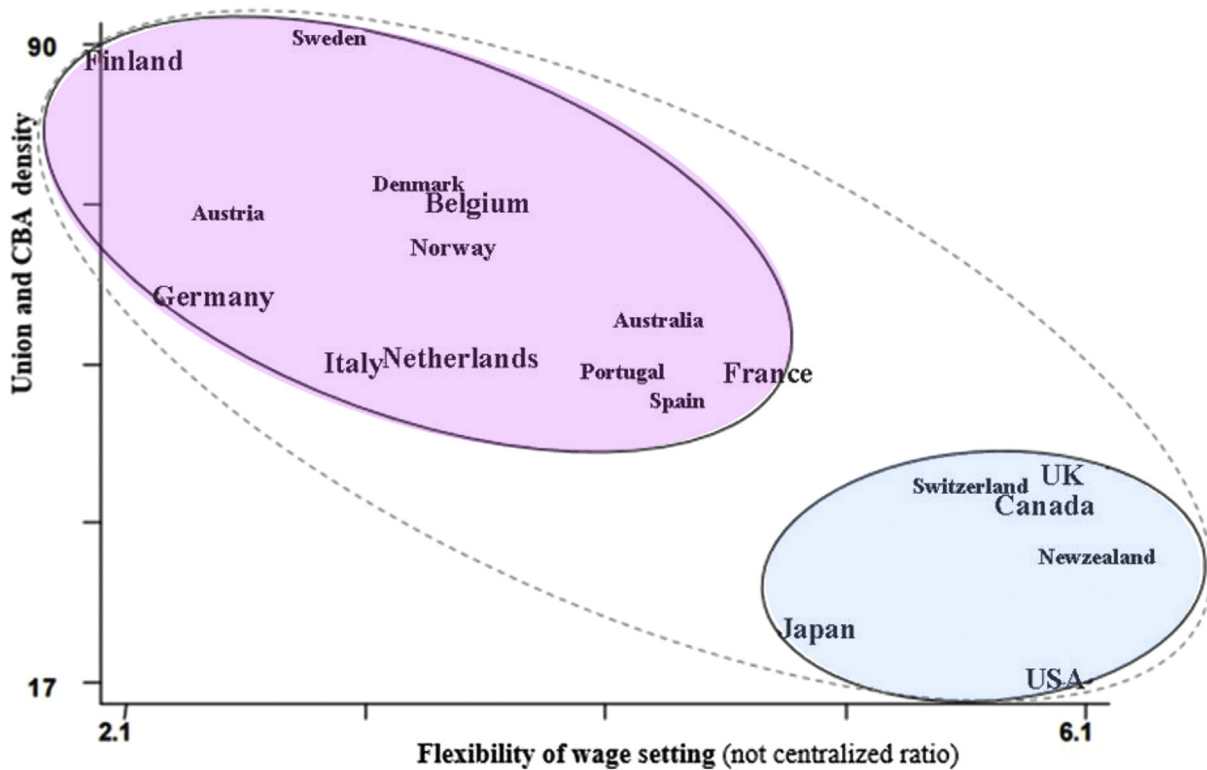
³ States are as of June 2016 based on, NY Times, HuffPo, Reuters, WSI, CNN and local news reports. Note that these states are subject to imminent change.

Table 3

Comparison of adaptability of Uber's development trajectories to LGDCC.(NYC, Jun. 2013–Sep. 2015).

	N_k	a	b	a_k	b_k	adj. R^2	
U_{T1}	144.13 (2.95)	0.123 (12.68)	25.800 (3.29)	0.0001 (0.10 ^x)	3.040 (1.29 ^{*6})	0.992	Rapid growth → Non self-propagation
U_{T2}	119.27 (41.41)	0.121 (36.67)	49.650 (11.13)	0.016 (2.43 ^{*3})	0.200 (1.43 ^{*5})	0.999	Steady growth → Self-propagation

See Table 2 equation and notations.

Figures in parenthesis indicate t-statistics: all significant at the 1% level except ^{*3}: 5%, ^{*5}: 15%, ^{*6}: 20%, x: non-significant.**Fig. 8.** Correlation between Centralization of Wage Setting and Union and CBA Density in 19 Countries in the Late 1990s.

CBA: Collective bargaining agreements. Union and CBA density = (Union density + CBA coverage)/2.

Source: Warner (2002) [22]

Table 4

Contrast of institutional elasticity in Accepting Uber in 16 countries.

Reaction to Uber	Ranking of flexibility of wage determination	Country	State
Generally positive	6	Singapore	Legality is pending but operating actively
	7	Japan	Seems illegal but operating
	14	Taiwan	Seems illegal but operating
	15	UK	Legality is pending but operating with expectation
	19	USA	Generally positive
	20	Saudi Arabia	Legality is pending but operating actively
	27	Russia	No ban, but difficult to operate
	33	Canada	Changing to support
With certain legal battles	69	France	Partial ban as illegal
	111	Thailand	Full ban
	123	Brazil	Against law and prohibited except certain cities
	129	Belgium	Partial ban as illegal
	131	Netherlands	Partial ban as illegal
	132	Germany	Partial ban as illegal
	134	Italy	Partial ban as illegal
	140	Finland	Suspicious it is illegal but connive to operate

Ranking out of 140 countries of the score of the weighted average to the state how are wages set [1 = by centralized bargaining processes; 7 = by each company].

Source: The Global Competitiveness Report 2015–2016 (World Economic Forum, 2015 [29]).

1. Uber has had tremendous difficulties in making inroads into the Japanese market due to “Byzantine” and complicated regulations.
2. Uber was ordered to suspend its pilot project in Fukuoka city in Feb. 2015 because it violates the laws. Uber stopped the project in Mar. 2015

