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**Big Data Analytics
Adoption in
Telecommunications
Industry : The Korean
Telcos Perspectives**

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- ❑ Background and Motivation
- ❑ Literature Review
- ❑ Conceptual framework & Methodology
- ❑ Findings
- ❑ Korea Telecom Landscape
- ❑ Conclusion



- ❖ The adoption of smartphones account for 82.5% of all mobile traffic **(Cisco,2012)**
- ❖ 90% of traffic on mobile network in the future will be delivered over the internet as an OTT service **(Cisco,2012)**
- ❖ Consumers are becoming hyper connected **(IBM,2012)**
 - Using MIM, SNS on mobile device
 - SMS usage down by 40% and revenue down 28% in one year **(Cisco,2012)**



Availability of : alternatives ; platform ; ubiquitous BB; generous price plan.

Should Telcos be the next KODAK or Dinosaur?



□ New ICT Trend:

❖ Service: Sharing / participation:

- It is no longer unidirectional but multidirectional

❖ Content:

- Dynamic(Video , intelligence, emotion)

❖ Technology

- All IP , Big Data, Cloud

People are experiencing SMARTIZATION in their everyday lives

– Source:

The Human face of Big Data by **Rick Smola**

The Age of the Platform by **Phil Simon**

Too Big to ignore: The business of Big Data by **Phil Simon**



□ Big Data

- ❖ Data sets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze (McKinsey Global Institute ,2011)
- ❖ The next frontier for innovation, competition, and productivity (MGI and McKinsey's Global Institute 2011)
- ❖ Big Data spans four dimensions: Volume, Velocity, Variety, and Veracity (Cisco,2012).
- ❖ Big Data is cultural ,technological and scholarly phenomenon (Danah et al, 2012)
- ❖ Trends in BD
 - It is alarmingly increasing in usage (Nielsen, 2011)
 - Organizations are investing huge amount of resources to it (IBM,2012; McKinsey & Company) eg Facebook, Google
 - Competitive advantage: operation optimization ,effective marketing, better customer experience and new streams of revenue
 - Big Data is not a business model.
 - The biggest concern is the pace of innovation.



Why Big Data for telecoms companies

- ❖ Saturation of the market
- ❖ Need to grow revenue
- ❖ Need to defend the existing revenue
- ❖ Need to grow new business and protect against churn
- ❖ Many communication channels are now available
- ❖ Data usage is growing fast
- ❖ ARPU is decreasing
- ❖ Telcos less relevant in the value chain

Data deluge era has come to stay. The telecom ecosystem is unfolding in a state of chaotic effervescence. Revenues erode and services are commoditized.

Multifaceted innovation around internet and mobile technology is revealing rich new gold mines to be exploited- customer data via BDA.

Issues :

Privacy & Security concerns

Background & Motivation 6/14



- Data is everywhere.
- **New technologies** provide capabilities to store huge data.



Sloan Digital
Sky Survey
(2000)

More data in first weeks than data had been collected in the entire history of the astronomy (Cukier, 2010)



Facebook
Web Site
(n.d.)

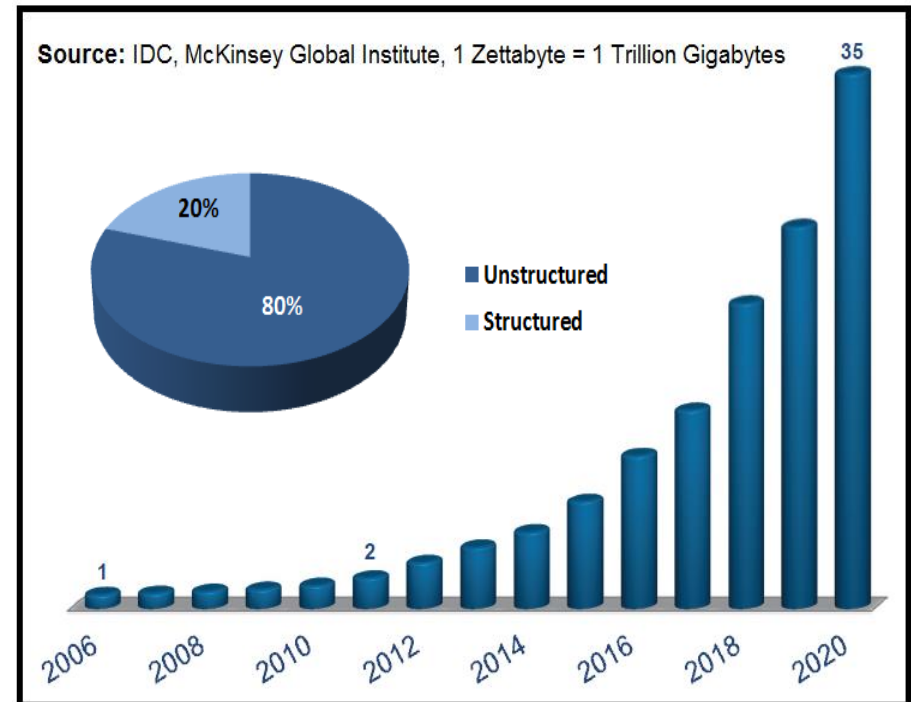
15 billion uploaded photos with a growth rate of 220 million new photos per week

- **Sources of Data:** social media, video, audio, mobiles, medical imaging, surveillance, etc.

Background & Motivation 7/14



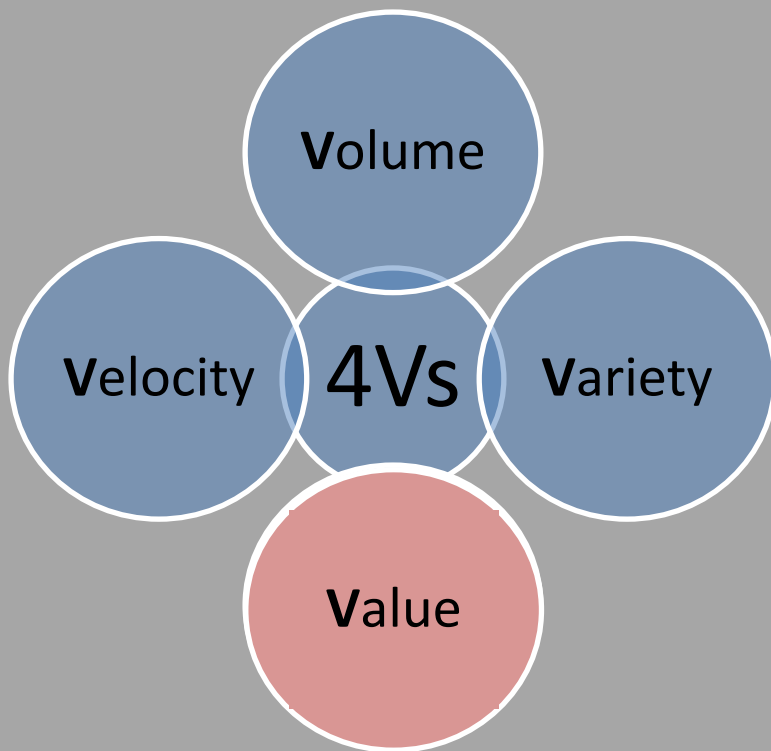
- Big explosion of data **will continue** in the next years.
- Big Data is a term related with this explosion of data.
- There is **not a concrete** definition of Big Data.



