2A02

デジタル経済下での「イノベーション指標」の変容
ーイノベーション・成長概念変容の構造解析と計測

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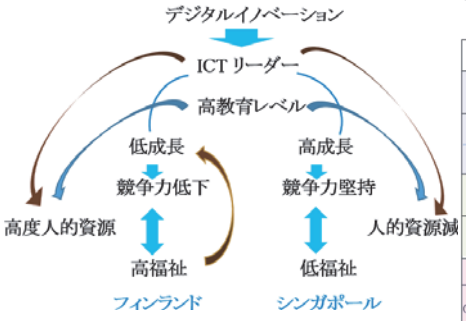
1. 序

Tapscott は、ベストセラー「デジタル経済」(1994) で、インターネットはデジタル経済を導き、ビジネスや日常生活を劇的に変えると洞察した。デジタル経済は、彼の洞察をはるかに超えて、従来の常識を覆し、在来の枠組みを越えて、想像を絶するスピードで進み続けている。インターネットは年々覚醒して、思いもしないソシアルエコシステムを創り出して、すべての生産要素を自己増殖的に席巻し、成長や競争力の概念を根底から変える (図 1-1)。

そのような渦中で、グローバル ICT リーダーは、限界生産性ゼロ社会に直面して、R&D 拡大と生産性低下のジレンマに直面する。それは、必然的にデジタル経済下でのネオ・オープンイノベーションともいうべき、新たなイノベーション資源の活用に導く (図 1-2)。

これらは、従来の「イノベーション指標」を根底から変える。その実相と国際対応の動きは前発表で示したとおりである。

本発表は、その認識に立脚して、昨・一昨年の報告をベースに、イノベーション・成長概念変容の構造解析と計測を試み、世界の IT リーダー及びグローバル ICT 企業の超克策にその裏付けを示した。

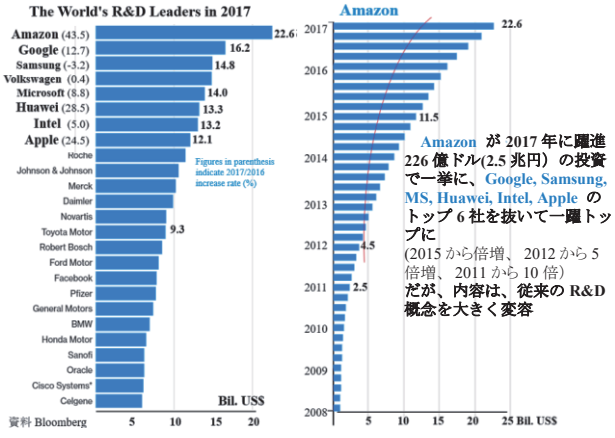


成長・競争力概念の変容
「高福祉・低成長」「低福祉・高成長」 構図の変容
高福祉の活力は成長回復のハイブリッド機能を内包

図 1-1. IT リーダーの投げかける課題.

・2016 世界ランク (< 2013 >)

		Finland	Singapore
Population (million) *2015		5.5	5.5
ICT (Rank out of 139)		2 <1>	1 <2>
Quality of primary education (Rank out of 138)		1 <1>	4 <3>
Quality of higher education system (Rank out of 138)		3 <2>	2 <3>
Human capital (Rank out of 130)		1 <1>	13 <3>
Global competitiveness (Rank out of 138)		10 <3>	2 <2>
GDP per capita (1000 US$) *2015		42.0	52.9
GDP growth rate (% pa at fixed prices) Average	2006-2013	0.57	5.85
	2014-2016	0.34	2.50
Trust (Rank out of 21) *2013		2	7
Gender parity (Rank out of 144)		2	55
Happiness (Rank out of 156) *2010-2012 state		7	30
Inequality (GINI index) *2010 state		19	45
GDP growth rate 2017-2018		2.79	3.28



Amazon が 2017 年に躍進 226 億ドル(2.5 兆円) の投資で一挙に、Google, Samsung, MS, Huawei, Intel, Apple のトップ 6 社を抜いて一躍トップに
(2015 から倍増、 2012 から 5 倍増、 2011 から 10 倍)
だが、内容は、従来の R&D 概念を大きく変容

図 1-2. R&D 投資概念の変容.

2. デジタル経済の原動力

2.1 インターネットの新たな覚醒

(1) 自己増殖的席巻

インターネットは年々覚醒して、すべての生産要素を自己増殖的に席巻。

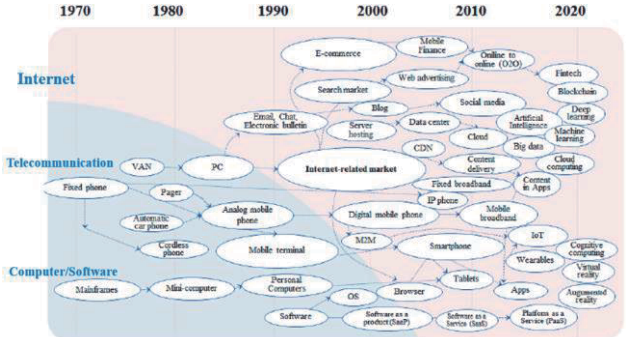
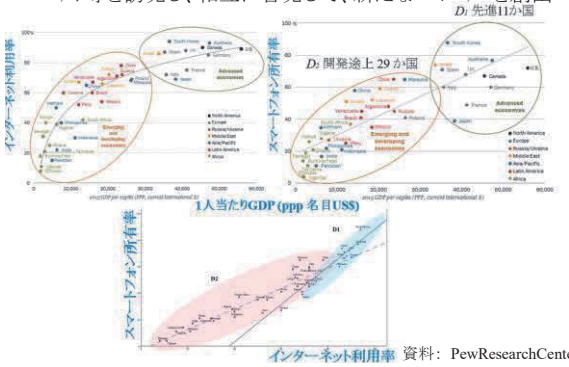


図 2-1. インターネットによる ICT 分野の自己増殖的席巻.

