Opening the Nation: Leveraging Open Data to Create New Business and Provide Services *

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ABSTRACT

Opening government data has been one of the main goals of nations building their e-government structures. Nonetheless, more than publishing government data for public viewing, the bigger concern right now is promoting the use change to "and proving the usefulness of available public data". In order to do this, governments must be able to, not only publicize data but more so, publish the kind of data usable to infomediaries and developers in order to create new products and services for citizens. This research investigates 30 open data use cases of South Korea as listed in Data.go.kr. This study aims to contribute to a better understanding of open datasets utilization in a technologically-advanced and well-developed nation and hopefully provide some useful insights on how open data is currently being used, how it is opening up new business, and more importantly, how it is contributing to the civic society by providing services to the public.

Keywords: *Open Government Data, Business opportunity, Case study*

I. Introduction

The concept of open data together with the goals of e-government has made the establishment of an effective open data initiative one of the highest priorities of government organizations to date. Currently, published case studies and research on open data initiatives among countries focus on open data readiness assessments, open data implementation studies, and impacts studies (Davies, Perini, & Alonso 2013). Nonetheless. A number of researchers and non-government organizations have investigated about outstanding cases regarding the usage of

open data in countries, states, or cities around the globe with the goal of understanding how open datasets are being utilized and how the goals of transparency, collaboration, and participation are being achieved.

This research investigates 30 open data use cases of South Korea as listed in its open data government portal (data.go.kr) and how these cases contribute to the fulfillment of two of the several mentioned future impacts of open data – opportunities for new business and new public services. South Korea ranks first in the 2014 United Nation's E-government Development Index and E-participation Index (in tie with Netherlands), respectively. The country has been on the top spot for the mentioned indices since 2010. However, despite the availability of e-government studies about the country, open data research in South Korea remains to be in its infancy. Nonetheless, several open data use cases are already out in public through the open data portal. Currently, there are 789 open data use cases published in the open government data portal, 611 of which are domestic cases. Of these 611 cases, there are 30 "Interviews with CEO", which are the focus of this study, published on the portal. This study aims to contribute to a better understanding of open datasets utilization in a technologically-advanced and well-developed nation and hopefully provide some useful insights on how open data is currently being used, how it is opening up new business, and more importantly, how it is contributing to the civic society by providing services to the public.

II. Research Background

2.1 Open Government Data

In 2009, a new wave of evolution brought about by technological, social, and demographic influences emerged through the so-called Open Government (OG) (Veljković, Bogdanović-Dinić, & Stoimenov 2014). The Open Government movements were initiated by the United States of America when President Barack Obama, in 2009, issued a Memorandum on Transparency and Open Government. The memorandum cited the establishment of a system of transparency, public participation, and collaboration between the government and its citizens to ensure public trust (Obama 2009a). Shortly after, Obama issued another Memorandum on the Freedom of Information Act which is said to be the "most prominent expression of a profound national commitment to ensuring an open government" (Obama 2009b). The Obama administration built the open government concept around the ideas of transparency, participation, and collaboration between the public and the government. The path toward the creation of the opportunity for Open Government to develop included the construction of the crucial legal platforms. McDermott (2010) notes in detail the legal history that lead to the growth of open government, starting with "The Paperwork Reduction Act" in 1980 towards the 2010

memorandum "Information Collection under the Paperwork Reduction Act", in relation to the "E-government Act" issued 2001 to "The Freedom of Information Act". Moreover, the penetration of communication technologies in the public's lifestyle has made it possible for governments to put the new and innovative OG idea into practice (Parycek & Sachs 2010).

Open data, in its broad sense, is defined as data that are freely accessible online, without any technical restrictions, available for re-use and provided under open access license, can be re-used without limitations for commercial and non-commercial purposes (OKF 2011). On the other hand, Open Government Data (OGD) refers to government data that is "data and information produced or commissioned by government or government controlled entities" that are published for use and re-use of private

and public entities. (OKF 2011). The OECD definition of Open Data in the context of public and government data is, "information, including information products and services, generated, created, collected, processed, preserved, maintained, disseminated, or funded by or for government or public institutions" (Ritter 2014).

Scrolini (2014) identified three models for Open Government that classifies open data initiatives between three types depending on which sector leads the initiative, see Table 1. South Korea is currently in a state-led environment with programs being organized, enforced, and promoted by the government. Consequently, entrepreneurs and developers are now catching up in terms of utilizing open datasets and API. The number of cases published on the open data portal is a proof of this.