“Data sets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze”
MacKinsey Global Institute (2011)



Features of Big Data



Source: DataStax (2011)

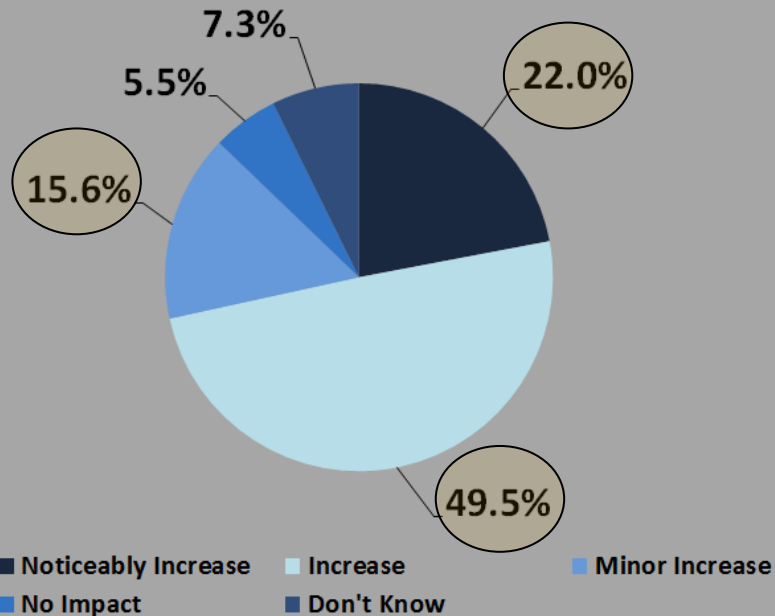
Importance of Big Data

The huge amount of information we are creating every day, through many sources, **may reveal trends or insights in real time***, giving the chance to improve **decision-making** (Global Pulse 2012).

(*) Real time refers to data that is relevant to a relatively short period of time, or data that is made available within a timeframe that allows governments, organizations, or individuals to take a fast action.



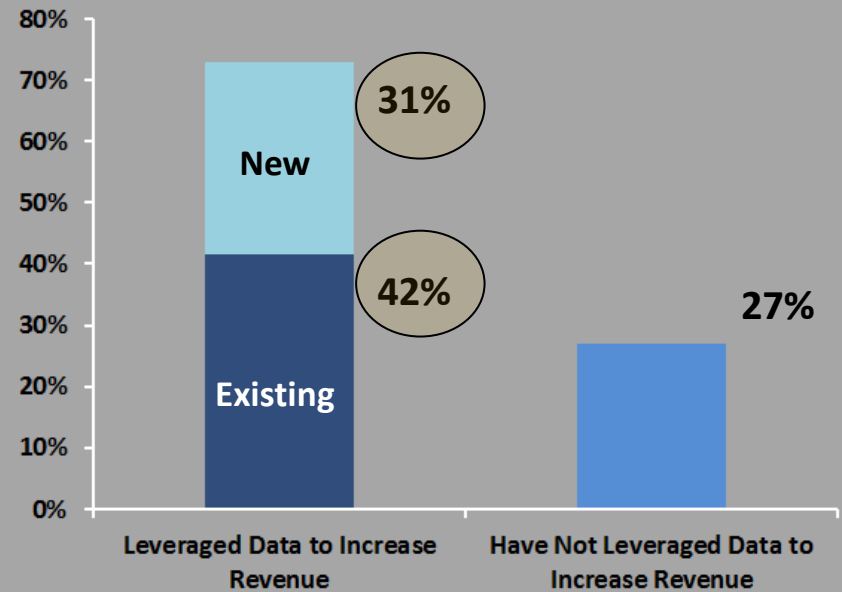
Big Data for Sales Effectiveness



Source: Lattice Engines/CSO Insights
(cited in Marketing Charts n.d.)

Around 87% had an increase in sales effectiveness with Big Data.

Big Data for Increase Revenue



Source: Avanade (2012)
Global Survey: Is Big Data Producing Big Returns?

42% increased existing and **31% found new** sources of revenues

BACKGROUND & MOTIVATION (10/14)



Big Data can generate significant financial value across sectors...



US health care

- \$300 billion value per year
- ~0.7 percent annual productivity growth



Europe public sector administration

- €250 billion value per year
- ~0.5 percent annual productivity growth



Global personal location data

- \$100 billion+ revenue for service providers
- Up to \$700 billion value to end users



US retail

- 60+% increase in net margin possible
- 0.5–1.0 percent annual productivity growth



Manufacturing

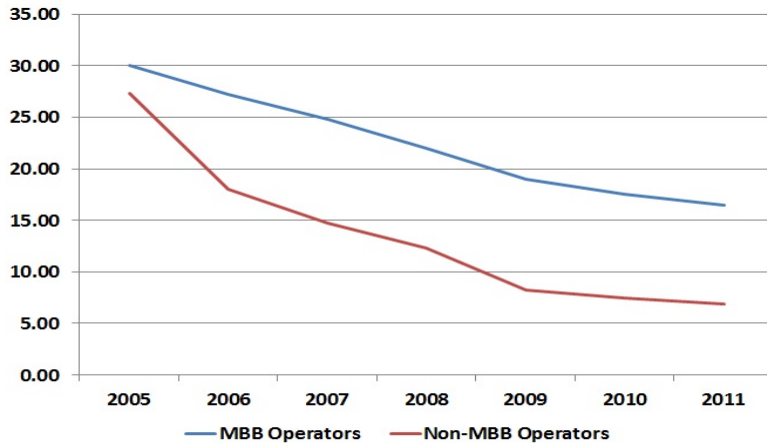
- Up to 50 percent decrease in product development, assembly costs
- Up to 7 percent reduction in working capital

Source: McKinsey Global Institute Analysis

BACKGROUND & MOTIVATION (11/14)

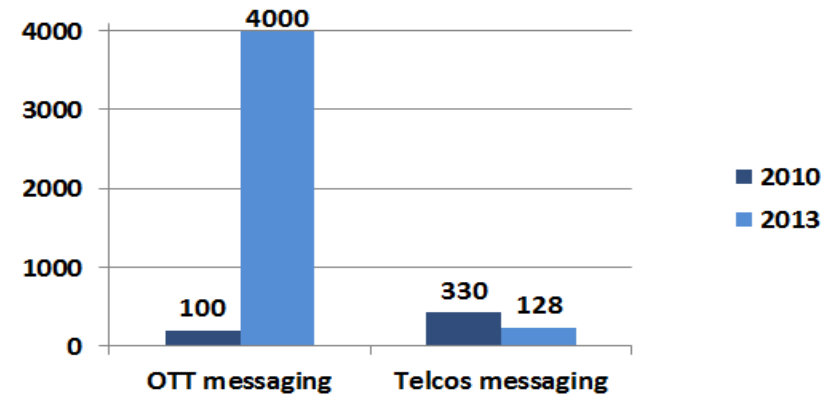


Global ARPU Trend (US\$)



Source: Wireless Intelligence
<https://wirelessintelligence.com/analysis/2012/02>

Messaging Trend (Million per day)



Source: KT's EVP Tae-Yol Yoo at the Broadband World Forum
Asia event in Hong Kong April 2013

Actual Hyper Competitive Environment

- Commoditization of traditional services.
- Other players eating into their revenues (e.g., Google & Skype).