(2) ソシアルエコシステムの形成

スナホ等を誘発し、相互に啓発して、新たなエコシステムを創出



$$\ln SP = -0.941 + 1.153\, D_1 \ln ID + 1.147 \ln D_2\, ID \qquad adj.\ R2\ 0.933$$
$$(-4.31)\quad (22.66)\qquad (19.81)$$

図 2-2. 40 か国のインターネット利用率とスマホ所有率の相関 (2015).

(3) 同質技術ストックの形成

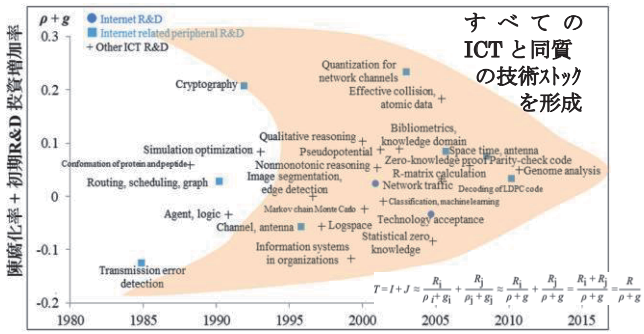


図 2-3. インターネット、ICT の陳腐化率・初期 R&D 投資増加率和の推移 (14,000 文献 1980-2015).

2.2 ICT の二面性

(1) インターネットの導く限界生産性ゼロ社会

ICT は、そのストックの増大に伴う新機能に応じて価格を上昇させる一方、逐年インターネットの無料利用が広がり、価格を低下。その結果、ICT 価格総体は逐年低下するが、経済指標では計測されない「従来にないユニークなサービス」(Uncaptured GDP) を提供。

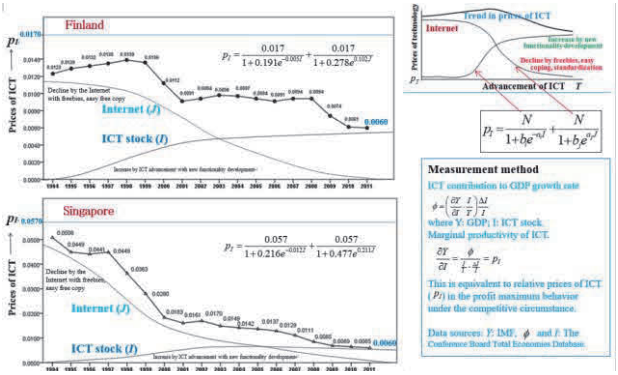


図 2-4. フィンランド・シンガポールの ICT 価格の推移 (1994-2011).

2.3 国民的選好の非貨幣消費へのシフト

軌を一にして、国民選好も経済価値を越えた「超機能」にシフト。

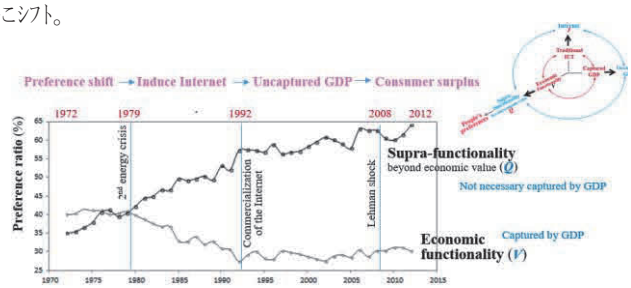


図 2-5. 日本の国民選好シフトの推移 (1972-2012).

2.4 イノベーション創出ダイナミズムの変容

(1) インターネット・非計測 GDP・超機能の共進

その結果、インターネットの飛躍 → Uncaptured GDP (非計測 GDP)への依存 → 国民選好の超機能シフト →さらなるインターネットの躍進、の共進的イノベーションが進展。

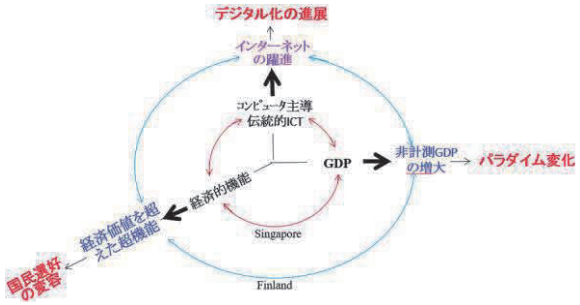


図 2-6. デジタル化イノベーション固有の 共進的メガトレンド.