<Table 1> Models of Open Government (Scrolini, 2014)

Type/ Characteristics	State-led Environment	Civil Society-led Environment	Entrepreneur-led Environment
Objectives	Promote the use of social services	Use of social services, transparency and accountability	Profit Making
Resources	Data already available, if in open format Spurs intra-agency and inter agency innovation. Possible contractors and in house teams carrying out the work	If data is available civil society is able to improve current services and develop new ones based on volunteer work, or specific grants.	If data is available, entrepreneurs devote their own time or funds from investors to projects
Focus	Provision of Public Goods	Provision of Public Goods	Provision of private and public goods if it is aligned with profit-making incentives
Sustainability	If embedded in city's strategic activities, applications can be sustainable.	Depending on civil society resources and volunteer	Depending on data availability and market value of the service
Replication	Ideas replicable and technology as well depending if public software was used	Ideas and technology are replicable depending if public software was used	Ideas replicable depending on business model and scale

2.2 Benefits of Open Data

Studies on impacts of open data investigate the benefits and the results that stem from the publishing of open data and the utilization of the datasets. They generally focus on whether open data has brought any one of the specific benefits that open data advocates suggested (Davies et al. 2013) – such as such as economic growth (Hammell, Perricos, Branch, & Lewis 2011) or democratic empowerment (Davies 2010).

Currently, there is a limited amount of documentation on the sustainability and initial impacts that OGD initiatives have effected on improving the citizen's access to information and how open data have promoted transparency and improved the delivery of services to the public (Mutuku & Mahihu, 2014). Large-scale and in-depth studies on open data impacts are yet to be done and most work remains on the ad-hoc level, isolated case studies, and anecdotes (Davies et al. 2013).

Davies et al. (2013) identified three broad categories which capture the mechanisms through which open data might bring change, these are; Transparency and accountability, innovation and economic development, and inclusion and empowerment. It is not surprising that countries who top open data implementation are also at the top of the rankings for emerging impacts. To date, entrepreneurial open data use has overtaken accountability as the most evident impact of OGD initiatives followed by transparency and accountability.

On the other hand, "emerging and advancing" countries list transparency and accountability as top visible impacts (ODDC 2015). Identified areas of impact are entrepreneurial open data use, transparency and accountability, government efficiency, economic growth, environmental sustainability, and inclusion of marginalized groups.

In academic research, the impacts of open data have been investigated in different aspects. Harrison and Sayogo (2014) found that the concepts of democracy, human capital, and budget document disclosures are consistently related to transparency, accountability, and the involvement of the Supreme Audit Authority with the public. Chan (2013) investigated open innovation strategies that will develop the Singapore open government data portal into an open innovation platform that will entice businesses to create e-services using open datasets. Aside from country level benefits, open data has also changed the way international organizations consider sharing data, planning, coordination and other uses of the data they collect through their operations (Luna-Reyes, Bertot, & Mellouli 2014).

Cranefield, Robertson, and Oliver (2014) explored the benefits, barriers, and enablers of open data apps – this study is in conjunction with entrepreneurial open data use. Value is created by providing context and meaning to a set of open data that will be relevant to an individual user (DiFranzo et al. 2011). Moreover, in Chicago, residents have already created several independent e-government projects

based on available open datasets within three years of the data portal launch (Kassen 2013).

Davies et al. (2013) suggested that future studies on open data impacts might take one of two paths. First, it might seek to measure impacts on the macro-level with the use of statistical correlations to investigate between published measures of open data implementations and variables that stand for the anticipated impacts of open data. Another route would be on the micro-level, to seek to understand and define the different conditions and processes where open data is being used. Measuring open data impacts should also be qualified whether it is the impact of a particular dataset, the impact of an open data initiative, or the impact of open data in a sector.

III. Sources of Evidence

This study mainly uses online documents from data.go.kr to make an analysis of the open datasets and open data use in South Korea. Currently, there are 789 open data use cases published in the open government data portal, 611 of which are domestic cases. Of these 611 cases, there are 30 "Interviews with CEO", the focus of this study, published on the portal. Table 2 summarizes the open datasets used in the domestic case and the number of CEO interviews published on the portal;

<Table 2> Summary of Open Data Use Cases Published in data.go.kr

Category	Total Number of Cases	Cases with CEO interviews
Education	35	1
Land & Infrastructure	18	0
Public Administration	13	2
Finance	10	1
Industry & Labor	60	3
Social Welfare	12	0
Food & Wellbeing	4	1
Tourism	155	9
Healthcare	32	2
Safety	7	1
Transportation	82	7
Climate	72	2
Science	16	0
Agriculture	6	0
Law	4	0
Foreign Policy	0	0