3. Tokyo has a rather tranquil market so far due to its qualified service seeking competitive market with 50,000 taxis (20% of the total in Japan and four times the number in NYC).
Nov. 2013 Uber started in Tokyo (limited launch. Expanded to whole Tokyo area from Aug. 2014).
Jan. 2014 Tokyo Hire-Taxi Association also introduced a mobile app service.
Jan. 2015 Japan's largest taxi company, Nihon Kotsu launched a mobile app Line Taxi.
Mar. 2015 Japanese government stated Uber probably violates laws (unlicensed, safety).
Uber reacted by continuing talks.
Mar. 2015 Japan's e-commerce giant Rakuten entered the ride-sharing industry by purchasing 11.9% in Lyft.
Oct. 2015 Prime Minister Abe instructed relaxing regulation for ride-share in isolated areas.
 4. Although the legal framework in Japan does not allow private cars or ordinary persons to operate as a paid taxi, taxi companies in Tokyo recognized Uber as a business competitor and worked towards improving their services by developing new functions.
 - 5 With government and broader industries involvement for social demand (traffic, aging, isolated rural) co-evolution emerged between IDBM (existing taxi companies also improved their services by introducing their mobile app services) and advancement of institutional systems by solving social demand.
- (3) **Taiwan** [Seems illegal but operating]
1. In response to Taipei's taxi drivers' protests against Uber over the summer of 2014, Taiwanese government planned to pull the app from local stores as it does not meet the country's legislation.
 2. In December 2014, Uber Taiwan was punished with fines and a cease and desists of the app for operating illegally.
 3. Issues included failure to insure vehicles, operating as a business without a business license, metered fares unknown to passengers, metered fares not inspected by the Ministry of Transportation and Communication, and failure to report income and pay taxes. Many drivers had their licenses suspended for violations.
 4. In December 2014 the Ministry of Transportation and Communications announced that the company was operating unlicensed taxis in violation of national law and that the government was considering blocking the service.
 5. In March 2016 the officials of Ministry of Transportation and Communications said there are about 3000 private car owners are working for ride-sharing service, even though the service remains illegal in the country. The cabinet announced that Uber is not welcome in Taiwan since it has never paid local taxes and all of its transactions are processed overseas.
 6. Also in March 2016, The Ministry of Transportation and Communications announced heavier fines. The fine for the first time offender driving a private car seating nine or fewer passengers or a truck weighing 35,00 kg or less is NT\$50,000 (US\$1534), and the vehicle's license plate will be suspended for two months. The fines for the second to the fourth offense have been raised to NT\$ 60,000, NT\$ 70,000, NT\$ 80,000 respectively and license plate suspension for three, four and six months respectively. Fine for fifth or subsequent violations was set to NT\$ 100,000 and license plates revoked.
 7. In June 2016 the Transportation officials decided to step up the police crackdown on Uber drivers in the country's six municipalities. The Fair Trade Commission fined NT\$ 1 million to Uber for the false statements on the company's website that may mislead private drivers into thinking that driving for Uber is lawful.
 8. In response, Uber is determined to support their passengers and drivers by considering them an integral part of its business. Uber has been continuously paying the fines of its drivers. Since September 2014 Uber has been fined more than NT\$ 56 million (US\$1.7 million) for violating the Highway Act.
 9. Uber is hoping to communicate with Taiwan's new government to effectively manage and include the sharing economy platform industry in legal frameworks and use innovation and big data technology to improve the quality of transportation.
- (4) **London** [Legality is pending but operating with expectation]
1. Black taxis have been the kings of the British capital's roads for over a century, but now they are battling a high-technology rival that threatens their dominance. Uber is active in three cities (London, Manchester, and Leeds) in the UK.
 2. Uber has won a significant legal victory in the UK, with London's high court ruling that Uber's app does not constitute a taximeter.
 3. The legal challenge was brought by London's transport agency Transport for London (TfL), following pressure from the city's black cab and taxi drivers.
 4. While taximeters devices which record distance travelled and are used to calculate fares are only allowed for licensed taxis, the judge ruled that the legal definition of a taximeter doesn't include "smart phones which rely on data from a server outside the vehicle."
 5. Uber hailed the decision as a "victory for common sense," adding that the ruling means the company won't have to change how its app works in London.
 6. London Mayor reported that "The technological innovation should not ban, unnecessarily, that which will serve a good purpose to the Londoners." This showed the positive impact of the service in the country. He also added that some solution needs to be sorted out so that the growth of Uber services does not impact the traditional black taxi drivers.
 7. London's Licensed Taxi Drivers Association described the outcome as unbelievable. The transport authority has also asked the court to determine if the service is, in fact, legal.
 8. Notwithstanding the above victory, Uber still faces ongoing legal challenges in London, including proposals to introduce compulsory five-minute wait times and the removal of car icons from the map in the Uber app.
- (5) **USA** [Generally positive]
1. Uber has first laid its foundation in the US with great success. Later regulatory acts were brought against it by the local taxi drivers. It had taken the sharing economy to a next level. A very strong installation growth occurred in the USA with a rate of 1.4% slowly developing to be a strong economy with 20% by the end of the second quarter of its introduction.
 2. Its main popularity is based on its demand side which has its base on the supply. The introduction of ride sharing system by Uber gave a new aspect for more people opting in as the prices were efficient in comparison to the taxi drivers. By the end of 2015, 55% of the ground transportation receipts were for Uber while 43% were for the taxi services.

3. Uber is operating in 75% of US locations although banned in Nevada and Oregon, and there were multiple on-going lawsuits. Among US cities, San Francisco tops the position with 79% usage, while Dallas is 60% and followed by Los Angeles with 54%.
 4. While many cities in the US readily accepted this disruptive innovation, cities like New York, Texas, Portland, Birmingham, etc. stood against Uber because it had no regulations. Regulatory systems were made to be enforced. State legislators in Ohio and Florida are moving ahead with regulations governing Uber and other ride services that would designate all drivers as independent contractors, bolstering a critical but much-disputed aspect of Uber's business model.
 5. The battle between Portland and Uber led to a 120-day pilot program, where Uber was allowed to operate legally in the city if and only if it followed the guidelines such as verifying that the drivers were under the TNC (Transportation Network Companies) or TLC (Taxi and Limousine Commission), insurance card and certificate. These regulations ensured safety for the riders if they opt for ridesharing.
- (6) **Saudi Arabia** [Legality is pending but operating actively]
1. Saudi Arabia's discriminatory automotive policies against women have allowed Uber to achieve great success, due to females having limited options for transportation.
 2. Women are not allowed to drive as it is feared to damage their ovaries leading to children born with clinical problems.
 3. Since women cannot keep their jobs in Saudi Arabia because they have trouble finding reliable transportation to get to work, Uber triggered an institutional revolution for women's social participation as demonstrated by the fact that women make up 70% of Uber's customers.
 4. With such expectation, Uber operates in the Islamic holy cities of Mecca and Medina, as well as the capital city of Riyadh, and the port cities of Jeddah and Dammam. The service is expected to be available in several more cities shortly.
 5. While there remains the issue of compliance with traditional government regulations, negotiations with the institutional regulators in Saudi Arabia have been extremely positive compared to other countries reception towards the app business.
 6. Thus, Uber is expected to grow 50–60% in trips per months in Saudi Arabia in 2016, which in turn accelerates social innovation in the country leading to a co-evolution between ICT-driven disruptive innovation and change in institutional systems triggered by women's social participation.
 7. In June 2016, the Saudi Arabia's Public Investment Fund announced to invest US\$ 3.5 billion in Uber. The investment is a part of the Saudi Arabia's 2030 vision to reduce the country's dependence on oil, its unemployment, and workforce inequality.
- (7) **Russia** [No ban, but difficult to offer service]
1. Regulations in Russia are comparatively simple in comparison to other countries.
 2. Moscow has already a culture of unlicensed taxis that makes Uber's expansion difficult.
 3. Citizens can often hail one by standing on the street corner or via some apps that had existed for years before Uber arrived.
 4. Since 2011, Russia's main search engine company, Yandex, has been running a taxi-app that now is simply known as Russia's Uber.
 5. Uber also trails Gett, known as the Uber of Israel, which operates 10,000 cars in Moscow.
 6. In February 2016, the Moscow's Transport Department threatened to ban Uber from the city unless it signs an agreement to use officially registered drivers and share travel data with local authorities.
 7. In March Uber reached an agreement with Moscow transport officials that gave it the green light to continue operating in the Russian capital.
- (8) **Canada** [Changing to support]
1. Uber drivers in Canada are required to register, collect and remit HST/GST from their fares to the government, regardless of their income.
 2. In December 2012, officials in the city of Toronto charged Uber with 25 municipal licensing infractions. Passengers may be fined for using Uber X, up to \$ 20,000 according to a Toronto city councilor.
 3. Uber was made legal in the city of Edmonton by passing a by-law. However, Uber ceased its operations in Edmonton in March 2016 citing the inability to obtain the necessary insurance. The City of Calgary, Alberta has charged at least 17 drivers illegally driving for Uber.
 4. These drivers were operating without legally mandated insurance. Uber continues to operate illegally in the other regions of Canada.
 5. Toronto Mayor expressed his support for Uber in 2014, and other cities are slowly beginning to look at regulatory options.
- (9) **EC** [Encouraging in principle]
1. On 2nd June 2016, The European Commission presented guidelines intended to support consumers, businesses and public authorities to engage confidently in the collaborative economy and to foster the development of new Internet-based sharing economy startups in Europe (EC, 2016 [10]). On the issue of restrictions, the report explained that the absolute ban or any quantitative restrictions on sharing economy services (Uber, Airbnb) should be proportionate to the public interest at stake, such as public safety or social policy and should only be used as a measure of last resort.
 2. The European Commission Vice-President for Jobs, Growth, Investment and Competitiveness, stressed the importance of keeping Europe as open as the USA for new innovative business models while addressing the negative effects, but such businesses should not become a "parallel informal economy" operating free of regulation. He further stressed that the government's role should be to encourage a regulatory environment that allows new business models to develop while protecting consumers and ensuring fair taxation and employment conditions.
- 3.5.2. *With legal battles*
- (1) **France** [Partial ban as illegal]
1. France government initially started to suppress the service with their policy and later started allowing Uber services in certain cases, not all the services.
 2. UberX is the low cost service that allows only the licensed drivers to operate the cabs and UberPop is also a service but allows even the drivers without a driving license to operate the cab.