(2) R&D 主導イノベーション戦略の変容 ― 高 R&D 企業の対限界生産性低下戦略

グローバルICT 500 企業	2005	2016
高 R&D 企業 ―悪循環	16	25
低 R&D 企業 ―好循環	484	475

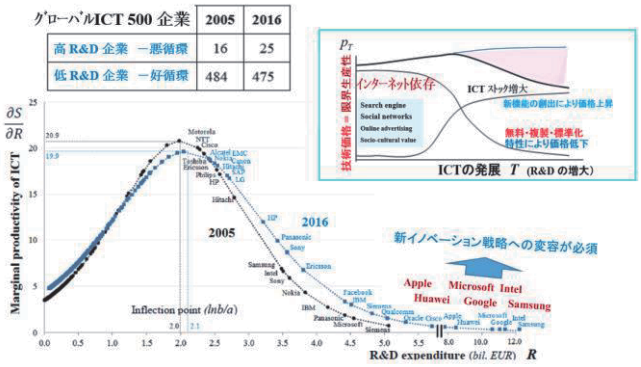


図 2-7. グローバル ICT 500 企業の R&D 主導発展軌道 (2005, 2016).

(3) 自己増殖機能の覚醒・活性化

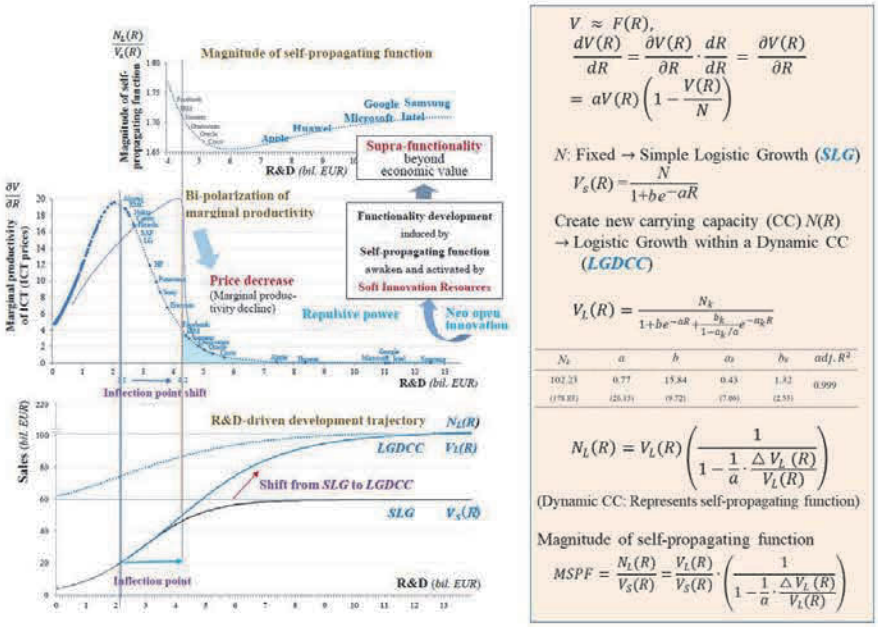


図 2-8. グローバル ICT リーダーの生存戦略 (2016).

デジタル経済下の世界競争に勝ち抜くためには、R&D の拡大を軸に、他に先駆けて革新的な新機能を創出することが不可欠。

しかるに、グローバル ICT リーダーは、ICT の二面性に伴う、R&D の拡大と生産性低下のジレンマに直面して、新たな破壊的イノベーションへの変容が喫緊の課題。

このため、デジタルイノベーション下のネオ・オープンイノベーションともいうべき、新たなイノベーションモデルへの変容に挑戦。

限界生産性の低下を来す R&D に依らない新たなイノベーション資源 (ソフトイノベーション資源) を発掘・開拓・活用して、それを梃に、ICT 固有の自己増殖機能を覚醒・活性化し、それに則って国民選好のシフトにそう超機能を創出。

それは、インターネットのさらなる革新を誘発して、「インターネット・非計測 GDO・超機能の共進」 にのっとった新たなイノベーションダイナミズムを創出。

(4) ﾃﾞｼﾞﾀﾙｲﾉﾍﾞｰｼｮﾝ下でのﾈｵ･ｵｰﾌﾟﾝｲﾉﾍﾞｰｼｮﾝ

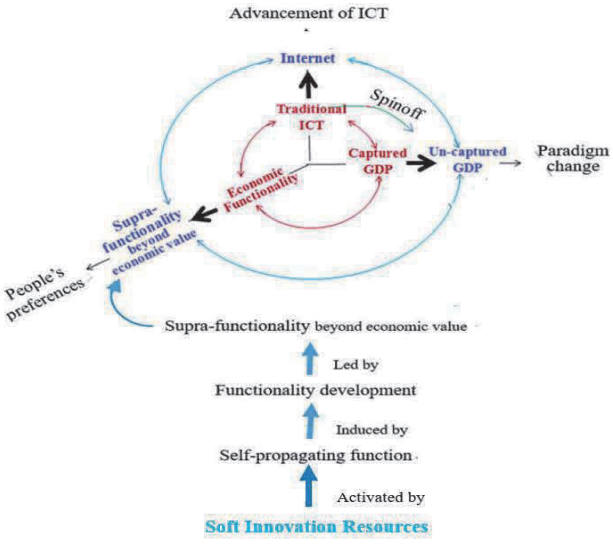


図 2-9. ｸﾞﾛｰﾊﾞﾙ ICT ﾘｰﾀﾞｰの破壊的ﾋﾞｼﾞﾈｽﾓﾃﾞﾙ.

