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Welcome to the Inaugural Issue

Welcome to the inaugural issue of the “International Academy of CIO and Digital Innovation”.

Founded in 2006, the IAC (International Academy of CIO) is a global academic society with co-founders including Japan, USA, Indonesia, Philippines, Switzerland, and Thailand. Current members and alliances include countries in all regions such as USA, China, India, Indonesia, Thailand, Philippines, Korea, Hong Kong, Kazakhstan, Macao, Singapore, Taiwan, Vietnam, Italy, Russia, Czech Republic, and Finland. The IAC is registered as an NPO in Japan.

The IAC’s initiatives include developing and publishing the annual IAC – Waseda International e-Government rankings now in their twelfth year, undertaking a Global eGovernance book series with IOS Press in Amsterdam and volumes including “ICT and Aging Society”, and “A Decade of eGovernment Rankings”, CIO Accreditation for masters’ degree CIO and IT executive leadership programs, annual conference, and research projects and partnerships including with APEC.

And now building upon these initiatives with this new online journal.

The Online Journal of CIO and Digital Innovation is a special journal for CIO, e-government, e-governance, and ICT fields. This journal will be published once per year with the vision to improve the efficiency of governments and companies by ICT and e-governance. The mission of this journal is to provide valuable insight for CIOs to facilitate efficiency and to help leaders, especially political leaders to have updated knowledge about world e-governance trends by clear data-driven methods.

Within the mission, the journal will cover ICT application to major societal issues such as aging society, Smart Cities, and readiness and emergency response for natural disasters; opportunities, challenges and ramifications of rapidly developing technologies such as robotics, autonomous vehicles and artificial intelligence; and major leadership and eGovernance challenges such as capacity building and cyber-security. The call for

papers of the Journal is categorized into three parts- (1) Double blind, peer-reviewed articles, (2) non-referenced papers, (3) IAC conference papers.

The journal is research to practice oriented and has an audience of readers from academia, government and private sector interested in ICT leadership and innovation.

The journal will be published in the late spring / early summer of each year. The annual call for papers will be announced in mid- summer and posted on the IAC website at:

<http://www.academy-cio.org/>

as well as circulated to IAC related audiences and through participating organizations.

If you have an interest in submitting an article and contributing to the journal please contact editors J.P. Auffret and Toshio Obi at:

J.P. Auffret at jauffret@gmu.edu and Toshio Obi at obi.waseda@waseda.jp

Sincerely,

Prof. Dr. J.P. Auffret, Chief Editor, IAC Journal of CIO and Digital Innovation

Prof. Dr. Toshio Obi, President of International Academy of CIO

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PART I. REFEREE REVIEW PAPERS

(DOUBLE-BLIND, PEER-REVIEWED PAPERS)

UNDERSTANDING THE CHANGES IN THE ROLE AND THE TASKS OF CIOs: AN EVOLUTIONARY BOUNDARY MODEL

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ABSTRACT

Research on the role and the tasks of CIOs has been conducted ever since the term was introduced. Several CIO role models with varying numbers of factors as well as descriptions on the evolutions of CIOs' work have been published. We consider them characteristic to the deployment of specific technologies or to certain periods of time. We opted to find a more robust explanation and applied Leavitt's model to describe the evolving boundary factors that define the tasks of CIOs over time and across organizations. We modified the wording of the original model to reflect the evolution of technology, business strategy, and other factors. We applied the modified model to categorize earlier research findings, recommended CIO competencies and analyzed data collected from interviews with 36 CIOs within six industries. We discovered that the modified model was able to categorize the findings of prior studies and to describe the tasks of the interviewed CIOs with links to prior studies.