3. The government allowed the former but not the latter stating that it would severely affect the regular taxi drivers.
 4. Uber did not accept the decision and filed against the government which led to huge violent protests by taxi drivers. Finally, Uber has suspended their UberPop services until hearing the final judicial result.
 5. Uber announced that it would re-launch its UberPop services if the government considers Uber to be legal. But that seems to be highly unlikely.
 6. Currently, UberPop is banned from functioning in France. Uber was facing equal protests from traditional Taxi drivers stating that it is not a fair competition as the taxi drivers are exempted from the taxes paid by them.
- (2) **Thailand** [Full ban]
1. Following concerns raised by taxi drivers in Thailand over the lower rates charged by Uber drivers, the head of the country's Department of Land Transport (DLT) declared Uber illegal on November 28, 2014 alleging that Uber vehicles are not properly registered in Thailand, the charging methods of Uber drivers are not valid, Thai Uber drivers are not properly licensed, and the service discriminates against people who do not possess credit cards.
 2. The Department also raised security concerns over Uber's credit card-only policy in Thailand, and the head of DLT said that Uber was also illegal under Thailand's Motor Vehicle Act B.E. 2522.
 3. Following the announcement of the November 2014, Uber drivers faced a maximum 4000-baht fine if caught by police.
 4. Meanwhile, a meeting of different government agencies was held to decide how Uber services would be managed in the future.
- (3) **Brazil** [Against law and prohibited except in certain cities]
1. Uber has been used in Brazil since 2015, but only in four major cities: São Paulo, Rio de Janeiro, Belo Horizonte and Brasília. Since it is a user-friendly app and broke up the monopoly of cab drivers on individual transport, Uber use has increased a lot over the first half of 2015. Uber is the preference for passengers who appreciate safety, more diversity in payment options (due to credit cards) and promotional offers.
 2. Since cab drivers are very organized in Brazil, they have frequently been protesting against Uber. They complain that since they pay taxes, Uber drivers or owners should too.
 3. In some cases, cab drivers have been violent. In Belo Horizonte, they've persecuted Uber drivers. In Rio de Janeiro, threats are common, and there was a massive protest against Uber there in late July 2015. In Brazil, a man was attacked by mistake in the airport of Brazil's capital after cab drivers had thought he was an Uber user.
 4. Due to the organization of cab drivers, their lobbying power is huge and in most cities where Uber is used, politicians are working for its prohibition.
 5. In Sao Paulo and Brazil, local legislators have approved different projects to forbid Uber. The mayor of São Paulo has to decide if this prohibition will become law. The governor of Brazil voted the ban on Uber, although this doesn't technically legalize the service. In Rio de Janeiro and Belo Horizonte, Uber is still operating without legal constraints. But their municipal chambers are expected to be as strict as in the other cities.
- (4) **Belgium** [Partial ban as illegal]
1. As in many other cities, established taxi drivers protested against UberPOP (which relies on non-professional drivers using their vehicles) since its arrival in Brussels in 2014.
 2. With such protest, a Belgian court ordered Uber to stop the UberPOP service in September 2015.
 3. In response to the court order, Uber decided to suspend its unlicensed UberPOP service in Brussels and concentrate on building up its more expensive UberX service, which uses professionally licensed drivers.
 4. While Uber has more than 50,000 users in Brussels, they are obliged to use only UberX, a service launched in September 2015.
 5. Therefore, while some 1000 Brussels drivers had used their cars to chauffeur passengers through UberPOP, drivers on the UberX service are very limited.
- (5) **Netherlands** [Partial ban as illegal]
1. UberPop service was launched as a pilot project in Amsterdam between July and September 2014 followed by an expansion project in Hague and Rotterdam.
 2. Currently, the Uber offer its UberX, UberBlack, UberVan and newly launched UberBike service. The UberBike is exclusively targeted at cyclists; now they can order a taxi equipped with a bicycle rack that can fit one city bike or two racing bikes.
 3. In December 2015 a court in Netherlands had banned the company's low cost service UberPop because of its violations of the law on licensing of drivers. The Transport inspectors carried out campaigns against the service and fined Uber a total of 450,000 euros for breaking taxi regulations with its UberPop service.
 4. In November 2015, Uber withdrew its controversial UberPop service in Netherlands by following the order of Trade and Industry Appeals Tribunal in Hague and said the UberPop is a hindrance to the constructive dialogue about modernizing the existing taxi rules.
 5. As Uber runs all of its European operations from Netherlands, so the company often faced criticism and accusations of processing revenues through its Dutch subsidiaries, because of the lower tax rate.
- (6) **Germany** [Partial ban as illegal]
1. The taxi industry is archaic in Germany. Large taxi companies were driven by the profit motivation in a quasi-monopolistic market.
 2. They have little reason to invest to improve customer service. Instead of upgrading their system by challenging innovation, they have chosen to continue using an inefficient and outdated system.
 3. March 2015, the Frankfurt district court imposed a nationwide ban on local transport services using UberPop because its drivers didn't have licenses for transport.
 4. So Uber had to stop its UberPop service. It resumed service under the name UberX with guarantees that its cars and drivers would comply with specific legal requirements. But taxi drivers remain skeptical. The taxi driver trade union declared it would watch whether Uber is abiding by local regulations.
 5. Though UberPop was banned, it introduced another service Uber Black (luxury version of UberX). It is not completely prohibited but still legal proceedings are ongoing stating that they are hired cars different from taxi drivers.
 6. Security and insurance issues remain as the drivers need not necessarily own their license.