限界生産性の低下を来すことになる R&D に依らないイノベーション資源（ソフトイノベーション資源）を活用して（ネオ・オープンイノベーション）、ICT 固有の自己増殖性を覚醒・活性化させることによって、国民選好のシフトに応える「経済価値を越えた超機能」を生み出して持続成長を維持。

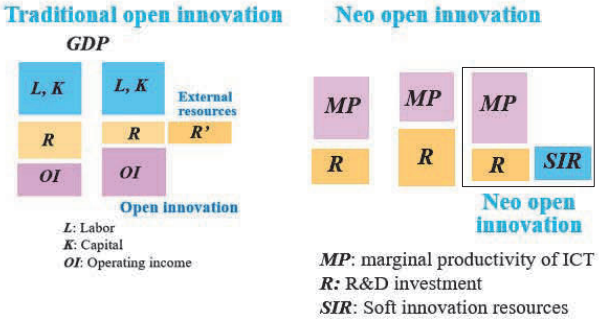


図 2-10. ネオ・オープンイノベーションのコンセプト.

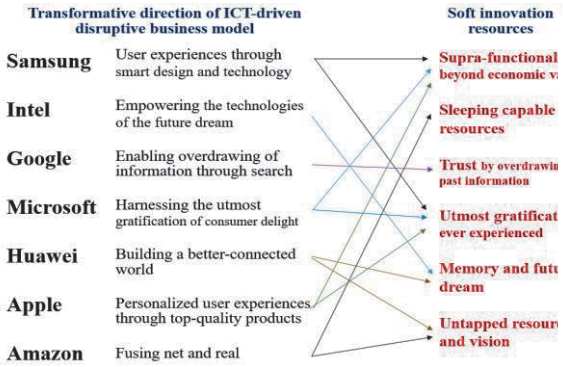


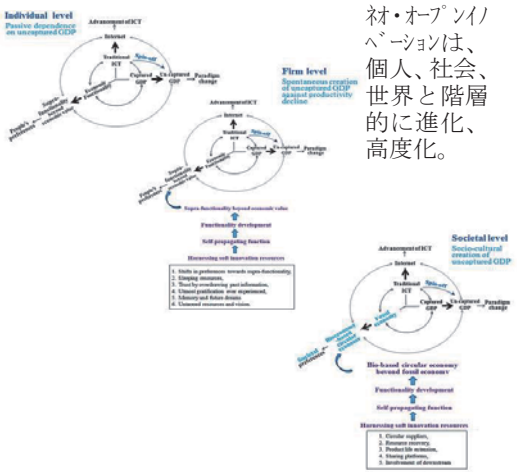
図 2-11. グローバル ICT リーダーのネオ・オープンイノベーション - Soft Innovation Resources の活用.

3. イノベーション指標の変容

– ｿﾌﾄｲﾉﾍﾞｰｼｮﾝ資源

3.1 共進的メガトレンドの発展

(1) ｿﾌﾄｲﾉﾍﾞｰｼｮﾝ資源活用の高度化



ﾈｵ・ｵｰﾌﾟﾝｲﾉﾍﾞｰｼｮﾝは、個人、社会、世界と階層的に進化、高度化。

図 3-1. ソフトイノベーション資源活用の高度化ステップ.

(2) ｻｰｷｭﾗｰｴｺﾉﾐｰ世界ﾘｰﾀﾞｰ UPM の先駆的挑戦

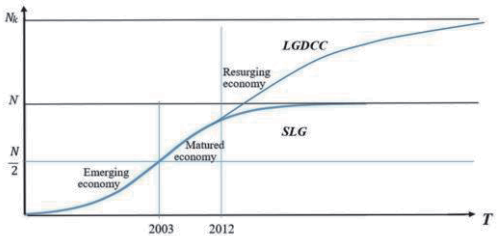


図 3-2. UPM の率先する Co-evolutionary Coupling.

3.2 ｿﾌﾄｲﾉﾍﾞｰｼｮﾝ資源の可視化・操作化

(1) 可視化・操作化の 3 アプローチ

3 軸で、可視化・操作化にチャレンジ。

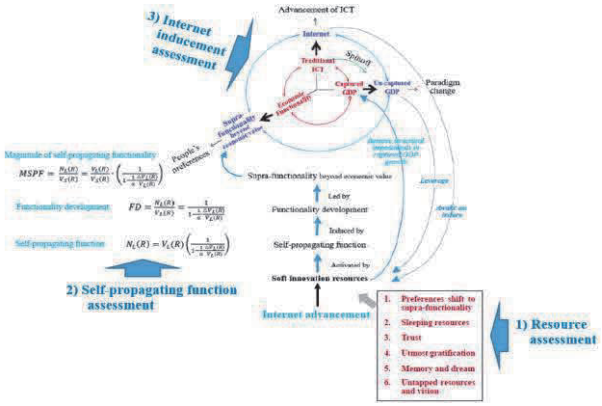


図 3-3. ｿﾌﾄｲﾉﾍﾞｰｼｮﾝ資源可視化・操作化の 3 ｱﾌﾟﾛｰﾁ.

(2) 検　証

ｲﾝﾀｰﾈｯﾄ/ｽﾏﾎ に大きく依存することに注目して、その相関に視点を据えてｲﾝﾊﾟｸﾄ/ﾄﾚﾝﾄﾞを検証。

1) イノベーション資源評価

(i) 休眠資源

表 3-1 Correlation between Smartphone and Uber in New York (Jun. 2013 – Sep. 2015)

$$\ln U_p = 12.07 - 2.17\, D_1 \ln SP - 2.16\, D_2 \ln SP - 0.16\, D \quad adj.\ R^2\ 0.954$$
(19.07) (-14.40) (-14.72) (-6.25) DW 1.03

U_p: Price of Uber (US$/trip); SP: Smartphone share in the US telephone market (%).
D: Dummy variables; D_1: Jun. 2013 - Oct. 2014= 1, others = 0;
D_2: Nov. 2014 - Sep. 2015 = 1, others = 0; D: Jun. 2015 – Sep. 2015 = 1. others = 0.
The figures in parentheses indicate the t-statistics: all are significant at the 1% level.