Keywords— CIO profession, CIO tasks, CIO role, CIO competencies, CIO curriculum, Qualitative Interview, Leavitt's organizational development model

1. INTRODUCTION

This article focuses on the evolution of the Chief Information Officer's (CIO) profession. According to prior research, issues that CIOs address and manage have changed and grown continuously in number and in scope [e.g. 17]. Both one-time studies on how the boundaries of information technology (IT) have changed, that is, enlarged [e.g. 62] as well as repeated studies such as the Society for Information Management (SIM) Annual IT Trends Study in

the US [e.g. 39] tell this story. The experiences of our research team are similar. In addition to academics, our research team includes practicing CIOs and participates in the annual "CIO of the year" selection. Shortlisted candidates are interviewed with so-called 360-degree interviews. Interview results together with other data are then used to make the nomination. The 12 CIOs of the year nominated so far and the more than five dozens of shortlisted and interviewed candidates each appear to execute their CIO role and tasks in a unique organization-idiosyncratic way. As myriad issues impact the CIO profession the motivation for this research comes from the question: *is it possible to model factors that define the boundaries of the evolving CIO profession over time including variations in the tasks and the role of CIOs within and between organizations?* We define the role as the organizational status and influential possibilities within an organization. For tasks we refer to work content, that is, what a CIO actually does in his/her profession during his/her CIO career.

Ever since the CIO term emerged some 35 years ago [64] research has been conducted on what CIOs do or should do [2,13 21, 55, 56, 57, 70], what are their main concerns [e.g. 39, 47], what kind of professional and personal competencies they should have [8, 11, 18, 36, 54, 65], and whether the CIO belongs to the top executives of his/her organization or not [7, 29, 35, 38, 44, 58, 59, 63]. Other investigated research questions include questions such as, are there differences between corporate and public sector [e.g. 19], between developed and developing economy [e.g. 25] and between group-level, regional/ divisional [e.g. 61] and special purpose, such as infrastructure or business/digitalization [e.g. 13] CIOs. Mentioned studies indicate how versatile the CIO profession and its evolution

have been and are.

During the past five decades, the deployment of IT has grown, widened and deepened. Correspondingly, the significance of IT has increased, as more organizational activities have become IT-enabled [15, 29]. Within an organization, the CIO has been regarded as one of the key persons responsible for the management and deployment of IT ever since the term emerged [5, 7, 58, and 64]. Thus, it is logical to reason that constant growth of IT usage will also impact the work of CIOs. Indeed, research has shown that the number of issues that CIOs need to manage has increased over the years [2, 11, 20, 26, 39, 47, 52, and 62]. Similarly, changes in the perceived focus of CIOs' work have been reported [1, 10, 12, 15, 33, 34, 38, 39, and 60]. Consequently, recommendations for the IS curriculum, such as the ACM/AIS MSIS curriculum [46, 66, 67], and for CIO competencies, such as the CIO Council Clinger-Cohen list [18, 36], have been modified several times. Changes in the CIO profession appear to be related to technology advancements, ever-increasing deployment of IT, but also to the evolution in organizational and strategy thinking as well as in governance and managerial practices. Nonetheless, it is legitimate to ask if we have really been able to model how the role and the tasks of the CIO

profession are defined in general and within organizations in particular - and especially how and why changes in the CIO profession occur over time. This was the starting point of our research. We felt and it appeared to us that although the CIO role and tasks descriptions as well as the IS curriculum and CIO competence recommendations change constantly there should be deeper theoretical understanding about the factors that establish boundaries for the CIO profession and its evolution.

Several models about the role of IT, the IT function and CIOs have been proposed. In general, most of them either suggest alternative roles for a CIO or describe the changes and evolution of issues that CIOs need to consider. Previous studies have suggested that CIOs could have one [11], two [9], three [63], four [13, 17, 68], five [31, 55] or six [28] alternative roles. Therefore we categorize them as CIO role studies. It is worth to note that the meaning of the term role in these studies differs from the definition given and used in the present research. Table 1 summarizes CIO role studies. CIO role studies describe what is a CIO's dominant scope in IT deployment [13, 55] or what tasks dominate the time consumed by a CIO while (s) he performs his/her various tasks [68].