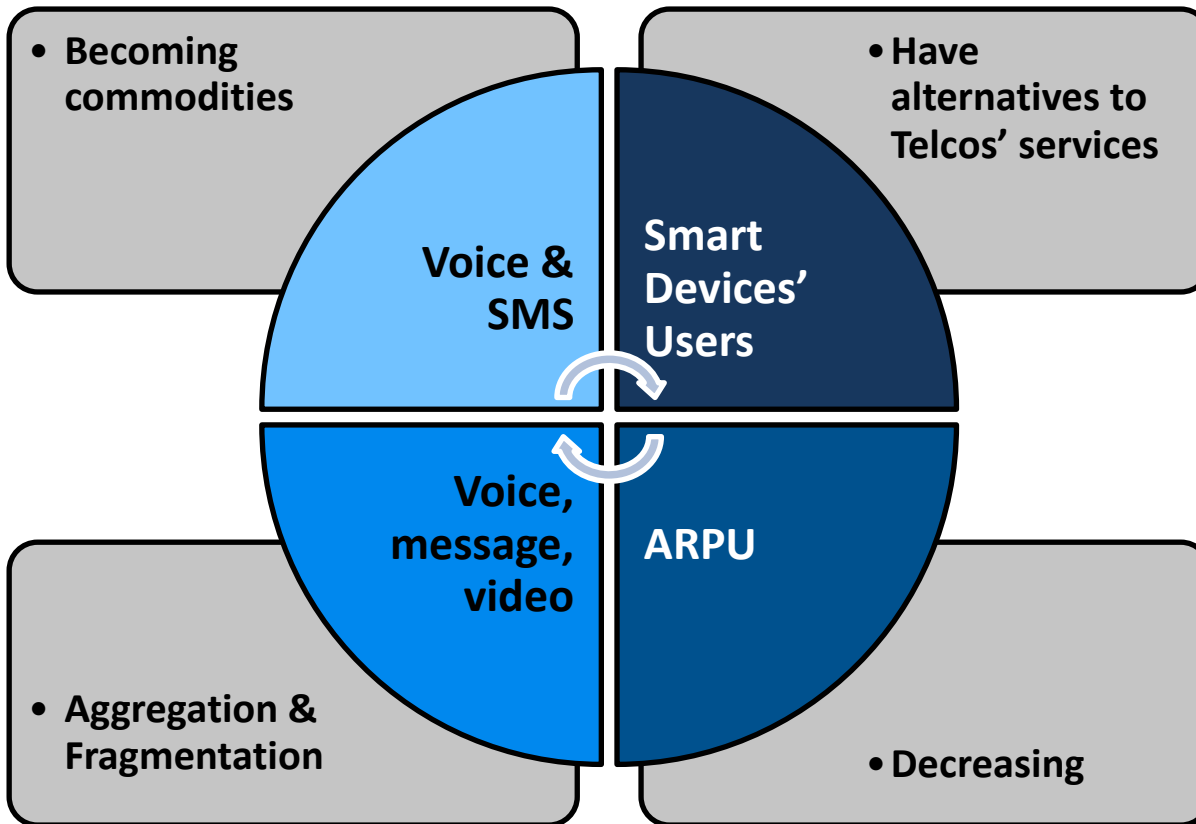
OVUM forecasts... due to OTT players

- By **2020** telcos will have experienced a loss of **US\$ 479 bn** in voice revenues.
- By **2016** the loss in SMS revenues will reach **US\$ 54 bn**.

BACKGROUND & MOTIVATION (12/14)



Key Trends Underlying the Telecom Market



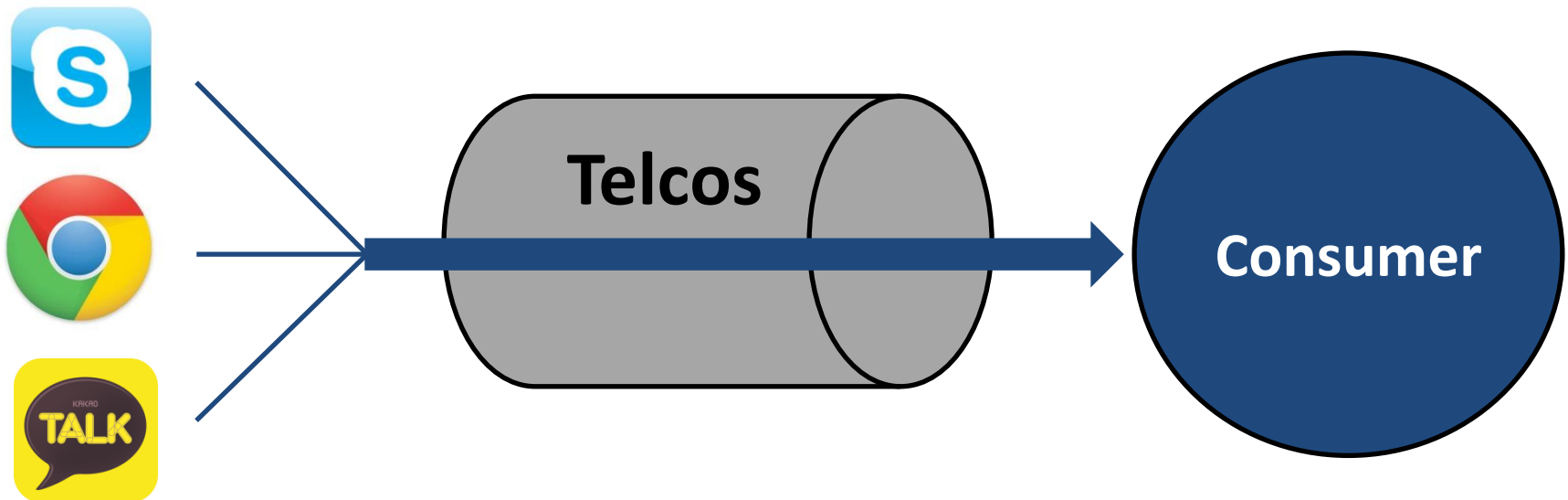
Revenues from SMS, Voice and data are declining. Telcos Cannot maintain revenues and usage.

Source: IDATE 2012, IE Market Research Corporation 2011, The Korea Economic Daily 2012

BACKGROUND & MOTIVATION (13/11)



In short: Telcos are now **dumb pipes** for service providers...