(ii) トラスト

表 3-2 Correlation between Internet Dependence and Trust in 20 countries (2013)

$$\ln X = 2.59 + 0.32\, D_1 \ln ID - 0.18\, D_2 \ln ID - 2.14\, D_1 - 0.16\, D_a + 0.10 D_\beta$$
(4.94) (1.96)* (-1.35)** (-2.20)* (-5.25) (2.28) $adj.\ R^2$ 0.734

X: Level of trust in teachers to deliver a good education; ID: Internet dependence;
D: Dummy variables
D_1: Israel, Czech, Singapore, France, New Zealand, Germany, Korea, Switzerland, Japan, UK, Finland, Netherland = 1, others = 0
D_2: China, Turkey, Brazil, Italy, Greese, Portugal, USA, Spain = 1, others = 0
D_a: Korea, Japan = 1. others =0 D_β: USA, Spain = 1, others = 0
The figures in parentheses indicate the t-statistics: all are significant at the 1% level except * 5%, ** 10%.

(iii) 追憶・夢

表 3-3 Correlation between Smartphone and Live Music in the US (Jun. 2013 – Sep. 2015)

$$\ln LM = 1.34 + 1.13\, \ln SP - 0.02\, D_1 + 0.02\, D_2 \quad adj.\ R^2\ 0.996$$
(21.67) (77.85) (-2.46) (4.09) DW 1.25

LM: Revenue of live music (mil. US$); SP: Smartphone share in the US telephone market (%).
D: Dummy variables; D_1: Feb. 2014 = 1, others = 0; D_2: Sep. 2014 - Nov. 2014 = 1, others = 0
The figures in parentheses indicate the t-statistics: all are significant at the 1% level.

(iv) 未活用資源

表 3-4 Correlation between Internet Dependence, Gender Balance Improvement and Male-dominated Society in 44 Countries (2013)

$$\ln Y = 0.99 + 0.30 D_1 \ln ID + 0.40 D_2 \ln ID + 0.36 D_3 \ln ID$$
(1.46)* (1.63)* (2.63) (2.16)
$$- 0.31 D_2 \ln W - 2.93 D_3 \ln W - 0.98 D_a + 0.72 D_b \quad adj.\ R^2\ 0.801$$
(-2.60) (-5.58) (-7.57) (3.12)

Y: Gender balance index; ID: Internet dependence; W: Intensity of male dominated society.
D_1, D_2 and D_3: Coefficient dummy variables corresponding to EMC (13 emerging countries), INC (27 industrialized countries) and CSC (4 countries with specific culture), respectively.
D: Dummy variable: D_a: BEL, CHL, HUN, TWN, RUS, PRT, BRA, GRC, EGY = 1, others = 0; D_b: NOR, SAU = 1, others = 0.
The figures in parentheses indicate the t-statistics: all are significant at the 1% level except * 10%.

2) 自己増殖機能評価

表 3-5 Correlation between Internet Dependence and Self-propagating Function (1995-2017)

$$\ln N_L(R) = 2.973 + 0.362\, D_1 \ln ID + 0.424\, D_2 \ln ID + 0.536\, D_3 \ln ID \quad adj.\ R^2\ 0.985$$
(109.79) (11.30) (21.51) (32.91) DW 1.20

$N_L(R)$: Self-propagating function; ID: Internet dependence; D: Dummy variables
D_1: 1995 – 2002 = 1, others = 0 ; D_2: 2003 – 2007 = 1, others = 0 ,D_3: 2008 – 2017 = 1, others = 0
The figures in parentheses indicate the t-statistics: all are significant at the 1% level.

3) インターネット誘発

表 3-6 Correlation between People's preferences Shift and the Advancement of the Internet in Japan (1994-2012)

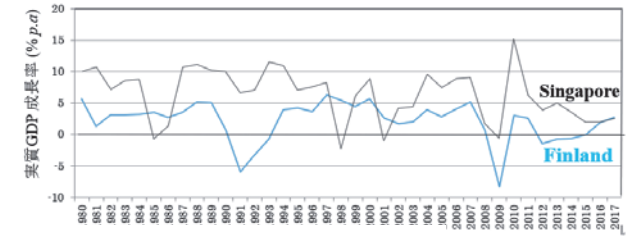
$$\ln ID = -34.77 + 8.81\, D_1 \ln Q + 9.34\, D_2 \ln Q + 9.50\, D_3 \ln Q - 1.11\, D$$
(-2.97) (3.05) (3.24) (3.33) (-2.56) DW 1.75 $adj.\ R^2$ 0.937

ID: Internet dependence; Q: Preference ratio of supra-functionality beyond economic value;
D: Dummy variables (D_1: 1994-1996 = 1, others = 0; D_2: 1997-2003 = 1, others = 0;
D_3: 2004-2012 = 1, others = 0; D: 1994 = 1, others = 0).
The figures in parentheses indicate the t-statistics: all are significant at the 1% level.