7. Finally, another new service 'UberTaxi' was introduced that adhere to the local and legal requirements of the government.
8. Uber has criticized the German courts for trying to force the digital platform to comply with laws "dating back to the '50s." Uber brought its concerns about the restrictions to the European Commission.
9. Consequently, Uber's ride-sharing revolution resulted in disengagement from German institutional systems.
- (7) **Italy** [Partial ban as illegal]
 1. Traditional taxi drivers in Italy raised a protest against UberPop, which was yet another legal battle thrust upon Uber.
 2. The court forbade UberPop for allowing unlicensed drivers for the taxi services. UberPop allows ride sharing services, and it also allows any person to use their car as a taxi which increases the risk to customers.
 3. UberPop is just a variation version of Uber, which is being offered in the country regions where the operation of unlicensed taxis is prohibited.
 4. Uber was given a time frame of 15 days to comply with the rules or encounter a fine of 20,000 euros for each day's delay in court meeting.
 5. On May 26, 2015, the court ordered a complete ban on the UberPop services much to the shock of the organization.
- (8) **Finland** [Suspicious it is illegal but connive to operate]
 1. Taxis in Finland are fairly expensive (A typical 10 km ride costs 1.2–1.6 times higher than NYC).
 2. Uber started its operations in Helsinki, Finland in 2014 and offered two products, Uber Black and UberPop on a six month trail. The app has been controversial from the beginning because of its direct hit on the operating model of existing taxi industry, which is highly regulated from pricing to the number of licensed taxis.
 3. The Finnish Taxi Association requested the police authorities to step in and deal with unauthorized and controversial taxi traffic by ride sharing service in the same manner as in other countries.
 4. The Finnish Tax Administration says it is concerned that some drivers working for Uber may be avoiding paying taxes.
 5. The Tax Administration stressed that it is not authorized to determine whether Uber's services conform to Finnish law, which requires taxi service providers to obtain a specific authorization for their business.
 6. Uber clarified itself as not a taxi company. But it's illegal to operate a cab without a license. The Finnish police instructed citizens not to use illicit taxis and call the police emergency service if they spot any such taxi. The police are using surveillance, citizen reports, and even sting operations to crack down on the drivers. The police weekend long road side checkpoints intended to catch drunk drivers also caught several illicit taxis, many of whom were working for Uber.
 7. The Helsinki Court has found a 23 year old man guilty of illegally operating as a taxi driver with Uber's ride-sharing service in Helsinki for three and half months. The man received a 25 day fine amounting to 150 euros and was ordered to surrender his ill-gotten gains estimated at 12,000 euros to the state.
 8. Recently, The Ministry of Transport and Communications has proposed new legislation to reform the transport in Finland and among other things propose the small freight and passenger transport permitted without a license up to an annual turnover of 10,000 euros.

3.6. Uber adaption in countries/cities depending on growth rate and institutional elasticity

3.6.1. Scheme of adaption to institutional systems

By the preceding analyses, it can be postulated that the contrast of Uber's global expansion without and with legal battles can be attributed to its co-evolution or disengagement with the host institutions. Furthermore, this contrast can be subject to the velocity of Uber "invasion" (its growth rate) and institutional elasticity of the host. While rapid growth enhances functionality development level significantly, it allows insufficient time for the host to routinization resulting in it being unable to accomplish its self-propagation as demonstrated in Table 3. Non-elastic institutions apt to internal regulations protect vested interests of incumbent organizations as demonstrated in Fig. 8.

With an understanding that there exists a certain threshold resisting innovation (Oreg et al., 2015 [16]), Fig. 9 illustrates a scheme of adaption of Uber in institutional systems. Critical legal battles in Germany and France, for example, can be attributed to rapid growth in their non-elastic institutions, while the relatively mild state in Finland notwithstanding its non-elastic institutions can be attributed to Uber's steady growth. Active operation in Singapore and Saudi Arabia notwithstanding legality can be attributed to a co-evolution with their elastic institutions which induces Uber's rapid growth in these countries. Tokyo's steady operation notwithstanding possible illegality can be attributed to its institutional elasticity with demanding nature in matured competitive environment and Uber's steady growth.

Noteworthy is those countries/cities without legal battles have constructed co-evolutionary acclimatization system and harnessing the vigor of counterparts as a possible countermeasure to the trap in ICT advancement as reviewed in 3.2 (see Fig. 6). This system induces CCSD (Consolidated Challenge to Social Demand) that consolidates broader stakeholders including company, employer, user and government for social demands like traffic, employment, environment, aging and disabled issues.

3.6.2. Consequence of Uber-driven IDBM with and without CCSD

The contrast between countries/cities with and without legal battles can be attributed to with or without CCSD as demonstrated in Fig. 10. While the former develops co-evolutionary dynamism, the latter results in disengagement.

3.6.3. ICT-driven disruptive business model with consolidated challenge to social demand

Preceding analysis suggests that ICT-driven disruptive business models with a consolidated challenge to social demand (IDBM – CCSD) as illustrated in Fig. 11 would be decisive for resilient IDBM co-evolving with the institutional systems of the host (cities which introduce Uber: Uber introducing cities UIC).

Uber is encouraging vertical and horizontal integration in the car-hire sector thereby it is reducing vertical fragmentation within taxi companies on company, employers and drivers relationship. Also, it is integrating the sector horizontally. Uber is compiling a massive database of driver and rider behavior essential to price-setting and market-making functions thereby reducing horizontal fragmentation of the sector (Rogers, 2015 [18]) Thus, Uber can be recognized as incorporating the inherent potential of IDBM with CCSD.

Given such inherent potential, Uber's success in its global expansion depends on the optimization of timing, pace, and selection of the hosts with different social demands suitable enough to constructing co-evolutionary acclimatization.

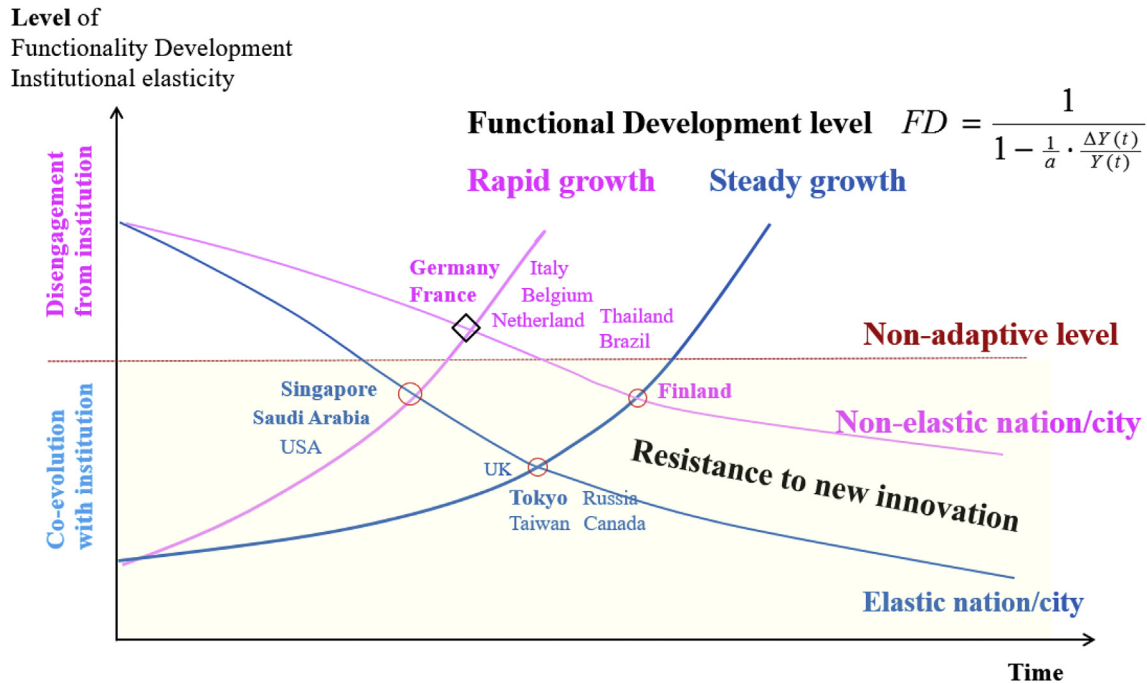


Fig. 9. Scheme of adaption of Uber in institutional systems.