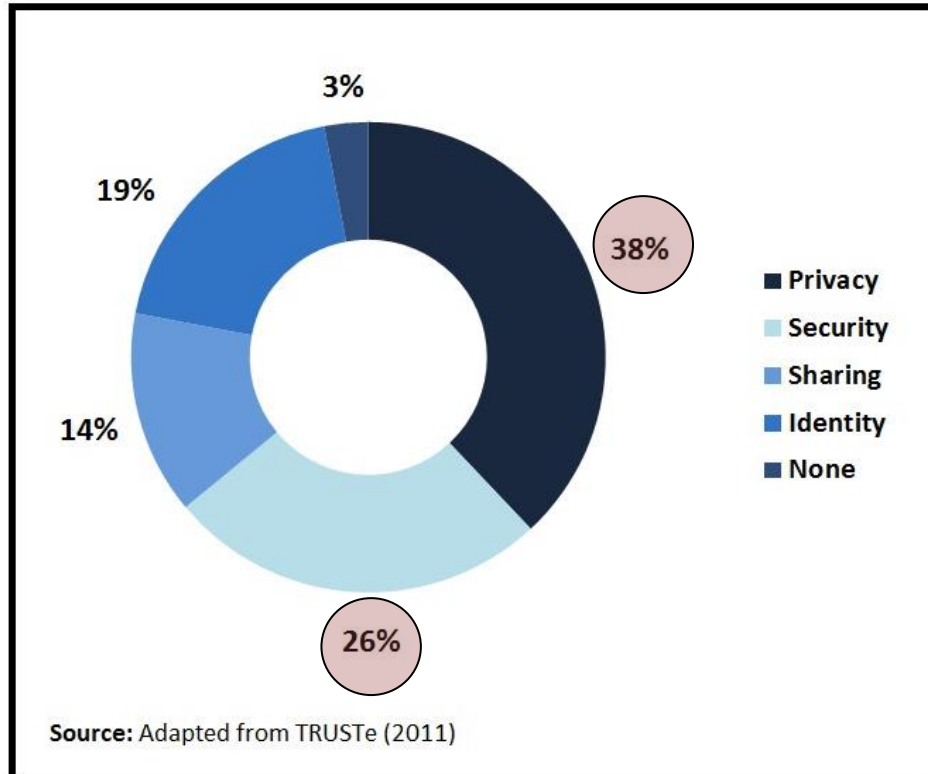
- 1) Telcos need to innovate in new business models and automate processes...
To be SMART pipe ([Oracle 2012](#); [Ovum 2012](#))
- 2) Data is the “oil that will fuel Telcos’ future growth” ([Ovum 2011](#))



What are the challenges?

Also, a proper adoption by Telcos is needed

Concerns When Using Mobile Apps



Privacy Laws



EC 95/461995 Directive

- Should be **followed by all sectors**, including Telcos.
- Personal information is defined as any information relating to an **identified or identifiable** natural person.
- **Under the Korean law, 11731**, everyone has the right to privacy in their conversations and messages for mailings and telecommunication



What can telcos do with the massive set of data which continue to grow exponentially in their networks and as their **services and **revenues** are rapidly becoming Commoditized and Cannibalized and in return their network get congested by the OTT players.**

**For fear of
Network Neutrality law
How do telcos remain relevant in a seriously weird business environment?**

Way out for Telcos



*Passing through
thick and thin
now due to the
rapid changing
face of
communications.*

Innovation- BDA

**Co-opetition/
Collaboration**

**Homegrown OTT service-
Joyn**

**Become a platform
player**

Source: Dundee,2000; Barnett et al.,2000; Wong,2000; Racanelli, 2001 and Ruke et al., 2003

Literature Review (1/6)



We integrated literature on:

Big Data

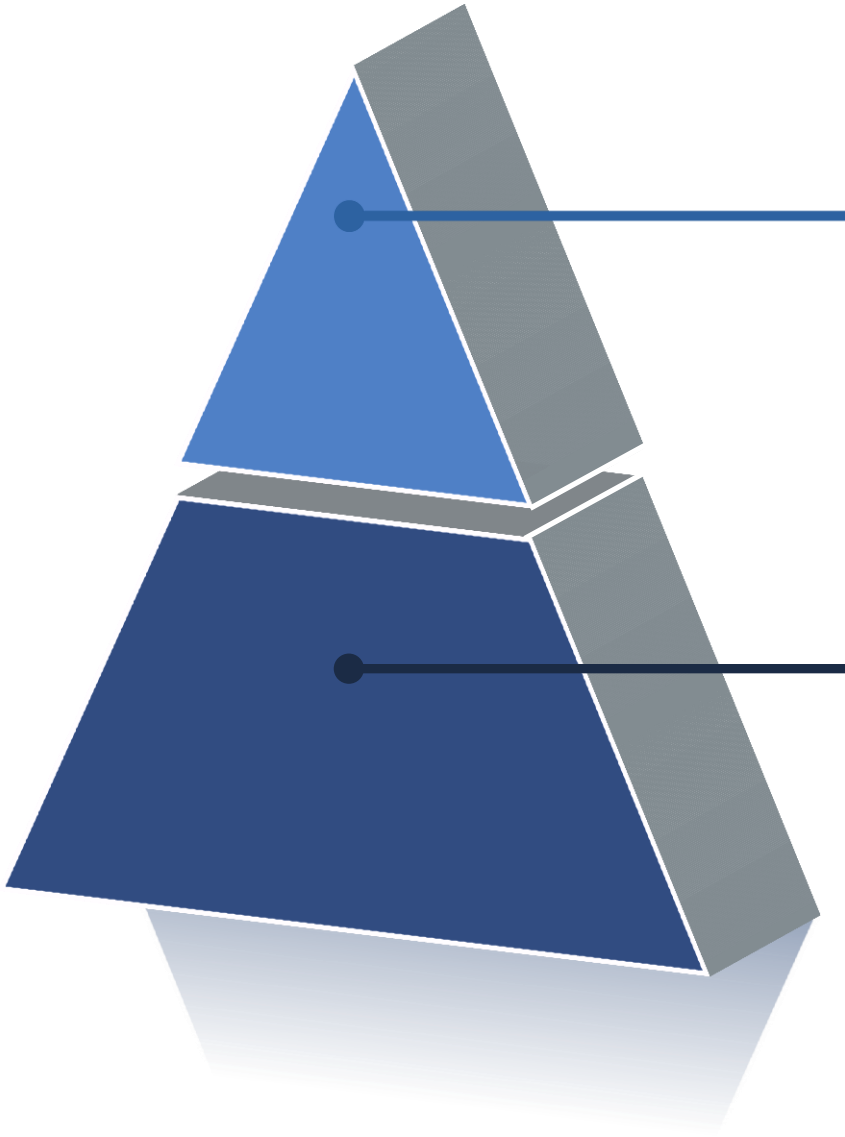
- Lazer et al. (2009); Manovich (2011); Pariser (2011)
- Sara Philpot (2010); Danah Boyd et al. (2012)
- Frank J. Ohlhorst (2012), Villars et al. (2009)

Data Mining

- Bose et al. (2001), Mozer et al. (2001)
- Fayyad et al. (2002); Apte et al. (2003)
- Chang et al. (2009); Sara Philpott (2010)

Churn Manage.