It is evident that in both total number of cases and CEO interviews, tourism and transportation are leading among all results. This shows that Tourism and Transportation are the most utilized datasets among others. More than the open datasets cases, the portal hosts the open datasets published by the South Korean government. The Dataset page of the portal gives 17, 442 results broken down as File Data (12,276), Open API (1,730), Visual (251), and Posts (3,185). File Data and Open APIs date back from 2013 (as last updated) while posts date back to 2010 (as date added). Popular search words on the datasets page, as of writing, are floating population, subway, weather, population, and bus.

Table 3 provides a summary of each application's function together with its name, type, and category. Note that some of these
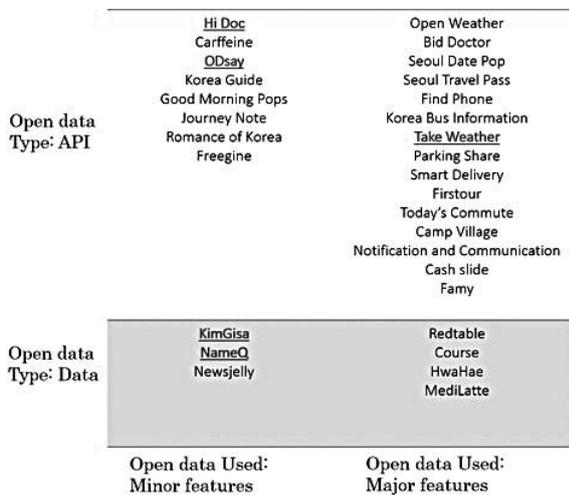
names were translated from Korean to English
so they may vary.

<Table 3> Descriptions of Open Data Use Cases

Name	Category	Type	Description
Carffeine	Transportation	Web	Vehicle care planner
Redtable	Tourism	Web and Mobile	Social rankings for restaurants
HwaHae	Food & Wellbeing	Mobile	Showing chemical components of beauty products
Course	Tourism	Mobile	Sharing tour course of places and restaurants
NameQ	Industry & Labor	Mobile	Exchange and share information of business cards
Bid Doctor	Industry & Labor	Mobile	Sharing information on bids and outcomes of bids
Seoul Travel Pass	Tourism	Web and Mobile	Booking tour places in Seoul and Gyeonggi with discounted prices
Find Phone	Safety	Mobile	Find lost phones based on police information
Dad and Trip	Tourism	Mobile	Sharing information about weekend farms and places to experience farms
Culture Here	Tourism	Mobile	Providing lists of cultural events
KimGisa	Transportation	Mobile	Providing route information for a car driver
Open Weather	Climate	Mobile	Providing weather and prediction information
ODsay	Transportation	Mobile	Providing navigation services through public transportation
Take Weather	Climate	Mobile	Take weather photo and share
Seoul Date Pop	Tourism	Mobile	Provide places for date
MediLatte	Healthcare	Mobile	Provide hospital information
Everyone Parking Lot	Transportation	Mobile	Provide parking places and their information
Hi Doc	Healthcare	Mobile	Provide healthy index for a region Check current healthiness of a user
Smart Delivery	Transportation	Mobile	Tracking post delivery through mobile app
NewsJelly	Industry & Labor	Web	Provide news based on data analysis
Korea Guide	Tourism	Web	Introducing education program of a tourism guide for foreign women
Firstour	Tourism	Mobile	Tourism information for foreigners
Journey Note	Tourism	Mobile	Journals for travels
Korea Bus Information	Transportation	Mobile	Bus arrival notification for Seoul and Gyeonggi
Romance of Korea	Tourism	Mobile	Travel quiz (following routes and solve quizzes)
Good Morning Pops	Education	Web	Study of Good Morning Pops radio program
Notification & Communication	Public Administration	Web	Provide lists of petitions
Today's commute	Transportation	Mobile	Check today's weather Check current traffic information
Camp Village	Tourism	Web	Camping community Camping portal and reservation of camping sites
Famy	Public Administration	Mobile	Safety location-reporting app for women who travel late at night
Cash Slide	Finance	Mobile	Advertising on mobile lock screen allows people to gain money in exchange for ad exposure

IV. Preliminary Analysis of Sources

A preliminary analysis of open data use cases reveals the following results, see Figure 1. The cases were classified using the open data type they utilize and whether it was used as a minor or a major feature on the mobile application. Moreover, out of the 30 CEO Interview cases, 7 are websites, 21 are mobile apps, and 2 are both mobile apps and websites. Most of the published cases uses certain APIs or datasets that serve as the major feature of the website service or the mobile application. Looking through the application cases, it is also notable that most applications started with open data while a few others are enhanced by open data and are using other paid data for their services or collected data on their won.