4. ソフトイノベーション資源のハイブリッド機能

4.1 IT リーダーの成長軌道の逆転

(1) GDP 成長率の逆転傾向



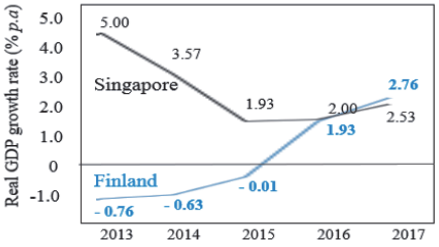


図 4.1. ﾌｨﾝﾗﾝﾄﾞ・ｼﾝｶﾞﾎﾟｰﾙの実質 GDP

世界の IT ﾘｰﾀﾞｰの低成長・高福祉、高成長低福祉の構造も変容。ﾌｨﾝﾗﾝﾄﾞは、福祉は成長のｴﾝｼﾞﾝたるﾊｲﾌﾞﾘｯﾄﾞ効果を内包することを実証。

資料： IMF (Oct. 2017).

(2) 逆転要素

表 4-1 ﾌｨﾝﾗﾝﾄﾞ・ｼﾝｶﾞﾎﾟｰﾙの GDP 成長率への貢献 (2013-2017)

Finland	2013	2014	2015	2016	2017
Private consumption	-2.09	0.11	1.50	0.83	0.96
Government consumption	2.28	0.00	0.10	0.37	0.32
Gross fixed capital	-9.50	-0.11	0.20	1.19	1.49
Net exports of goods and services	8.45	-0.63	-1.98	-0.18	0.53
Others (inventories and net acquisitions of variables)	0.10	0.00	0.17	-0.28	-0.54
Total	**-0.76**	**-0.63**	**-0.01**	**1.93**	**2.76**

Original source: National Accounts of Finland (Statistics Finland, 2018).

Singapore	2013	2014	2015	2016	2017
Private consumption	1.27	1.37	1.40	0.33	0.98
Government consumption	0.98	]0.00	0.61	0.17	0.35
Gross fixed capital	1.67	1.74	0.44	-0.08	-0.42
Net exports of goods and services	1.27	1.56	1.58	0.92	-0.56
Others (inventories and net acquisitions of variables)	-0.19	-1.10	-2.10	0.66	2.18
Total	**5.00**	**3.57**	**1.93**	**2.00**	**2.53**

Original source: National Accounts of Singapore (Department of Statistics Singapore, 2018).
Adjusted to IMF statistics using the share of respective contribution by respective statistics.

GTC contribution to GDP (% p.a)		2013	2014	2015	2016	2017
Finland	**GDP**	**-0.76**	**-0.63**	**-0.01**	**1.93**	**2.76**
	GC contribution to GDP	-9.50	-0.11	0.20	1.19	1.49
	GSC contribution to GC	-1.80	0.40	-1.20	-1.81	-1.51
	GTC contribution to GC	-7.70	-0.51	1.40	3.00	3.00
Singapore	**GDP**	**5.00**	**3.57**	**1.93**	**2.00**	**2.53**
	GC contribution to GDP	1.67	1.74	0.44	-0.08	-0.42
	GSC contribution to GC	4.57	4.54	-0.16	-1.18	1.28
	GTC contribution to GC	-2.90	-2.80	0.60	1.10	-1.70

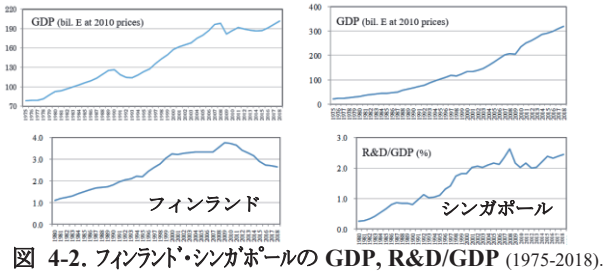


図 4-2. ﾌｨﾝﾗﾝﾄﾞ・ｼﾝｶﾞﾎﾟｰﾙの GDP, R&D/GDP (1975-2018).

4.2 フィンランド復調のダイナミズム

(1) ダイナミズム

ソフトイノベーション資源が R&D に代替しつつ有形固定資本にスピルオーバーして、その成長制約を打破。

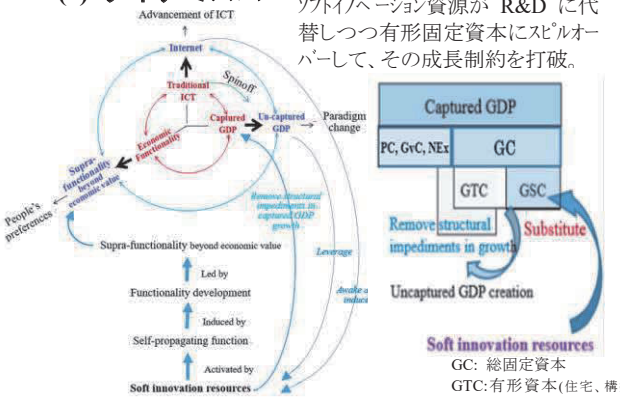


図 4-3. フィンランド復調のダイナミズム.

GC: 総固定資本
GTC: 有形資本(住宅、構築物、機械・設備)
GSC:無形資本(R&D, ソフトウエアー)
PC: 民間消費 GvC: 政府消費
NEx:ネット輸出

(2) 検 証

1) GDP への MFP の貢献

表 4-2. Correlation between MFP and GDP growth rate in Finland (1994-2016).