TABLE 1: CIO ROLE STUDIES AND CIO TYPES (=ROLES) PROPOSED IN THEM

	Researchers	Research	CIO types
One CIO type	Brown (1993)	Research integrates the organizational and individual perspectives as well as the CIO partnership role.	General manager
Two CIO types	Broadbent and Kitzis (2005)	Research is recognizing different kind of organisations which require different behavior and actions from CIOs.	Demand-side leadership for shaping and managing expectations and Supply-side leadership for delivering cost-effective services
Three CIO types	Stephens et al. (1992)	Researched how MIS managers and CIOs use their work time within IT and outside IT and how close the activities are compared with CEOs work.	MIS manager, CIO in decisional role and CIO interacting outside IT function
Four CIO types	Chun and Mooney (2009)	Introducing the CIO types according to company's IT strategy and how the IT infrastructure is managed (divergent or orchestrated)	Innovator & Creator, Opportunity Seeker, Landscape Cultivator, Triage Nurse & Fire Fighter
	Carter et al. (2011)	The study points out three traditional IT management roles: Decisional, Informational and Interpersonal, and suggesting a new business technology strategist	Decisional CIO/Entrepreneur & Resource Allocator, Interpersonal CIO/Leader, Informational CIO/Spokeperson & Monitor Interpersonal CIO/Liaison, Business Technology Strategist
	Weil and Woerner (2013)	A study of CIOs role from digital economy point of view; Identifying key activities for four type of CIO's and how CIO's should spend their time across these activities.	Embedded CIO, ICT services CIO, External customers CIO, Enterprise processes CIO
Five CIO types	Peppard et al. (2011)	A study of ambiguous role of a CIOs; "CEO's need to understand what type of CIO is appropriate at a particular point in the organisation's journey"	Innovator CIO, Utility IT Director, Agility CIO, Evangelist CIO, Facilitator CIO
	Guillemette and Pare (2012)	The objective of the study is to offer an explanation of the contribution of the IT function in organizations with a typology of ideal profiles.	Partner, Systems provider, Architecture builder, Technological leader, Project coordinator
Six CIO types	Gottschalk (2000)	A study of IS/IT leadership roles, analysing how the individual, position and organisation characteristics predict the CIO role in an organisation.	Product developer, Technology provocateur, Chief operative strategist, Chief architect, Change leader, Coach

Previous studies have also described the changes and growth of IT deployment and the impact of this on the work of CIOs [e.g. 3, 16, 30, 34, 46, 56, 58, and 60]. We categorize these as evolutionary CIO studies. Evolutionary CIO studies usually refer to the characteristics of IT and especially to the changes in the deployment of IT, often in relation to new emerging technologies, during a specific time period [34] and/or within a specific managerial context

[31]. These contexts include, for example, the use of IT to execute business strategy [56], to manage risks [23, 69] or to manage information [8, 40]. Some other factors considered include the impact of how IT and innovation intensive organizations or industries are [1], how much organizations rely on IT in business process management [10], or how IT sourcing is managed [42].

We feel that the descriptive validity of both the role model and the evolutionary CIO studies are limited to certain types of organizations or to the deployment of IT in a specific way or for specific purposes, and/or to specific periods of time. Diverse priorities within an organization and changes in the environment of the organization may change the tasks and the roles of the CIO in a short time, even several times every day. For example, in a large organization, the CIO may need to interact in various ways with each division/region/function of the organization. Similarly, changes in the competitive environment influence the priorities of an organization and thus also the priorities of the CIO. Furthermore, it is likely that evolution in IT, strategic management thinking as well as in organizational behavior, skills and processes could make these models outdated. For example, descriptions of CIO focus and tasks reported in studies conducted during the 80s, 90s and early 00s appear no longer depict what most CIOs focus on and do today.