- Kenneth Cox et al. (1997); Scarfe et al.(1995); Tsaih et al. (1998)
- Berson et al. (1997); Xie et al. (2009); Tsai et al. (2010)
- Xia et al. (2001); Song et al. (2001), Kim et al. (2003); Kim et al. (2004)

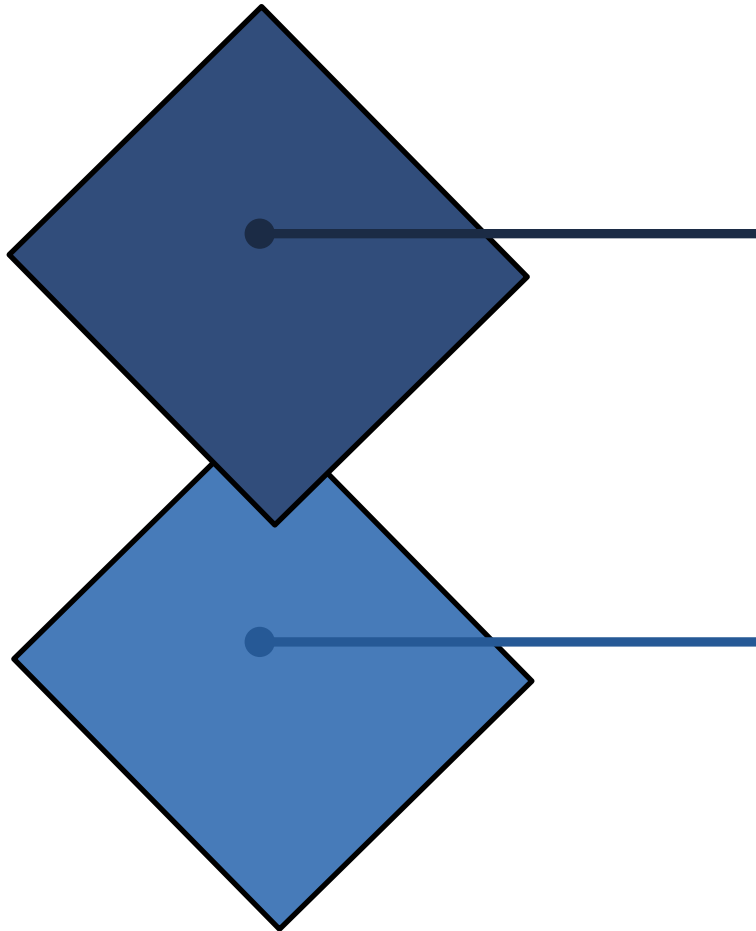


TECHNOLOGY ADOPTION THEORIES

- Adoption: "Tend to adopt", use, and utilization (Rahim 2003, Lertwongsatien et al. 2003).
- Tornatzky et al. (1990) posited a 3- stage process for technological adoption in organization.
- **STOPE** (Barky 2004).

TASK TECHNOLOGY FIT (TTF) CONTEXT

- The TTF model **Goodhue et al. (1995)** – impact on individual – and **Zigures et al. (1999)** – impact on organization: proper match b/n task and technology characteristics results in a better performance impact.
- **Goodhue and Thompson (1995)**, TTF "on individuals the degree to which a technology assists an individual in performing the portfolio of the task."



GAPS

Relatively little or no sufficient research has been done on the adoption of BDA in the telecom industry in this era of Data deluge.

OUR CONTRIBUTION

- OPERATIONAL & METHODOLOGICAL
- Contribute to a growing body of literature in BDA in the telecom industry
- Explore TOE framework and show the relationship and factors of BDA adoption



TOE

- BD as ICT innovation / emerging technologies adoption.
(Caldeira et al. 2003; Rui 2007; Oliveira et al. 2011)
- Comprehensive tool for technological adoption in an organization.
(Tornatzky et al. 1990)

Why TOE?... Macro-Level

- Individual Level:
TPB, TRA, TAM, Innovation Diffusion Theory.
- **Organizational Level:**
Yazn Alshamalia et al. (2013) used Rogers DOI.

Literature Review (5/6)



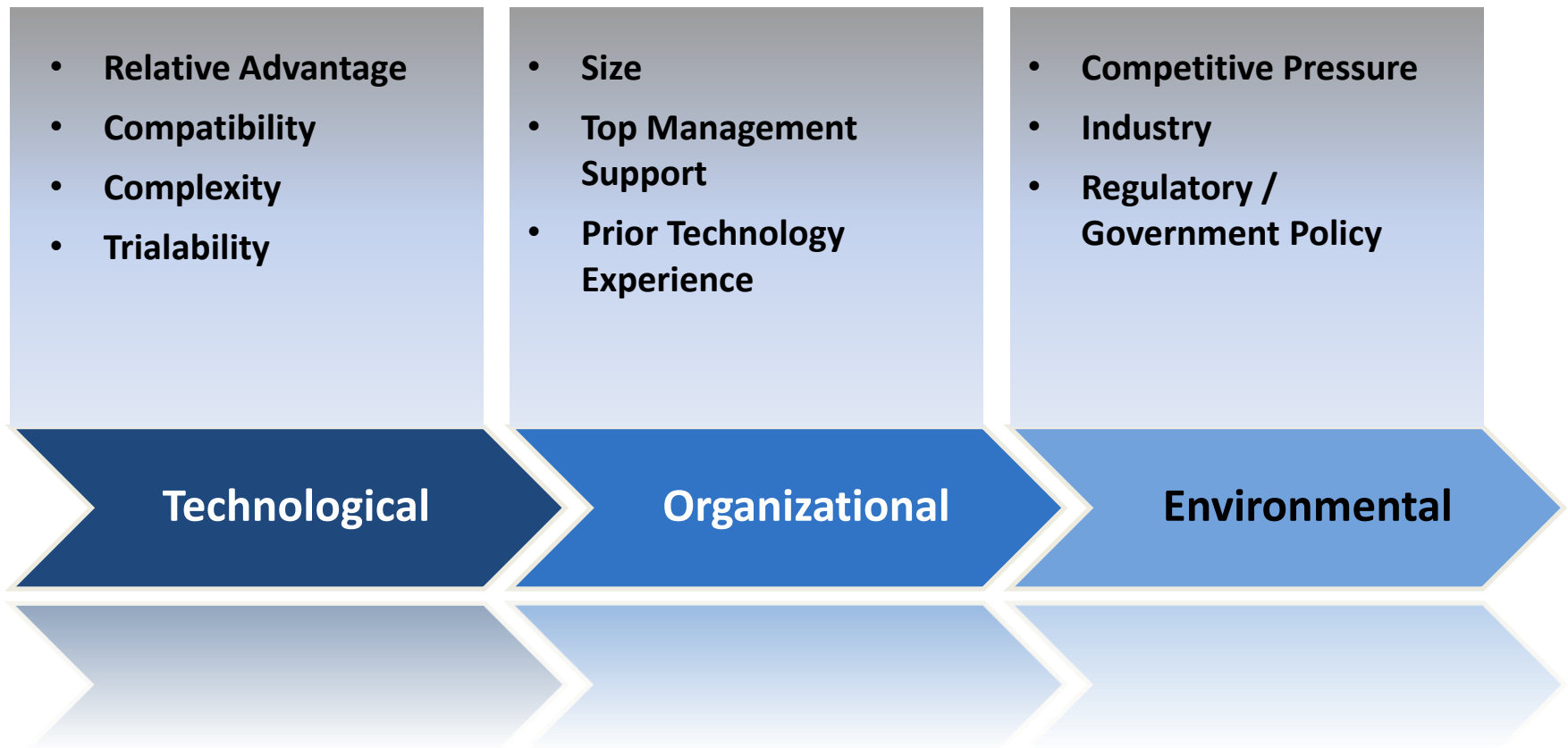
IS Adoption and Context	Authors	Technological analyzed variables	Organizational analyzed variables	Environmental analyzed variables
Enterprise system SMEs in Northwest of England	(Ramdai et al.,2009)	Relative advantage, Compatibility, Complexity, Trialability, Observability	Top management support, Organizational, IS experience Size	Industry, Market scope, Competitive pressure, External IS support
Electronic Data Interchange Small firms in Hong Kong	(Kuan and Chau,2001)	Perceived direct benefits, Perceived indirect benefits	Perceived financial cost, Perceived technical competence	Perceived industry pressure, Perceived government pressure
Communications technologies RFID in the manufacturing industry	(Wang et al.,2010)	Relative advantage, Complexity, Compatibility	Size, Top management support, Technology competence	Competitive pressure, Trading partner pressure, Information intensity
Communications technologies SME in the US	(Wen et al.,2010)	Relative advantage, Complexity, Cost, Compatibility	Size, Top management support, IT competence	Competitive pressure, Vertical linkages, External support, Information intensity
Communications technologies Adoption of single –on and multifactor authentication	(Marise-Marie et al.,2010)	Existing technologies in use, New technologies relevant t an organization, Business processes accomplished through technology	Size, Global scope, Top management support, Technology competence	The industry, Competitive pressure, Dealings with government, Regulatory compliance
Communications technologies Grasping project complexity in large engineering project	(Bosch-Rekvelde et al.,2011)	Goals, Scope, Task, Experience, Risk	Size, Resources, Trust, Risk, Project team	Stakeholders, Location, Market conditions, Risk
Communications technologies OSS in South Africa	(Van Belle et al.,2012)	Relative advantage, Complexity, Compatibility	Size, Scope, Resources	Rivalry and relations with buyers and suppliers, Risk
Communications technologies Cloud computing	(Borgman et al.,2013)	Relative advantage, Complexity, Compatibility	Size, Top management support, IT competence	Competition intensity, Regulatory environment
Communications technologies Cloud computing in Vietnam	(Chang et al., 2013)	Relative advantage, Complexity, Compatibility	Size, Top management support, Formalization	Competitive pressure, Trading partner pressure
Communications technologies Cloud computing adoption by SME's in the North East England	(Alshamaila et al., 2013)	Relative advantage, Complexity, Compatibility , Uncertainty, Trialability	Size, Top management support, Innovativeness, Prior IT experience	Competitive pressure, Industry, Market scope, Supplier efforts and external computing support

