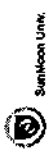


e-Biz World 2005  
 8<sup>th</sup> International e-Biz Conference (March 23<sup>rd</sup>, 2005)  
 "Invitation to Emerging World of e-Business"

### Economic Effects Analysis on Ubiquitous Industry\*

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Keywords: ubiquitous IT, ubiquitous industry, u-Korea

- Abstract -

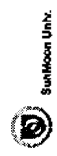
In this work, we have investigated the national economic effects of the ubiquitous industry(UI) for a u-Korea(ubiquitous Korea) project. Since the UI are now playing the more and more important role in Korean economy, it will be very appropriate to provide the policy makers with the accurate and reliable information regarding the role of UI in the national economy. This paper employs input-output analysis to examine the impacts of UI while carefully taking into account the unique situations of Korea. The meaningful results have been obtained by utilizing the rich experiences of the UI. To be more specific, the economic effects of UI on the production-inducing, added value-inducing, export & import-inducing and employments have been addressed in this work.

### Definition "Ubiquitous IT"

Embedded, Pervasive, Disappearing, Silent, Sentient, Disposable Computing	Ubiquitous Computing & Network
Traditional Business Computing	Mobile, Portable, Nomadic, Wearable, Disposable Computing

Embedded-ness

Mobility



### Conception "Ubiquitous Environment"

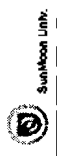
High-quality information services by using the 5A (any time, any where, any device, any service, any network)

Mobility

#### Ubiquitous Environment

- Vernicle information services provided from computer-embedded goods and objects which are connected by networks each other
- Ultra-small computers composed of e-tags and sensors are embedded in everywhere including human bodies and commercial goods, etc.
- The embedded computers are tightly connected through the wire and wireless networks and provides useful information and services requested by customers any time and anywhere

- Virtualization of the physical space and materialization of the cyberspace like internet space
- Expansion of IT application space time
- New creation of space where the physical and cyberspace converges : "The 3+4 Space"



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## Understanding "Ubiquitous Industry"

**Definition**

Industry based on ubiquitous IT which opens a new dimension to the present knowledge-based economy by innovating the traditional and IT industry

Convergence of technology, business, and traditional IT industry

Creation of the new value and wealth generated by the novel ubiquitous service group

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## Growth Factors of "Ubiquitous Industry"

**Technological Factor**

- Utilization of the Networks
- Spread of the broadband networks
- Increase of inter-network services
- Network Assets Becoming Commodity
- General Utilization of the network technology
- Reduced cost of network services

**Customer Factor (Consumer)**

- Higher Standards of Customer Satisfaction
- Increase of demand for high-tech and high quality
- Familiarity with Network Services
- National spreading of the broadband network
- Increased dependence on online and mobile

**Activation "Ubiquitous Industry"**

**Political Factor**

- Reduced Intervention of the Government
- Relaxation of various industry regulations
- Support Based on Policy
- Continuous support for construction of the IT-sitona country
- IT-sitona Korea → e-Korea → u-Korea

**Strategic Factor (Provider)**

- New Business Models for Customer Satisfaction
- Enhanced customer management
- Pursuit of new values for distinctness
- Effort for New Business Opportunity
- Cooperation to provide various services
- Fusion between the internet industries

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## Strategy for Ubiquitous Industry

USA	Europe	Japan	Singapore	Korea
Ubiquitous Computing Pervasive Computing	Disappearing Computer Ambient Computing	Ubiquitous Network	Pervasive Infra	Ubiquitous Appliance
Service by smart devices	Intelligent cooperation by information artifacts	Anywhere connection by smart chip, smart card, context, roaming	Network for integrating with Wireless LAN, Mobile, Broadband Internet	Network Contents, consuming variation Appliance, Terminal
Computer Devices	Everyday Objects	Network	Infra	Appliance ?
Smart + Networking + Mobility				
Wireless LAN, Sensor, MEMS, ultra-mini Computer Chips				

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## Category of New Ubiquitous Service on the Basis of the u-Korea