Our conclusion was to look for an alternative approach. That produced the research idea to search for an explanation – and a robust model - that describes the boundaries of CIOs' role and tasks as well as their evolution. Therefore, we ask if it possible to find or craft a generic model, which describes factors impacting the CIO profession and its boundaries. This would include: over time across organizational units, organizations and industries; changing IT and organizational environments, and evolving strategic management thinking and practices. In addition to describing the CIO profession, such a boundary model should be able to capture the findings of prior CIO research and CIO competence requirements. We claim that such a generic model offers both researchers and practitioners a robust means to define factors that shape and confine the organizational role and tasks of the CIO in general and within a specific organization.

The work of the CIO is conducted in an organizational context with the overall objective to deploy IT for the benefit of the organization [e.g. 5, 18]. The need to respond to continuous changes in technologies, services and user expectations from the perspective of organizational performance improvement and strategy execution is probably a most accurate description of a CIO's work. Hence, changes in the business environment of an organization and in the strategy of the organization influence what a CIO needs to do. Such changes might affect even the CIO's organizational status and power structure. Motivated by these reasons, we decided to seek the theoretical basis of our research from organizational diagnostic models since they describe organizational evolution from a socio-technical perspective [48]. Socio-technical perspective to organizational diagnosis means that the organization's current level of functioning and activities are assessed in order to design appropriate social and technological efficiency and effectiveness improvements (i.e. interventions) such as IT investments and IT service/legacy improvements. We considered evolutionary IS theories, for example, Jaspersen et al. [37], Leonardi and Barley [45] or Wheeler [71], as alternatives to evolutionary organizational theories. We chose the latter due to the

socio-technical and organizational rather than the information systems technological nature of CIOs' work.

From the organizational diagnostic models, we selected Leavitt's model [45]. It has become established during the past decades both in organization [e.g. 24, 49] and in information systems (IS) research. Leavitt's model has been used in previous IS research to investigate IT in stationary contexts [e.g. 72], IS changes caused by punctuations [e.g. 48], and in evolutionary IS environments [e.g. 50]. The use of Leavitt's model in IS research helps to relate our work to past research. Leavitt's model suits also well to describe the continuous growth of IT and CIO work as well as the expansion of their boundaries. To reflect this, we modified the wording of the Leavitt model factors by including concepts becoming used during the recent decades, such as governance, business model, and ICT services.

Finally, the model fits well to analyze our empirical data and categorize past CIO studies, as later sections of this article will show. We interviewed 36 CIOs. Each interview covered the entire career of the interviewee as a CIO. We noticed already during the first interviews that the tasks and roles of each CIO were different, reflecting the variability in the business imperatives and other characteristics of the organization. In addition to variability, the tasks of a CIO typically changed in relation to technology evolution and especially in relation to the changes in the business imperatives of the organization such as the economic cycle, customer demands, the need to improve productivity and other similar issues. The tasks of some interviewees had changed significantly and several times whereas there was more stability in the careers of other interviewees. Both the CIO role and evolutionary CIO studies were useful but insufficient to describe our data. That finding was one of the motivations to search for an alternative approach. Our findings were also in strong contrast to our initial assumption that changes in IT would define the CIO profession and dominate changes in their tasks and role. Leavitt's model provided the framework, which was able to capture the variation in the tasks and roles of the interviewees as well as changes in them.

Our research question is "*What boundary factors shape CIO's role and tasks in general and within an organization?*" The main contribution of our research is to use the Leavitt diamond as the generic model explaining factors, which define the evolving boundaries of CIOs' work. To demonstrate the contribution of the proposed approach, we used the modified Leavitt model to analyze both the findings of prior research and our interview findings from 36 Finnish CIOs.