Source: Alshamalia et al. (2012)

Literature Review (6/6)

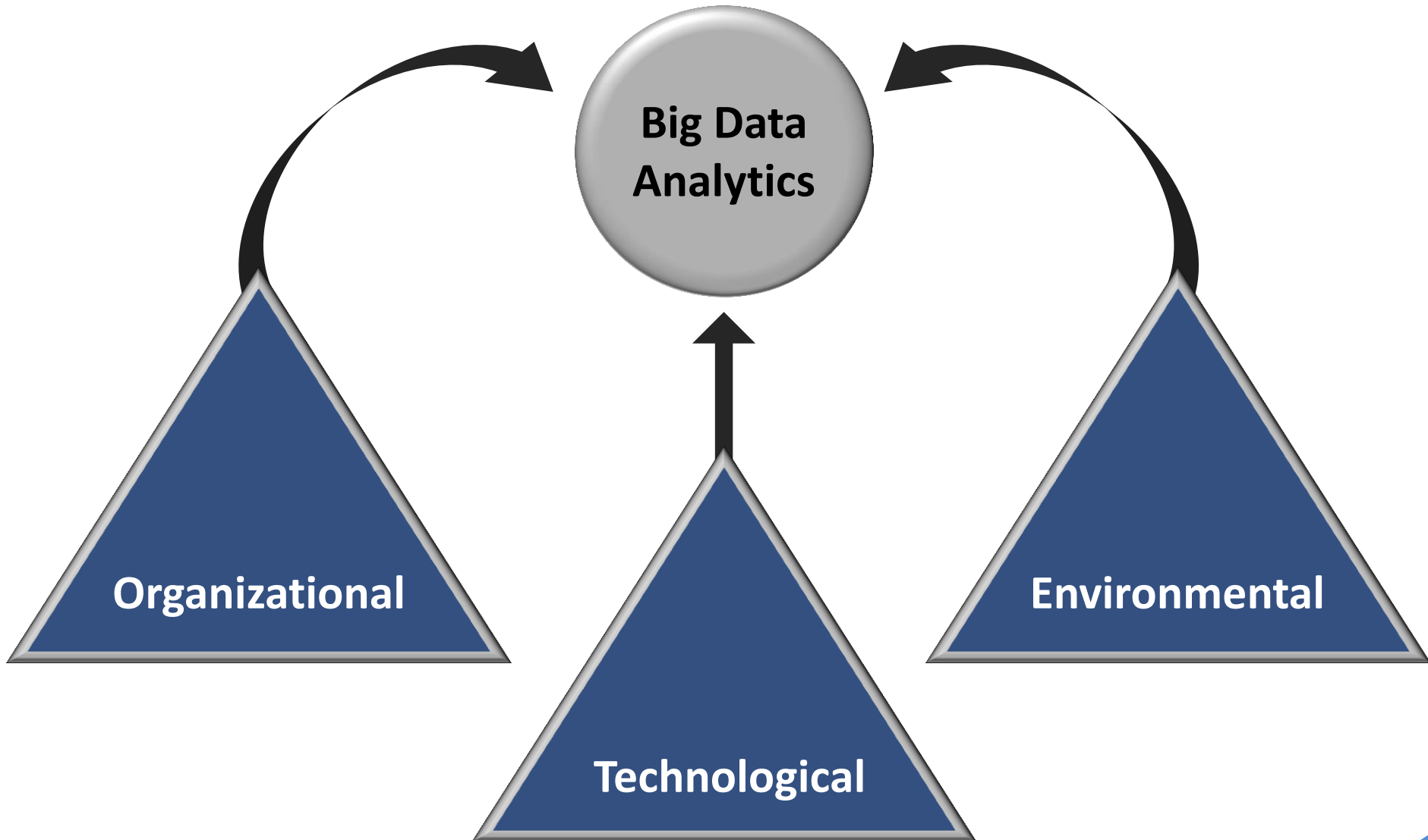


... IT innovations are highly differentiated technologies for which there is no single adoption model



Source: Kautz et al. (2000) and Alshamalia et al. (2012)