Countries without legal battle

Uber induced CCSD leading to a co-evolution between ride-sharing revolution and advancement of the institutional systems.

Singapore: Induced incorporating user's requirements into the tripartism framework (company, employee, government) by stimulating social demand (transport, job, productivity).

Saudi Arabia: Enabled women's social participation by providing the reliable transportation leading to co-evolution.

Tokyo: Stimulated better service seeking competitive market broader stakeholder's involvement for social demand solution.

Countries with legal battle

Traditional quasi-monopolistic market protected by non-innovative government impeded Uber's revolution resulting in disengagement from the institutional systems.

Germany: Government non-innovative policy urging traditional legal requirements in response to traditional taxi companies' requirement to preserve existing profit securing system based on quasi-monopolistic market impeded Uber's disruptive innovation resulting in failing CCSD construction.

France, Italy follows the similar results.

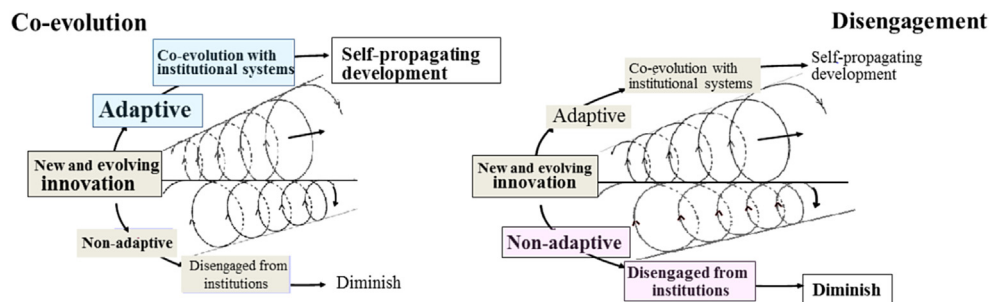


Fig. 10. Co-evolution and disengagement between Uber-driven IDBM and institutional systems.

4. Lessons from success model

4.1. Significance of shift to IDBM with CCSD

Nowadays, a key factor in obtaining business opportunity is the

ability to solve social demand. A company to gain a profit must consolidate all stakeholders: company, employee, user, and government with respective heterogeneous objectives. Developing systems that address all stakeholders' demands in society as a whole can allow these disparate groups to successfully function

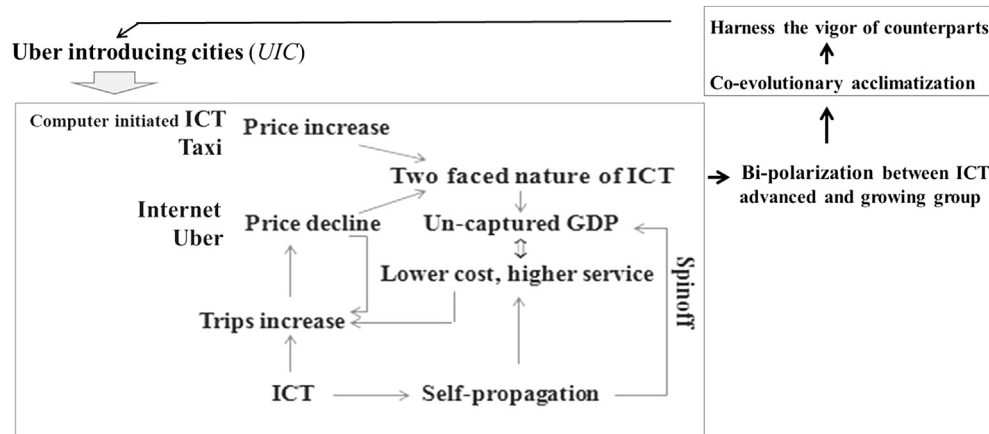


Fig. 11. Scheme for ICT-Driven disruptive business model with consolidated challenge to social demand (IDBM – CCSD).

together. In this process, the company can attain its profit seeking target as illustrated in Fig. 12.

The company that can attain such system success has the following required abilities:

- (i) Penetration of the social demand that can be its business opportunity,
- (ii) Organize and orchestrate all stakeholders, and
- (iii) Attain the system success thereby gain profit.

Effective development and utilization of ICT enable such endeavors which up to now had no conception. This is the reason why Uber, the crown jewel of ICT can be recognized as incorporating inherent potential of IDBM with CCSD.

4.2. IDBM with CCSD in success model

Table 5 summarizes the structure of CCSD in success countries like Singapore, Saudi Arabia, and Tokyo. Singapore's success can largely be attributed to its tripartism framework consisting of Ministry of Manpower, National Trades Union Congress, and Singapore National Employers Federation, and based on trust among them. Uber enabled user's involvement in this framework thereby establishing the consolidation of all stakeholders as a company, employee, users and the government. Uber enjoys Singapore's well developed infrastructure and innovation seeking spirit. Thus, co-evolutionary acclimatization based on IDBM with CCSD has been established. Success in Saudi Arabia owed largely to Uber's contribution to women's social participation which

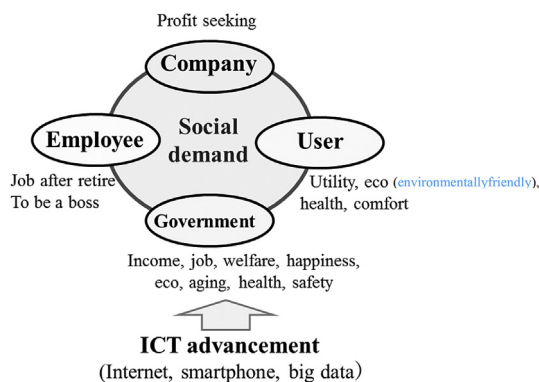


Fig. 12. Consolidated challenge to social demand.

inevitably consolidates broad stakeholders involved in education and industrial structure. Country's affluent financial base accelerates IDBM with CCSD. In Tokyo's case, while legal constraints are strong, nation's demanding nature and high potential demand with four times bigger market than NYC as well as matured competitive environment benefitted Uber to advance its business. Increasing demand in the aging society also accelerated unique IDBM with CCSD.

4.3. Transformative role of co-evolutionary acclimatization

All success cases suggest the significance of CCSD through co-evolutionary acclimatization that creates IDBM with CCSD by harnessing the vigor of counterparts. The function of trust-based tripartism framework suggests the significance of ICT and trust toward IDBM with CCSD in the digitally-rich environment.

Koopman et al (2014 [12]), suggested that markets, competition, reputation systems, and ongoing innovation often solve problems better than regulation when we give them a chance to do so. Arvind et al (2014 [1]), suggested that platforms can be better than governments at spotting stalkers, running background checks on sharing service providers, and responding quickly to conflicts among members as platforms are closer to the action and they have an incentive to look after their communities. They also pointed out that the task is to share the pain and the wealth, and if this sharing happens, the wealth will grow and endure.

Cohen et al. (2014 [6]), by using agency theory, attempted to unveil the optimal relationship between service providers (agents) and the local governments (principals) to achieve the common objective of sustainable mobility. They claimed that the private rideshare operators had opted to avoid interaction with local governments resulted in legal action and other threats posed by local governments and taxi operators. They suggested that shared mobility service providers would be better served by finding ways to collaborate with local governments.