Major Sort	Minor Sort	Contents of it's Category
Life Service	Life/Culture	u-Home(Smart Home, Smart Room, Smart Display), u-Print, Information supply (u-Library, u-Museum), office (Intelectual) Home Shopping
	Education	u-Learning, u-Education, u-Campus
	Labour	u-Employment Information, Home Work, Realize of 3D-Work Intelectual Robot
	Environment	Information management of environment through RFID (air/water/soil pollution, management of toxicities/industrial wastes etc.)
Industry	Health/Welfare	Intelectual Robot for the aged/patient, LBS for imobility/missing child through RFID, u-Healthcare/health care, Remote treatment, Emergency service, Care for the aged etc.)
	Business /Commercial Transaction	u-Commerce, u-Commerce, m-Commerce, u-Commerce, Call Technology, u-Business (Real WWW development, RFID) Smart Chip design, Sensor Network, wide-area measuring a constantial cognition learning, u-Production through RFID etc.)
	Finance	Bill through RFID, forged Check of trademark etc., u-Payment(Intelectual EC), u-Banking
	Logistics/Transport	u-Logistics, u-WMS, u-FUM, u-Post, u-Distribution through RFID, Telematics, u-ITS, Smart Traffic(S, P, C), u-Car, Smart Ship, Intelectual Road(Smart Way, u-Highway), u-Reservation for Tickets
Public	Building/SOC	u-Apartment, u-Building(Smart Building), u-City
	Agriculture & Livestock	Safety Supervision of Agriculture & Livestock Products through RFID, Traceability
	Administration	u-Government, GPS-Supply, Integrated System for Logistic and transport, u-Coverance, Intelectual System for Traffic
	Management of Disaster (Infrastructure etc.)	Safety Supervisor & course of natural disaster(History Rich, Earthquake, abnormal u-Defense, Security, System for a Protection(Fire, Flood, Gas Leak, Interruption of Power Supply, etc.), Safety Diagnosis of Public Facilities(Bridge, Highway, etc.)

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### A Market Research of Ubiquitous Industry

Market/Year	2005	2008	2010	Annual Growth Rate
International (100 M\$)	2,525	4,664	7,025	22.7%
Domestic (Trillion Won)	13.7	30.0	51.4	30.3%

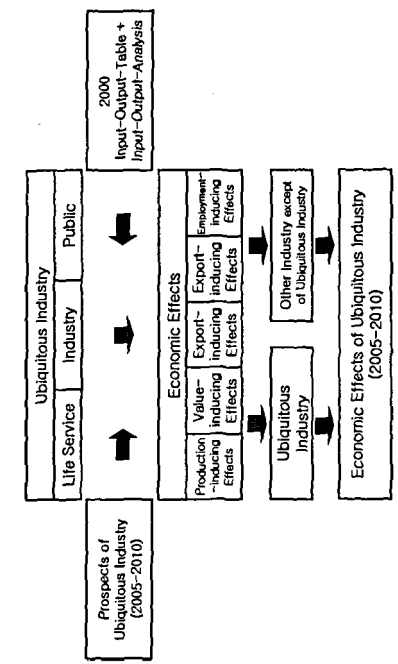
Field/Year	International Market (100 M\$)		Domestic Market (Trillion Won)	
	2005	2010	2005 (4.5%)	2010 (5%)
Network	875	2,867	4.7	21
EC	608	2,016	3.3	15
Service	517	1,242	2.8	6.9
Terminal	459	650	2.5	4.7
Platform	67	250	0.36	1.8
Total	2,525	7,025	13.7	51.4

(source : KETI)

### SWOT-Analysis for Ubiquitous Industry

Strength	Weakness
<ul style="list-style-type: none"> <li>Government effort of u-Korea and active investment of the industry</li> <li>World-top network infra including mobile environment, appliance</li> <li>Large potential customers who are friendly with most recent IT products</li> <li>Sufficient qualified R&amp;D manpower</li> </ul>	<ul style="list-style-type: none"> <li>Absence of well-organized national scale plan</li> <li>Slow-down in national economy for years</li> <li>Lack of proficient fusion-type business</li> <li>Mediocrity in computing and sensor tech.</li> <li>Vulnerability in information security</li> <li>No industry service model</li> <li>Lack of core device technology</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>World-wide consensus for construction of ubiquitous environment</li> <li>Market is in its early stage</li> <li>Potential applicability on almost all industry existing IT industry</li> <li>Possibility of entirely new futuristic service when combined with BT, and NT</li> </ul>	<ul style="list-style-type: none"> <li>High entry barrier caused by lack of standard</li> <li>Extremely competitive environment</li> <li>Tendency of obligatory use of RFID in many advanced country</li> <li>Poor synergy effect produced between relevant companies</li> </ul>