Conceptual Framework

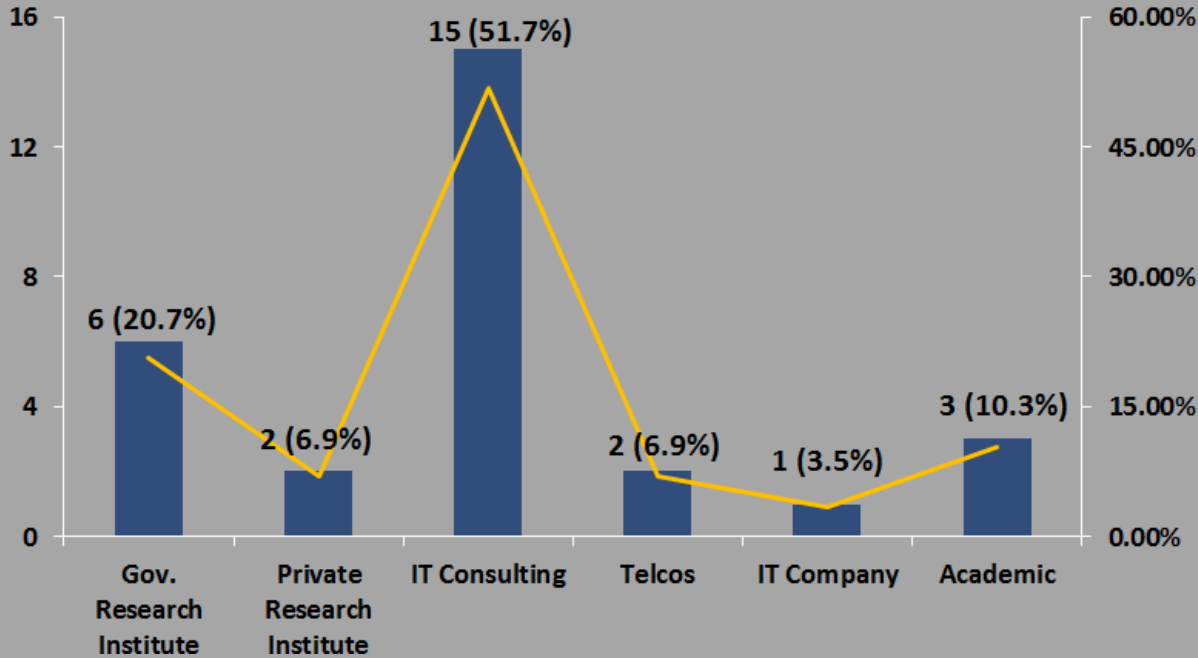




Research Design

- ❑ A **multi-perspective (TOE)** framework as theoretical base.
- ❑ An **inductive content and qualitative analysis** using semi-structured interviews as primary data (face-2-face) (Leedy and Ormrod 2005).
- ❑ **Interviewees:** industry experts, research institutes, vendors, and from the three telcos in Korea.

Results (1/3)



Interviewees (N = 29):

- Government Research Institute
- Private research Institute
- IT Consulting
- Telcos
- IT Company
- Academic

Results (2/3)

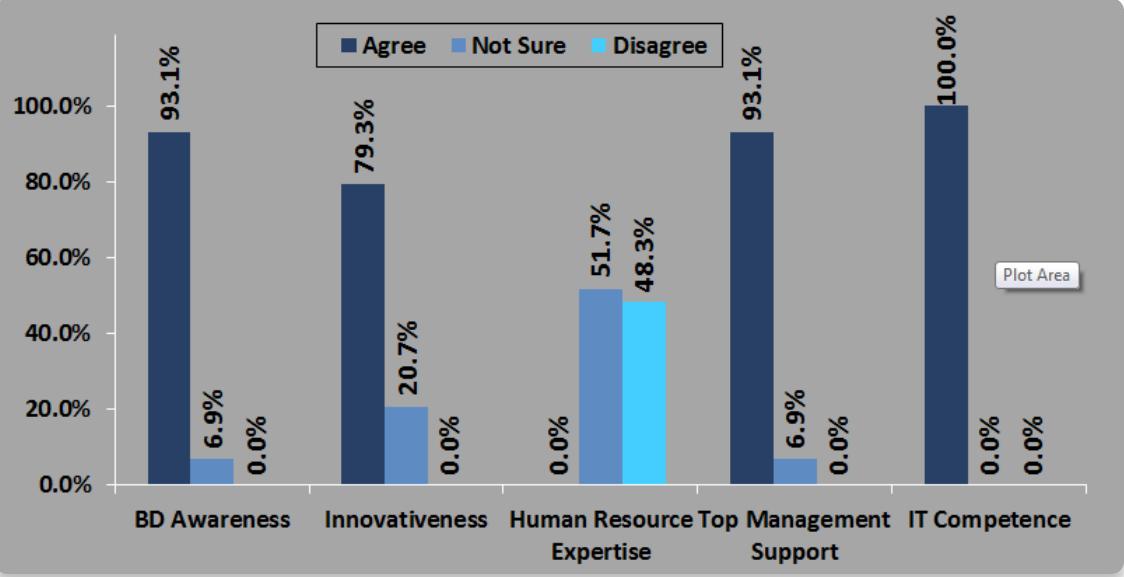
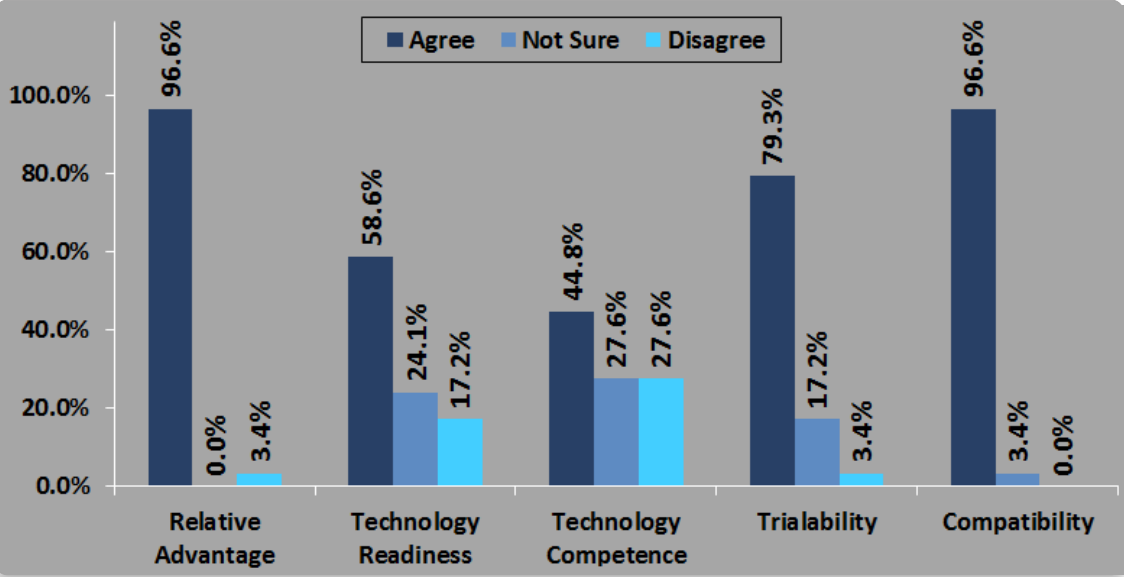