Posen (2015) [17] pointed out that the solution is not to force Uber to comply with outdated regulations; rather, regulators should rely on experimental regulations for safety, which will allow consumers to make their choice of which service they would like to use while ensuring their safety. Furthermore, by relying on the use of experimental regulations, regulators will be able to evaluate the effectiveness of the regulations as more information on these services becomes available. Experimental regulations of that nature will allow regulators to protect consumers and will allow consumers to have access to the services they want. Cusumano (2015)

Table 5
Structure in CCSD in success countries/cities.

	Consolidated challenge by all stakeholders	Social demand	Co-evolutionary acclimatization
Singapore	Tripartism framework User involvement Company, employee, user, government consolidation	Traffic service, Job opportunity, Overall productivity enhance, Digital innovation	Tripartism framework, Well developed infrastructure, Innovation seeking spirit
Saudi Arabia	Women (user, employee) Company involvement Government involvement	Women's social participation, Education, Industrial structure	Strong inertia to women's social participation, Affluent financial base
Tokyo	User welcome Company, employee concern Government involvement	Traffic service, ICT advancement, e-commerce, Depopulation, Aging society	High potential demand, Demanding nature, Matured competitive environment

[8] suggested that traditional enterprises should be able to provide more reliable, consistent, broader, and safer services than sharing-economy competitors.

All suggest the significance of the transformative role that co-evolutionary acclimatization plays.

Given that the key of Uber's system success can largely be attributed to the emergence of un-captured GDP driven by the discrepancy between taxi prices and magnitude of their decline effect derived from Uber⁴ (Watanabe et al., 2016 [28]), how to transform this asset to hosts could be the fundamental question. We should note that co-evolutionary acclimatization dynamism incorporates this function as reviewed in Fig. 6.

A vicious cycle which ICT advanced economies suffer is in compensation for un-captured GDP emergence as illustrated in the center of Fig. 6. This un-captured GDP satisfies people's preferences shift to supra-functionality beyond economic value and plays a locomotive role for inducing further ICT advancement as illustrated in the right center of Fig. 6. While the further advancement of ICT accelerates to emerge un-captured GDP in ICT advanced economies, it is necessitated for sustainable GDP increase in ICT growing economies. However, they are running short of sufficient ability for this advancement. Therefore, upon appropriately transferred to ICT growing economies, transferred ICT may sufficiently contribute to increasing captured GDP in ICT growing economies which can be harnessed by ICT advanced economies for their balancing of captured and un-captured GDP as illustrated in the bottom of Fig. 6.

This illustration suggests that co-evolutionary acclimatization dynamism incorporates self-organizing ability in attaining optimal timing, pace, and selection of the host. Also, we should not overlook the transformative role that this system functions in transforming un-captured GDP (in ICT advanced economies) into captured GDP (in ICT growing economies) thereby enabling ICT advanced economies to maintain an optimal balance between captured and un-captured GDP as illustrated in Fig. 13.

Thus, we could conclude that triggering to activate latent self-organization ability that co-evolutionary acclimatization dynamism incorporates may provide the solution to Uber for its successful global expansion. This solution provides insightful suggestions for the trajectory management of the nations moving toward the era of IoT.

5. Conclusion

In light of a question raised regarding the rationale of noting ICT-driven disruptive business model (IDBM) demonstrated by Uber the crown jewel of ICT, and given Uber's legal battles in a number of cities around the world as it rapidly expanded globally to over 479 cities worldwide, the institutional sources contrasting such success and failure were examined.

Aiming at elucidating these sources, focusing on the ICT's inherent function on which IDBM is based, comparative empirical analysis of Uber's global expansion was attempted.

Noteworthy findings include:

- (i) Success or failure of Uber's global expansion can be attributed to its co-evolution or disengagement with host institutions,
- (ii) This contrast can be subject to Uber's growth rate and institutional elasticity of the host,
- (iii) Countries/cities without battles have constructed co-evolutionary acclimatization system and harnessed the vigor of counterparts,
- (iv) This system induces CCSD (Consolidated Challenge to Social Demand) that consolidate the broad stakeholders including company, employer, user and government, based on trust among them, for social demands,
- (v) Thus, IDBM with CCSD would be critical for resilient IDBM co-evolving with the institutional systems of the host,
- (vi) Since Uber can be recognized as incorporating the inherent potential of IDBM with CCSD, its success in global expansion depends on the optimal balance of timing, pace, and selection of the host suitable enough to constructing a co-evolutionary acclimatization,
- (vii) Transformative role incorporated in co-evolutionary acclimatization dynamism, upon functioning, may lead to this optimization, and
- (viii) Therefore, triggering the activation of latent self-organization resources ability that co-evolutionary acclimatization incorporates may provide the solution to Uber for its successful global expansion.

These findings form the bases for the following suggestions supportive to sound development of worldwide IDBM:

- (i) Careful and thorough consideration of IDBM development with CCSD,
- (ii) The “quadpartism” framework enabling careful consultation among company, employee, user, and government,

⁴ The substance of this un-captured GDP can be summed up as follows (Watanabe et al., 2016 [28]): High-qualified services with lower cost and shorter time. An increasing initiative of passengers and the company's systematic market strategy of continuous deduction of costs and time in search and matching, eliminating information asymmetries and compiling a massive database.

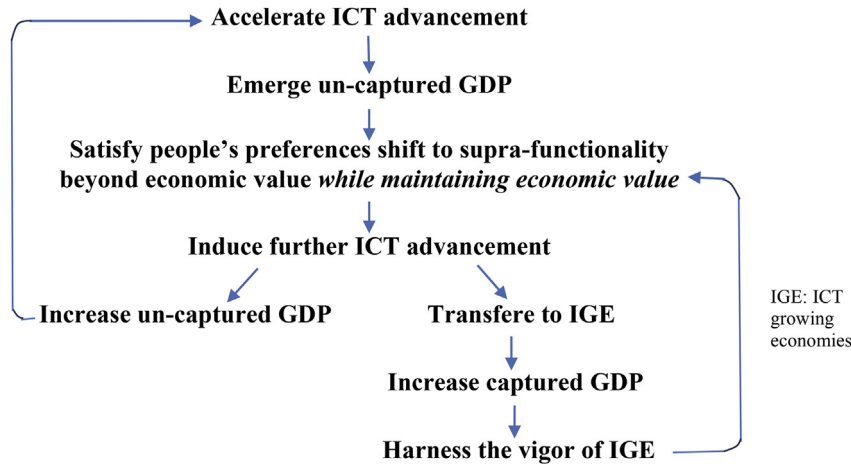


Fig. 13. Scheme of optimal dynamism for balancing captured and un-captured GDP.

- (iii) Optimal balance between captured and un-captured GDP emergence,
- (iv) Effective triggers activating the latent ability of self-organization incorporated in the co-evolutionary acclimatization system, and
- (v) Instilling of the leading role of IDBM in solving social demands.

This analysis has explored a prototype of the analysis of IDBM for sound global expansion focusing on ICT inherent functions. A similar approach is expected to be undertaken for similar IDBM such as education, digital music, electric game, and printing/publishing.

Given the significance of ICT and trust toward IDBM with CCSD in the digitally-rich environment, trust-based education toward digitally-rich learning environments would be particularly expected as a timely subject to undertake.