$GGR = 0.85 + 1.22\ MFPGR$ adj. R^2 0.917 DW 1.66
(4.05) (15.60)

$GGR = 1.09 + 1.24\ MFP^*GR$ adj. R^2 0.889 DW 1.36
(4.61) (13.29)

where *GGR*: Real GDP growth rate, *MFPGR*: MFP growth rate including contribution of R&D, and *MFP*GR*: MFP growth rate not including contribution of R&D.
The figures in parentheses indicate the t-statistics: all are significant at the 1% level.

2) MFP 貢献要素

$MFP = F(T, I, C, \lambda) = A' e^{\lambda t} T^{\alpha} C^{\beta} I^{\gamma} = A e^{\lambda t} R^{\alpha} C^{\beta} I^{\gamma}$
$A = A'(\rho + g)^{\alpha}$
where A, A': scale factor, λ: learning coefficient, T: technology knowledge stock, R: R&D expenditure C: final consumption expenditure, I: Internet dependence, α, β, γ: elasticity, ρ: rate of obsolescence of technology, and g: R&D growth rate at the initial period.
$\ln MFP = \ln A + \lambda t + \alpha \ln R + \beta \ln C + \gamma \ln I$

表4-3 Governing factors of MFP in Finland (1994-2018)

$\ln MFP = -43.23 - 0.04\ t + 0.03\ D_1 \ln R - 0.25\ (D_2+D_3) \ln R + 1.80 \ln C$
(–6.01) (–6.71) (2.75) (–2.56) (7.23)
$+ 0.04\ D_1 \ln I + 0.84\ D_2 \ln I + 8.96\ D_3 \ln I + 38.89\ D_1 + 36.87\ D_2 + 0.02D$
(1.75)*1 (1.87)*1 (6.27) (6.22) (5.78) (2.91)
adj. R^2 0.983 DW 2.27

D: dummy variables identifying R&D-driven economic features of respective periods as follows:

D: Dummy variables		1994 - 2009	2010 - 2015	2016 - 2018	Features of the period
D_1	1994-2009 = 1, others = 0	1	0	0	Sustainable increase in R&D intensity that supported economic growth
D_2	2010-2015 = 1, others = 0	0	1	0	R&D intensity decline in the economic stagnation
D_3	2016-2018 = 1, others = 0	0	0	1	Economic resurgence after the Competitiveness Pact despite R&D intensity decline

D: 2000, 2001, 2007, 2010, 2011 = 1, others = 0.
The figures in parentheses indicate the t-statistics: all are significant at the 1% level except *1 10%.

3) 代替

表 4-4 Correlation between I/R ratio and relative price in Finland (1995-2018).

$\ln \frac{I}{R} = -2.01 + 0.63 D_1 \ln \frac{P_I}{P_C} + 2.17 (D_2+D_3) \ln \frac{P_I}{P_C} + 3.34 D_1 - 0.13 D$ adj. R^2 0.966 DW 1.25
(–2.30) (18.12) (5.44) (3.82) (–2.39)

D: dummy variables. D_1-D_3: see Table 6; *D*: 1999, 2000 = 1, others = 0..
The figures in parentheses indicate the t-statistics: all are significant at the 1% level.

4) スピルオーバー

表 4-5 Governing factors of MFP in Finland (1994-2018)

$\ln MFP = -43.23 - 0.04\ t + 0.03\ D_1 \ln R - 0.25\ (D_2+D_3) \ln R + 1.80 \ln C$
(–6.01) (–6.71) (2.75) (–2.56) (7.23)
$+ 0.04\ D_1 \ln I + 0.84\ D_2 \ln I + 8.96\ D_3 \ln I + 38.89\ D_1 + 36.87\ D_2 + 0.02D$
(1.75)*1 (1.87)*1 (6.27) (6.22) (5.78) (2.91)
adj. R^2 0.983 DW 2.27

D: dummy variables identifying R&D-driven economic features of respective periods as follows:

D: 2000, 2001, 2007, 2010, 2011 = 1, others = 0,
The figures in parentheses indicate the t-statistics: all are significant at the 1% level except *1 10%.

4.3 Uncaptured GDP の誘導効果

Uncaptured GDP が代替・スピルオーバーを誘導。

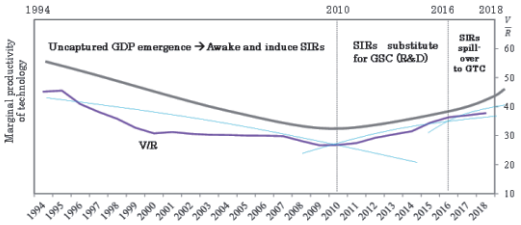


図 4-4. Uncaptured GDP の代替・スピルオーバー誘導 軌道 (1994-2018),

$$\frac{\partial V}{\partial T} = \left[\frac{b(\alpha+\gamma q)}{1+b(\gamma q-\beta b^*)}\right](\rho + g)\frac{V}{R}$$

			1994 - 2009	2010 - 2015	2016 - 2018
b	$\partial \ln V / \partial \ln MEP$	MFP elasticity to GDP	1.22	1.22	1.22
b^*	$\partial \ln C / \partial \ln V$	GDP elasticity to consumption	0.46	0.46	0.46*
α	$\partial \ln MFP / \partial \ln R$	R&D elasticity to MFP	0.03	-0.25	-0.25
β	$\partial \ln MFP / \partial \ln C$	Consumption elasticity to MFP	1.80	1.80	1.80
γ	$\partial \ln MFP / \partial \ln I$	SIRs elasticity to MFP	0.04	0.84	8.96
q	$\partial \ln I / \partial \ln (R/V)$	R&D intensity elasticity to SIRs	4.17#	-0.21	-0.21
ε	$\partial \ln (I/R) / \partial \ln (p_I/p_C)$	Elasticity of SIRs substitution for R&D	0.63#	2.17	2.17

*Estimate by 2016-2017 and #estimate by 1995-2009.