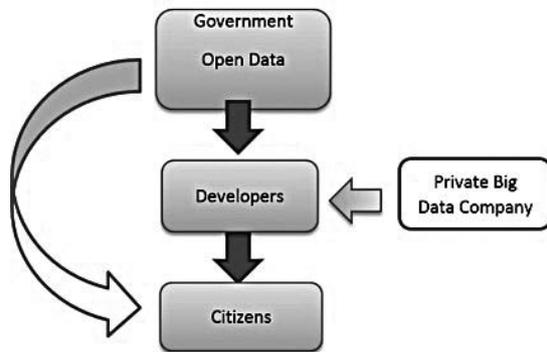| Open data Type: API	Hi Doc Carffeine ODsay Korea Guide Good Morning Pops Journey Note Romance of Korea Freegine	Open Weather Bid Doctor Seoul Date Pop Seoul Travel Pass Find Phone Korea Bus Information Take Weather Parking Share Smart Delivery Firstour Today's Commute Camp Village Notification and Communication Cash slide Famy
Open data Type: Data	KimGisa NameQ Newsjelly	Redtable Course HwaHae MediLatte
	Open data Used: Minor features	Open data Used: Major features

<Figure 1> Classification of Open Data Use Cases (underlined apps were enhanced with open data)

These results show how the opening of government data has helped create new opportunities and new business for entrepreneurs and independent developers. Based on the CEO interviews, a number of cases started with joining application-making contests and then proceeded with developing the application as a form of business. Moreover, these web and mobile applications focus on delivering services or information in a more convenient manner –whether in updating them about accurate weather, delivering highway route information or informing them about harmful ingredients in existing cosmetic brands.

Figure 2 shows a diagram of how most open data applications (web and mobile) are created. Most open data cases started with developers accessing open data from the government and then creating an application that will feature the open dataset or API. Next, their applications are offered to the public through the website or mobile application portals (Apple store, Google play, Windows Store). While some other developers enhanced their applications using open data later on or still some others use private data or their own collected data in collaboration with open datasets.

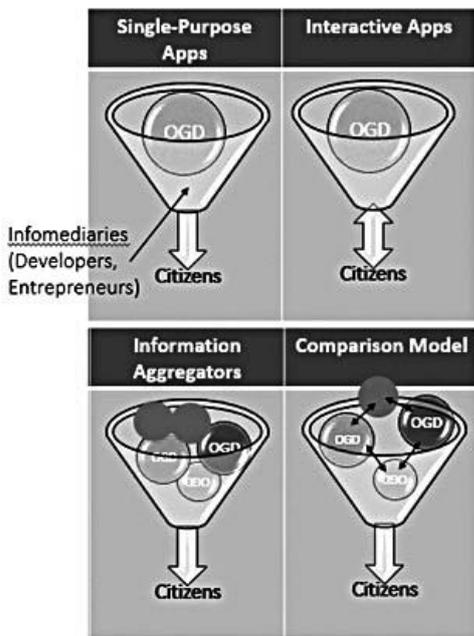<Figure 2> Flow of Data for the Creation of Open Data Apps

In this instance, we see how the situation is very much state-led with main initiatives being lead by the government and all open data files being delivered by government institutions. Nonetheless, developers have also started requesting the government to open up more pertinent data that will be useful for the public. The developers of KimGisa, mobile application that provides route information for drivers, requested the Ministry of Land, Infrastructure and Transport for milepost information on the expressway, however, the request got rejected. The developers sought the help of the Committee of Conflict for Public Data Provision with the help of the National Information Society Agency. The data was released two months after. Nonetheless, the developers of KimGisa expressed that most data that will be very useful for developers are still not available publicly.

<Figure 3> Application Business Models (Janssen and Zuiderwijk, 2013)

Due to the lack of available references on business models that involve open data applications, Janssen and Zuiderwijk (2014) devised a matrix of infomediary business models for connecting open data providers and its users. There are 6 business models mentioned in the research, 4 of which are used in this paper to analyze the open data use cases in Korea.