By doing the analysis of Uber, authors succeeded to project national level findings on un-captured GDP onto the business level. Further projection onto the user level should be explored. An empirical analysis of digital music may open an insightful path for this development.

Acknowledgement

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Appendix 1. Self-propagating nature of ICT leveraging spin-off

Diffusion trajectory of innovative goods Y

$$\frac{dY(t)}{dt} = aY(t)\left(1 - \frac{Y(t)}{N}\right)$$



Simple Logistic Growth (SLG) with fixed carrying capacity (N)

$$Y(t) = \frac{N}{1 + be^{-at}}$$



Particular innovation which create new N during the process of diffusion.

$$\frac{dY(t)}{dt} = aY(t)\left(1 - \frac{Y(t)}{N(t)}\right)$$



Logistic Growth within a Dynamic Carrying Capacity (LGDCC)

$$Y = \frac{N_k}{1 + be^{-at} + \frac{b_k}{1-a_k/a} e^{-a_k t}}$$

Carrying capacity increases as Y increases.

$$N(t) = Y(t) \left(\frac{1}{1 - \frac{1}{a} \cdot \frac{\Delta Y(t)}{Y(t)}} \right)$$



Functionality spirally increases as Y increases.

$$FD = \frac{N(t)}{Y(t)} = \frac{1}{1 - \frac{1}{a} \cdot \frac{\Delta Y(t)}{Y(t)}} \quad \Delta Y(t) = \frac{dY(t)}{dt}$$

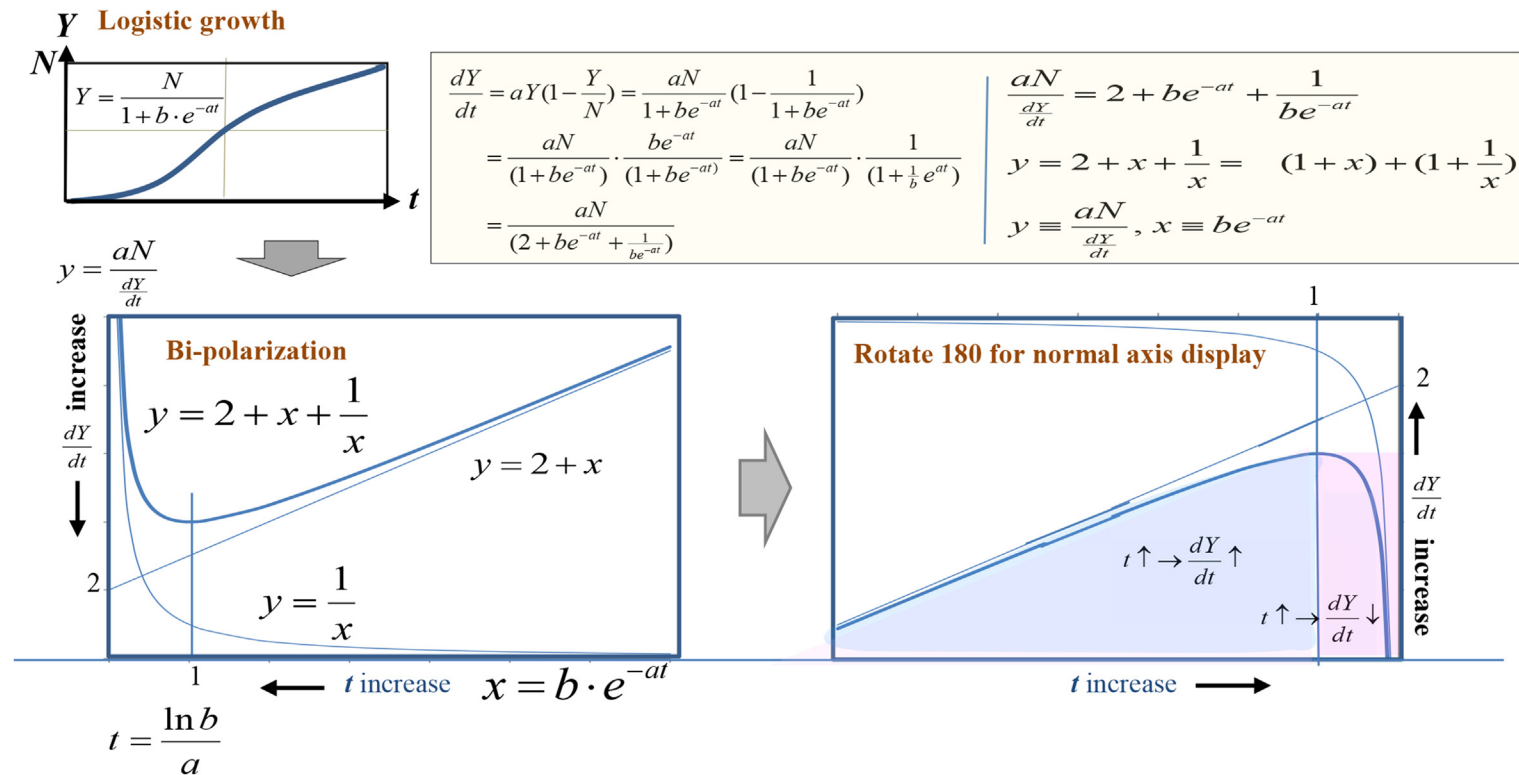


Self-propagation



Spin-off

Appendix 2. Scheme of the bi-polarization fatality of logistic growth



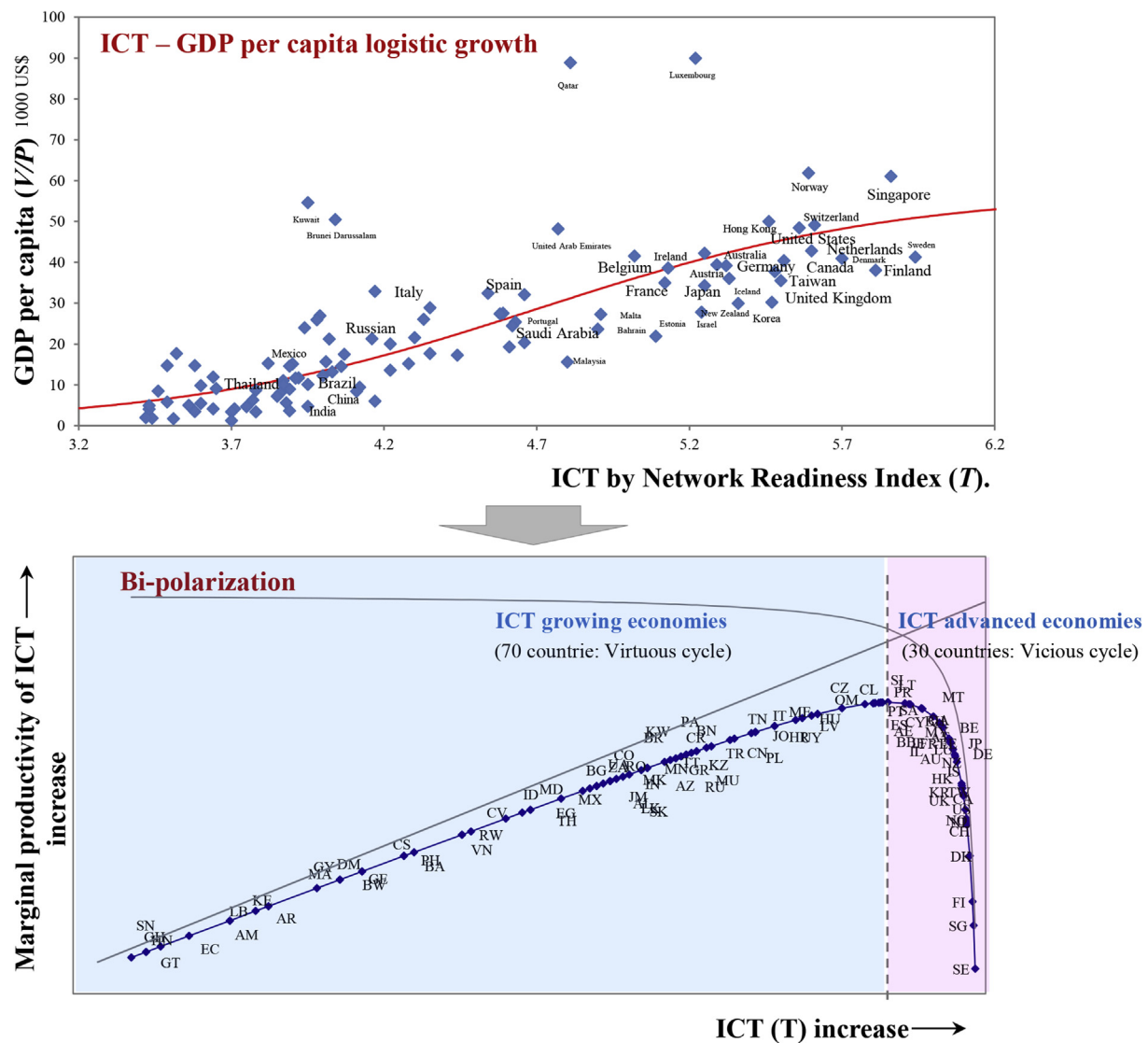
Appendix 3. ICT-driven logistic growth and its bi-polarization