4.4 ソフトイノベーション資源の復調への貢献

(1) 貢献ダイナミズム

ソフトイノベーション資源が、復調のトリガー。労使協調の Competitiveness Pact (2016) が核。

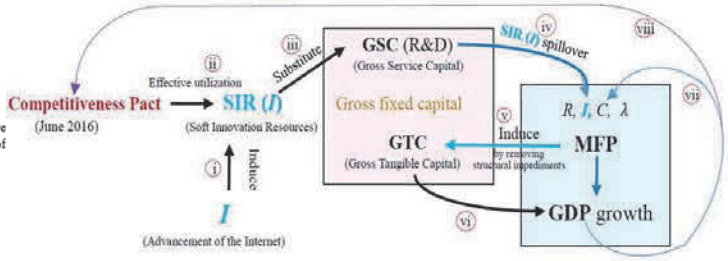


図 4-5. ソフトイノベーション資源の成長制約克服メカニズム.

(2) ソフトイノベーション資源の成長制約打破

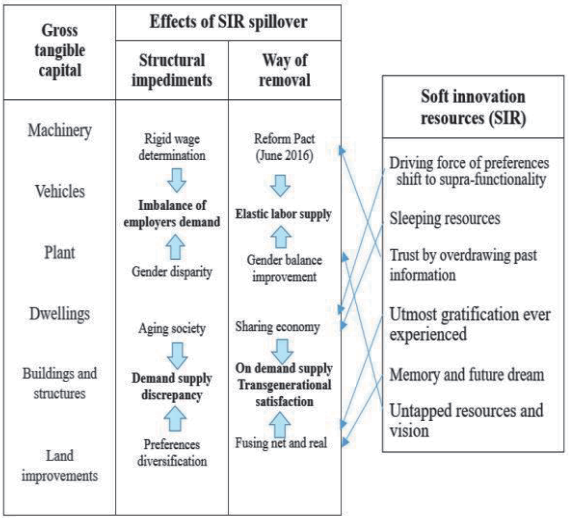


図 4-6. ソフトイノベーション資源の成長制約打破.

5. 結　論

従来の常識を覆し、在来の枠組みを越えて、想像を絶するｽﾋﾟｰﾄﾞで進み続けているﾃﾞｼﾞﾀﾙ経済は、GDP の枠を、概念を越えて 世界を飛びまわり、次々に新たな非常識な常識を創り出していく。

ｲﾉﾍﾞｰｼｮﾝや成長の概念も顕著に変容している。年々覚醒して新たなｿｼｱﾙｴｺｼｽﾃﾑを創り出し、ICT はもとより、すべての生産要素を自己増殖的に席巻するｲﾝﾀｰﾈｯﾄは、従来にないｻｰﾋﾞｽ・ﾋﾞｼﾞﾈｽ・社会・文化を生み出す。だが、その多くは GDP には反映されない。

しかるに、GDP 万能神話からの脱却は遅々として進まない。

ｲﾉﾍﾞｰｼｮﾝのｲﾝﾌﾟｯﾄにおいてもしかりである。Amazon は 2017 年には、2 年間に R&D 投資を倍増させ、一挙に Google, Samsung, MS, Intel, Apple を抜いて一躍 R&D ﾄｯﾌﾟに躍出した。だが、その“R&D” の中身は、従来の常識を破るものである。

昨年は、ﾃﾞｼﾞﾀﾙ経済下での GDP の計測を狙いに、その根幹をなす Uncaptured GDP の構造解析と計測を試みた。

本稿は、さらに限界生産性ｾﾞﾛ社会に直面して、R&D 投資と生産性低下のｼﾞﾚﾝﾏに直面するｸﾞﾛｰﾊﾞﾙ ICT ﾘｰﾀﾞｰの生存戦略にﾒｽをいれ、ﾃﾞｼﾞﾀﾙ経済下におけるネオ・オープンｲﾉﾍﾞｰｼｮﾝ戦略ともいうべき、ｿﾌﾄｲﾉﾍﾞｰｼｮﾝ資源の活用の実相を明らかにし、その検証・計測を試みた。

さらに、Uncaptured GDP ｼﾌﾄをﾘｰﾄﾞした IT 大国ﾌｨﾝﾗﾝﾄﾞの GDP 面での顕著な復調に注目して、R&D 投資に代替したｿﾌﾄｲﾉﾍﾞｰｼｮﾝ資源が、他の生産要素にｽﾋﾟﾙｵｰﾊﾞｰして、成長制約を打破したことを実証し、ｿﾌﾄｲﾉﾍﾞｰｼｮﾝ資源のﾊｲﾌﾞﾘｯﾄﾞ効果を示した。

いずれも、ﾃﾞｼﾞﾀﾙ経済下における「成長・ｲﾉﾍﾞｰｼｮﾝ指標」の再考を促すものである。

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