Figure 3 illustrates how infomediaries connect open government data and citizens and Table 4 classifies all published open data cases into the four business models. These four business models are classified as single purpose apps, interactive apps, information aggregators, and comparison models. The dynamic characteristics of each application allows for it to be categorized into more than one business model. Single-purpose apps provide real-time services such as information about weather, roads, and vehicles. These type of apps usually provide a single purpose and are based on one type of open data provided. The app processes the data and presents it to the user in a more useful, understandable, and visually appealing way for the convenience of the users. Most of the cases are single-purpose apps with additional features for interaction.

Next, for interactive apps, the users are provided with the opportunity to add content. This business model usually allows users to provide ratings or give a space for giving feedbacks and complaints. All interactive apps in the sample are single-purpose apps.

Third, information aggregators combine

several sets of open data (Data and API) and combine them in one place for meaningful presentation to the users. The combined data is processed to provide more comprehensive and useful information to the users. In this model, interoperability is often a challenge because of the different data and data sources involved. Red Table, Hwahae and Course are among the examples of information aggregator apps.

Lastly, the comparison business model aggregates open government data and open data from various sources for the purpose of comparison of performance of services or entities with others. Red Table aggregates information on different restaurants and establishments, not just in Korea, and gives ratings based on a criteria.

<Table 4> Business Model Classification of Open Data Cases

	Single-Purpose Apps	Interactive Apps	Information Aggregators	Comparison Model
Carffeine	x	x		
Redtable	x	x	x	x
HwaHae	x		x	
Course	x	x	x	
NameQ	x	x		
Bid Doctor	x		x	
Seoul Travel Pass	x		x	
Find Phone	x		x	
Dad and Trip	x		x	
Culture Here	x		x	
KimGisa	x		x	
Open Weather	x			
ODsay	x			
Take Weather	x	x		
Seoul Date Pop	x	x	x	
MediLatte	x		x	
Everyone Parking Lot	x		x	
Hi Doc	x	x	x	
Smart Delivery	x		x	
NewsJelly			x	
Korea Guide	x		x	
Firstour	x		x	
Journey Note	x	x		x
Korea Bus Information	x		x	
Romance of Korea	x	x	x	
Good Morning Pops			x	
Notification & Communication			x	
Today's commute	x		x	
Camp Village		x	x	x
Cash Slide	x	x		
Famy	x	x		

V. Discussion

The earliest data of the open data portal of South Korea were registered in 2010 and most data are constantly being updated based on the information published on the portal. Despite the amount of data published, 17,442 files as of date, the proportion of recorded open data use, 789 data use cases, account for less than 10% of all data published. Moreover, most of the data being used come from the tourism and transportation category. Scholars agree that the success of open data initiatives depends on the impacts and does not end in the publication of data. Evidently, despite South Korea's top ranking in e-governance globally, it is also just in the infancy stage of harnessing the benefits of open data publication. Table 5 gives a summary of the benefits delivered by open data as evidenced by

the CEO interviews from the open data cases presented in this study.

<Table 5> Summary of Achieved Open Data Benefits

Publication of Open Data	Government Transparency & accountability
Entrepreneurs making use of open data and requesting to open data	Participation
Creation of new business and services	Innovation and economic development
Citizens actively use open data through services provided by intermediaries	Inclusion and democratic empowerment
Between Government and Entrepreneurs but needs more participation from civil society	Collaboration
Needs further investigation	Economic Growth

Nonetheless, current status shows the benefits that government data publication has effected in the country though this benefits lie in the more immediate effects achieved by the use of open data rather than a mature impact that can portray open government as a major character in e-governance.

VI. Conclusion

This study has proven that opening government data has been fulfilling a number of the perceived benefits earlier mentioned in studies. However, this impacts are to be considered early and immediate effects of open government data adoption more than longer-term and major effects.

It is also important to note the vital roles of infomediaries like entrepreneurs and independent developers in promoting the use and benefits of open data. Entrepreneurs are actively participating in the demand for open data by creating value-added services, opening new businesses, and identifying needed data and petitioning for their release from the government agencies.

Moreover, a civil-society led open data is the next step to complete the cycle of reciprocity and prove open data's sustainability in the long run. It is interesting to see the effects of open government data once the general public acknowledges its importance and becomes conscious about the potential benefits of opening data to the society.

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현재 가톨릭대학교 경영학전공 교수로 재직 중이다. KAIST 산업경영학과를 졸업하고 KAIST 테크노경영대학원에서 석사 및 박사학위를 취득하였다. 주요 관심분야는 데이터분석, 지능형 정보시스템, 온라인 사용자들의 상호작용등이다.