(A Case of 100 Countries in 2011).

$$Y \equiv \frac{V}{P} = \frac{N}{1 + b \cdot e^{-at}} + c \cdot D_1 + d \cdot D_2$$

N	a	b	c	d	adj R ²
57239 (9.62)	1.68 (7.58)	2697.28 (9.80)	46434 (14.54)	-12913 (-5.25)	0.885

V: GDP, P: population, N: carrying capacity, T: ICT, D₁, D₂: dummy variables, a, b, c, d: coefficients.
Figures in parenthesis indicate t-statistics: all significant at the 1% level.

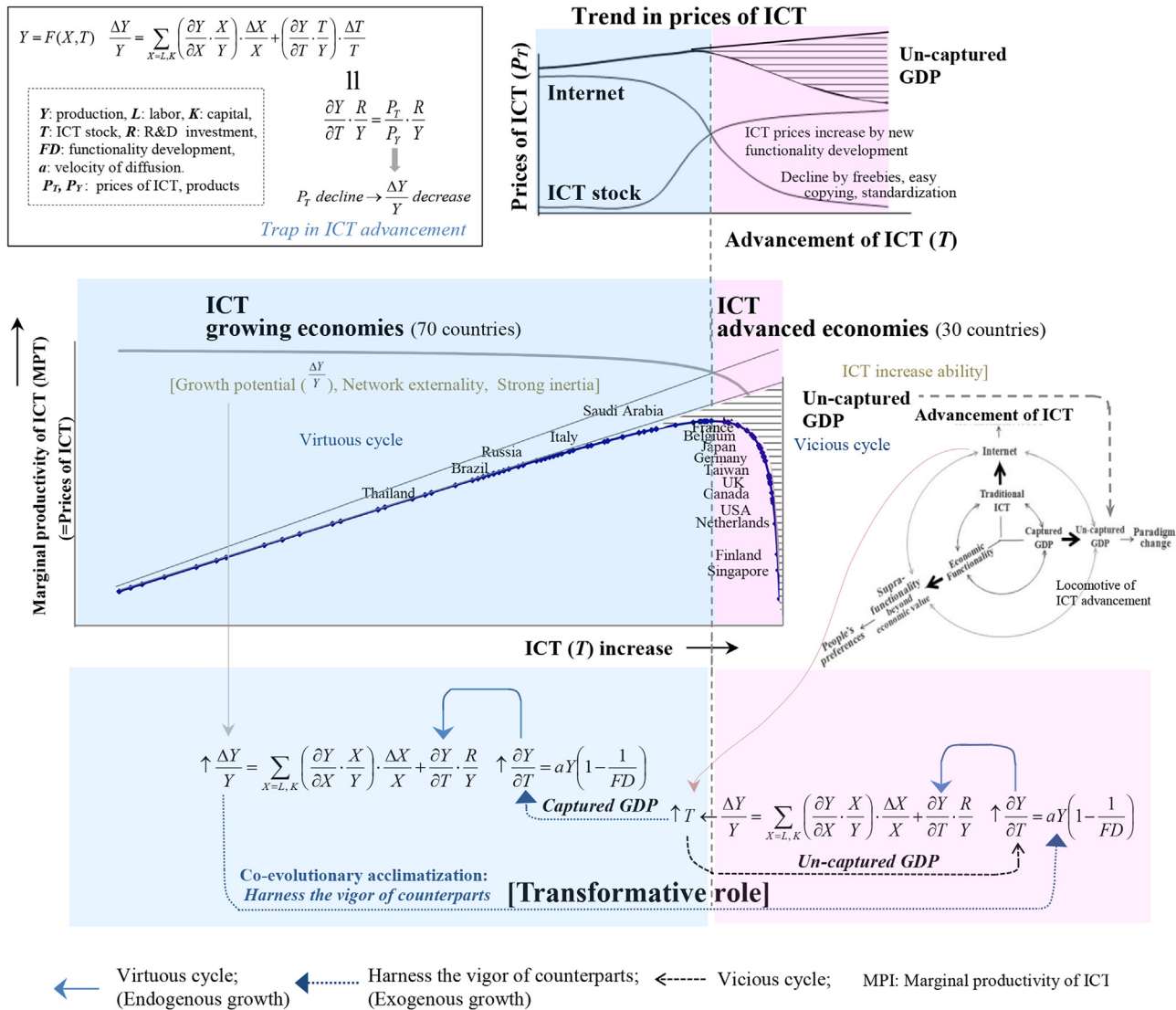


ICT Ranking in 100 Countries (2011)

1. SE Sweden	6. NL Netherlands	11. TW Taiwan	16. DE Germany	21. LU Luxembourg	26. MT Malta	34. SA Saudi Arabia	65. BR Brazil
2. SG Singapore	7. NO Norway	12. KR Korea	17. AU Australia	22. BE Belgium	27. BH Bahrain	38. ES Spain	69. IN India
3. FI Finland	8. US United State	13. HK Hong Kong	18. JP Japan	23. FR France	28. QA Qatar	48. IT Italy	72. ZA South Africa
4. DE Denmark	9. CA Canada	14. NZ New Zealand	19. AT Austria	24. EE Estonia	29. MY Malaysia	51. CN China	76. MX Mexico
5. CH Switzerland	10. UK United Kingdom	15. IS Iceland	20. IL Israel	25. IE Ireland	30. AE UAE	56. RU Russia	77. TH Thailand

Appendix 4. Transformative role of co-evolutionary acclimatization

Trap in ICT Advancement - ICT's Two Faces



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