### Formulation of the Analysis



### Framework of input-output-analysis

$$X_i = \sum_{j=1}^n z_{ij} + Y_i - M_i = \sum_{j=1}^n a_{ij} X_j + Y_i - M_i \quad (a_{ij} = z_{ij} / X_j) \quad \text{input coefficient}$$

$$X_j = \sum_{i=1}^n z_{ij} + W_j = \sum_{i=1}^n r_{ij} X_i + W_j \quad (r_{ij} = z_{ij} / X_i) \quad \text{output coefficient}$$

$$X = Z^T Y - M = A X^T + Y - M = (I - A)^{-1} (Y - M)$$

$$X = \hat{X}^T \quad \text{transpose}$$

### Formulas of economic effects

Effects / Formulas	Outcome of Formulas
Production-inducing Effects	$\Delta X^p = (I - A^p)^{-1} (A_k^p \Delta X_k^p)$
Value-inducing Effects	$\Delta W^v = \hat{A}^v (I - A^v)^{-1} (A_k^v \Delta X_k^v)$
Export-inducing Effects	$\Delta EX^e = \hat{A}_x^e \Delta X^e = \hat{A}_x^e (I - A^e)^{-1} (A_k^e \Delta X_k^e)$
Import-inducing Effects	$\Delta IM^i = \hat{A}_m^i \Delta X^i = \hat{A}_m^i (I - A^i)^{-1} (A_k^i \Delta X_k^i)$
Employment-inducing Effects	$\Delta N^e = \hat{n}^e \Delta X^e = \hat{n}^e (I - A^e)^{-1} (A_k^e \Delta X_k^e)$

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### Analytical coefficient of economic effects

Effects / Category	Total	Life Service	Industry	Public
Production-inducing Effects	1	0.0896	0.8247	0.0657
Relevant inducing	1.0000	1.0000	1.0000	1.0000
Irrelevant inducing	0.3498	0.5893	0.3082	0.4296
Subtotal	1.3498	1.5893	1.3082	1.4296
Value-inducing Effects	0.5792	0.6695	0.5507	0.7069
Relevant inducing	0.1804	0.3227	0.1598	0.2295
Irrelevant inducing	0.7566	0.9732	0.7105	0.9384
Subtotal	0.6370	0.6370	0.2127	0.0607
Export-inducing Effects	0.0506	0.0967	0.0432	0.0741
Relevant inducing	0.2594	0.1937	0.2559	0.0748
Irrelevant inducing	0.1306	0.1293	0.1442	0.0009
Subtotal	0.0946	0.0958	0.0924	0.1150
Import-inducing Effects	0.2252	0.2251	0.2368	0.1169
Relevant inducing	0.9159	1.0200	0.8103	0.9200
Irrelevant inducing	0.1892	0.3000	0.1600	0.2600
Subtotal	1.1051	2.2100	0.9700	1.2500

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### Effects on the production-inducing

Category / Year	2005	2006	2007	2008	2009	2010	Sum Total
Life Service	12,230	17,120	22,000	26,880	36,288	45,696	160,223
Relevant inducing	7,213	10,988	12,964	15,840	21,385	26,929	94,420
Irrelevant inducing	19,452	27,208	34,964	42,720	57,678	72,625	254,642
Subtotal	112,654	157,573	202,491	247,410	334,004	420,597	1,474,729
Industry	34,720	49,584	62,408	76,252	102,940	129,628	454,512
Relevant inducing	147,374	206,137	264,899	323,682	436,943	550,225	1,929,240
Irrelevant inducing	11,707	16,374	21,042	25,710	34,709	43,707	153,249
Subtotal	5,032	7,038	9,044	11,050	14,918	18,785	65,867
Public	16,738	23,412	30,086	36,760	49,626	62,492	219,114
Relevant inducing	136,600	191,067	245,533	300,000	405,000	510,000	1,788,200
Irrelevant inducing	46,964	65,680	84,416	103,142	139,242	175,342	614,796
Subtotal	183,564	256,757	329,949	403,142	544,242	685,342	2,402,896
Total							

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### Effects on the value-inducing

Category / Year	2005	2006	2007	2008	2009	2010	Sum Total
Life Service	7,962	11,136	14,311	17,485	23,695	29,725	104,224
Relevant inducing	3,950	5,524	7,098	8,674	11,710	14,746	51,703
Irrelevant inducing	11,911	16,611	21,410	26,180	35,315	44,471	155,928
Subtotal	62,039	86,775	111,512	136,249	183,906	231,623	812,134
Industry	16,002	25,180	32,358	39,536	53,374	67,211	235,661
Relevant inducing	60,041	111,956	143,870	175,785	237,309	298,654	1,047,995
Irrelevant inducing	8,288	11,868	14,917	18,226	24,605	30,984	108,639
Subtotal	2,687	3,758	4,829	5,908	7,966	10,031	35,171
Public	10,965	15,366	19,746	24,126	32,570	41,015	143,806
Relevant inducing	76,299	109,520	140,739	171,960	232,146	292,332	1,024,996
Irrelevant inducing	24,638	34,463	44,287	54,111	73,049	91,968	322,536
Subtotal	102,938	143,982	185,026	226,071	305,195	384,320	1,347,532
Total							