Technological Key Words

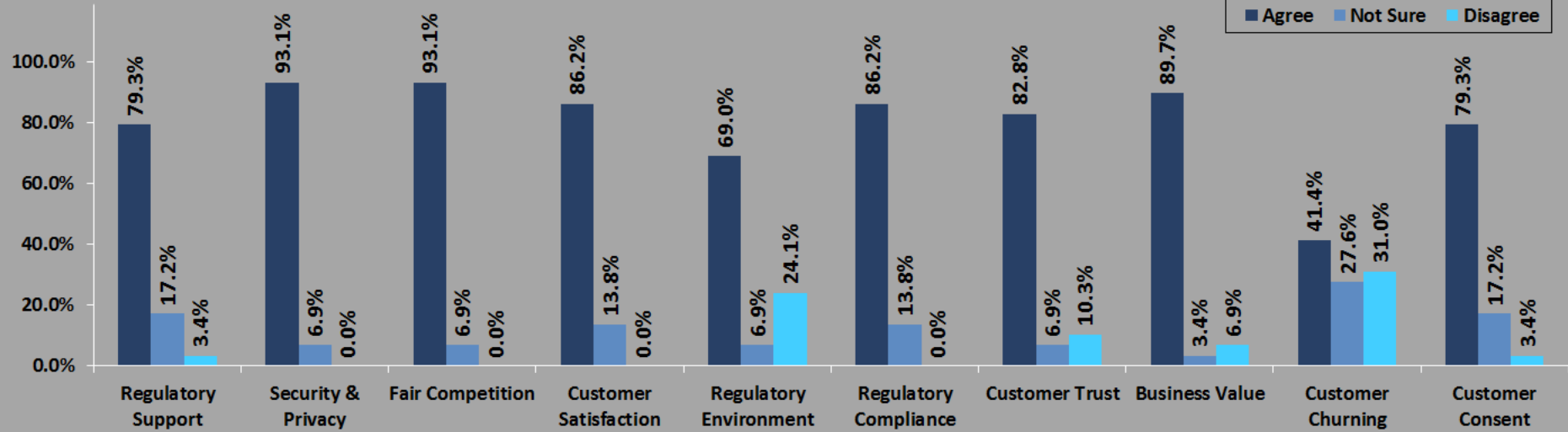
- Relative Advantage
- Technological Readiness
- Technology Competence
- Trialability
- Compatibility

Organizational Key Words

- Big Data Awareness
- Innovativeness
- Human Resources Expertise
- Top Management Support
- IT Competence



Results (3/3)



Environmental Key Words

- Regulatory Support
- Security and Privacy Protection
- Fair Competition
- Customer Satisfaction
- Regulatory Environment
- Regulatory Compliance
- Customer Trust
- Business Value
- Customer Churning
- Customer Consent

**80% of
Respondents
agreed with TOE
framework**



- ❑ **In the organization context, Big Data awareness, and human capacity development towards Big Data and management support posed strong influence. From the environmental context, regulatory compliance, competition and privacy concerns indicated strong influence**
- ❑ **From the Questionnaire and Experts interview, dearth of skilled Big Data practitioners and data scientists, most enterprise lack right mindset to exploit Big Data and Big Data training and education are needed.**
- ❑ **Implementing Big Data could pose some challenges.** The new paradigm involves the use of data in an ethical and secure manner to overcome customers' privacy concerns.

Case Studies



- ❑ Telefonica: Brazil, Germany, UK

- ❑ Verizon Wireless :USA

- ❖ Precision Market Insight

- ❖ Dynamic Insight

- ❑ Packaging anonymized customer data, analyzing, and aggregating it and then sell the insights (but not the total) to marketers, retailers (Ovum,2012)

- ❑ Telecom Italia

- ❑ UK telecom firm O2:

- ❑ Customers can sign up to view their personal data(who and when calls came and went out)

Source: (Ovum,2012)

But . . . **BIG DATA** Adoption is Slow. Dearth of Skilled **BIG DATA** Practitioners and Data Scientists. Most telcos Lack Right **MINDSET** to Exploit.

BIG DATA THE New, DEFINITIVE Source of **COMPETITIVE ADVANTAGE** Across ALL Industries most especially telcos.

Source: Wikibon Big Data Manifesto, 2011

South Korea Mobile Market

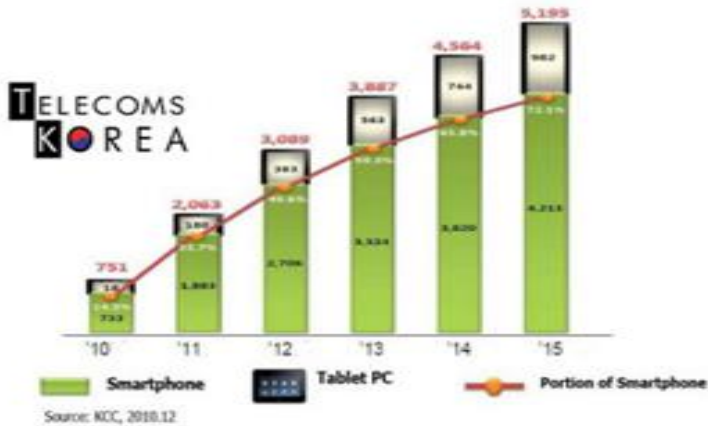


- South Korean mobile users primarily use MIM services on their mobiles.
- Mobile penetration over 110%

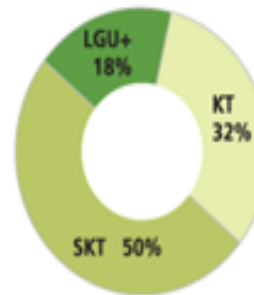


Smartphone addiction jumps to 18.4% among Korean teens
 Those who are addicted spend over 7hrs on MIM activities
 Source: Ministry of Science, ICT & Future Planning June, 2013

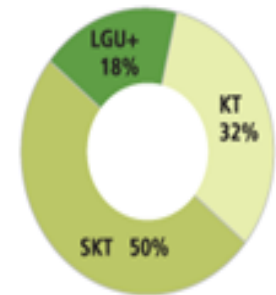
Number of Smartphone & Tablet PC User (2010-2015)



Q1 2007 mobile market share



Q1 2011 mobile market share



Conclusion 1/2



- Telcos' **business models are no longer sustainable**. Dumb pipe model **strategy is no longer sustainable**, **smart pipe strategy – relying on network assets and network services to compete with the disruptive innovation in the industry.**
- The novelty of this study can be seen as a significant contribution to the body of knowledge and vital for policymakers and stakeholders in the industry.

Conclusion 2/2



- ***The telecom ecosystem is unfolding in a state of chaotic effervescence.***
- ***Revenues, services and networks are facing undue pressures***
- ***Yet multifaceted innovation around the internet and mobile technology is revealing new gold mines to be exploited!***
- ***Big Data is to telcos in this era of data deluge what electricity was to the Industrial Age.***



Thank You
감사합니다