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## Effects on the export-inducing

Category / Year	2005	2006	2007	2008	2009	2010	Sum Total
Relevant Inducing	453	633	914	995	1,340	1,691	5,929
Irrelevant Inducing	1,184	1,655	2,127	2,589	3,509	4,419	15,483
Subtotal	1,638	2,289	2,941	3,584	4,852	6,110	21,422
Relevant Inducing	23,962	33,516	43,070	52,624	71,043	89,461	313,676
Irrelevant Inducing	4,867	6,807	8,748	10,698	14,429	19,170	63,709
Subtotal	28,829	40,323	51,817	63,312	85,471	107,631	377,382
Relevant Inducing	8	11	15	18	24	31	107
Irrelevant Inducing	867	1,213	1,559	1,905	2,572	3,239	11,955
Subtotal	875	1,225	1,574	1,923	2,596	3,269	11,463
Relevant Inducing Subtotal	24,429	34,161	43,899	53,637	72,469	91,182	319,711
Irrelevant Inducing Subtotal	6,918	9,676	12,634	15,193	20,510	25,827	90,558
Total	31,340	43,837	56,333	68,829	92,919	117,010	410,269

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## Effects on the import-inducing

Category / Year	2005	2006	2007	2008	2009	2010	Sum Total
Relevant Inducing	1,563	2,214	2,845	3,476	4,692	5,908	20,718
Irrelevant Inducing	1,173	1,640	2,108	2,575	3,476	4,378	15,350
Subtotal	2,735	3,854	4,952	6,051	8,168	10,286	36,066
Relevant Inducing	16,245	22,722	29,199	35,877	48,163	60,650	212,656
Irrelevant Inducing	10,409	14,560	18,710	22,861	30,862	38,863	136,265
Subtotal	26,654	37,282	47,909	58,537	79,025	99,513	348,920
Relevant Inducing	11	15	19	23	31	39	138
Irrelevant Inducing	1,346	1,898	2,420	2,957	3,991	5,026	17,623
Subtotal	1,357	1,898	2,439	2,980	4,023	5,066	17,763
Relevant Inducing Subtotal	17,633	24,950	32,063	39,175	52,887	66,598	233,511
Irrelevant Inducing Subtotal	12,928	18,093	23,236	28,392	38,330	48,267	169,238
Total	30,766	43,033	55,300	67,568	91,216	114,865	402,748

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## Effects on the employment-inducing

Category / Year	2005	2006	2007	2008	2009	2010	Sum Total
Relevant Inducing	22,276	31,158	40,040	48,922	66,044	83,167	291,607
Irrelevant Inducing	4,773	6,677	8,590	10,463	14,152	17,821	62,468
Subtotal	27,049	37,834	48,619	59,405	80,196	100,988	354,075
Relevant Inducing	91,250	127,634	164,018	200,402	270,543	340,694	1,194,531
Irrelevant Inducing	18,825	25,212	32,309	39,596	53,441	67,296	235,959
Subtotal	109,274	152,846	196,416	239,998	323,983	407,979	1,430,496
Relevant Inducing	11,590	16,211	20,632	25,453	34,361	43,270	151,717
Irrelevant Inducing	3,044	4,257	5,471	6,695	9,024	11,364	39,845
Subtotal	14,633	20,468	26,393	32,138	43,386	54,634	191,562
Relevant Inducing Subtotal	125,115	175,002	224,999	274,777	370,948	467,120	1,537,851
Irrelevant Inducing Subtotal	25,842	36,149	46,449	56,753	76,617	96,481	308,288
Total	150,957	211,148	271,339	331,530	447,565	563,601	1,876,141

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## Conclusion

- Through the input-output analysis, the Korean economic effects of ubiquitous industry for a U-Korea (ubiquitous Korea) project on the production-inducing, added value-inducing, export & import-inducing and employments
- Since the UI are now playing the more and more important role in Korean economy, it will be very appropriate to provide the policy makers with the accurate and reliable information regarding the role of UI in the national economy.
- Ubiquitous IT as a new Technology will bring about new paradigm shift, which transforms the structure and behavior of industries, societies and cultures.
- First, Korea government needs to make a strategy of ubiquitous industry, in order to take a leading position among advanced countries on ubiquitous IT society.

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