2. THEORETICAL BACKGROUND WITH THE MODIFIED LEAVITT MODEL

2.1. CIOs' everyday tasks change constantly and the role remains stable

Electronic data processing (EDP) Manager, EDP director, and IT director were some of the titles used for the head of the IT function prior the CIO term, which was introduced by Synnot and Gruber [64] as one of the first. During the last 30+ years, the use of the CIO term has raised the status

of the IT function head conceptually to the level of other C-level executives [57]. Yet, still today several interpretations about the role and the tasks of CIOs exist. This probably results partly from the fact that organizations deploy IT in different ways and for different purposes and partly from variations in the history of IT deployment within organizations. We reviewed close to 50 articles from the beginning of the 1980s to recent times in order to understand how researchers had described the work of the CIOs during the last four decades.

Researchers have studied changes in CIO work from a variety of perspectives, which range from technological to organizational. Consequently, many factors have been proposed to act as the underlying explanatory reasons for the change in the role and the tasks of CIOs. As stated earlier, we feel that most of the models are historically descriptive and valid but also limited. They characterize technologies, organizational practices and/or other factors that depicted the CIO work during specific periods and/or in specific contexts. Cumulatively, these models reflect the continuously growing deployment of IT in organizational activities and the related increase in the number of issues that CIOs need to address and manage. There is a strong consensus among the reviewed studies that the organizational role and the tasks of the CIO emerged and evolved gradually and also that the role and the tasks of the CIO will continue to change over time as the volume, depth, and maturity of IT deployment increases.

Benbasat, Dexter, and Mantha [5] analyzed data collected during the 1970's. Significantly, they stressed the importance of the people and business perspectives rather than technology. In summary, the striking feature of literature published during the 1980s is that the role of the CIO was described as a strategic and business-oriented executive who has a good understanding of technology and who works organization-wide with all units/functions to deploy IT in order to better implement business strategy and to support the achievement of business objectives [5, 6, 7, 20, 22, 33, 58, 64, 70]. The strategic stance of IT in business execution emphasized during the 1980s mirrors current concerns of CIOs [e.g. 39].

During the 1990s, CIOs' competencies and personal skills including interpersonal skills were investigated [8, 65]. Other new issues addressed included CIOs' capabilities to manage the complexity of technology [2, 59] and to establish co-operation between business and IT [8, 60, and 63]. During the 2000s the governance of IT, enterprise architecture and the ability of IT to create value and support innovations were investigated as new descriptors of CIO work [e.g. 1, 12, 15, 23, 27, 29, 56, and 69]. Fuelled by so-called business IT such as digital strategy, web-service technologies, digital data explosion, Internet of things and other developments, many issues concerning the CIOs' profession have re-emerged into research. CIOs' role in enterprise transformations, in information asset and capabilities management as well as in the creation of IT and digital understanding and digital strategies among business executives are new or reinvented demands placed on CIOs [4, 13, 31, 35, 39, 40, 47, 54, 55, 57, and 67].

Against the widely held belief that the organizational role of the CIO changes over time, it seems remarkable that what was written about the role the CIO during the 1980s appears fresh and valid in 2016. Our conclusion is that the concrete everyday tasks of IT CIOs related to technological understanding as well as to strategy and business orientation have changed over time and will probably continue to do so. At the same time, the organizational role of the CIO has remained unchanged and may continue to do in the near future. For example, in the 1980s, IT technological understanding focused on mainframe and minicomputer environments and on organization-internal software development. The importance of mainframes has drastically decreased, minicomputers have vanished and software application development is largely outsourced. Today, the range of necessary technological understanding is significantly wider with a focus on the Internet, web services, enterprise architecture, mobile technologies, business IT, digital and big data, cloud services and other emerging technologies and in linking them to IT legacy. Similarly, during the 1980s, strategy and business orientation focused on value chains, competitive advantage, and business-IT relations. Globalization, value and business networks, digital strategy, electronic business, business models, IT-enabled business transformations characteristic for today were not on CIOs' agendas. In summary, the organizational role of the CIO is still to act as a strategy-oriented and business-focused executive whose specialty is to understand how IT and digital data can be deployed. By supporting and enabling all units, regions, functions and stakeholders of an enterprise to deploy IT, by managing IT services and assets and by helping to establish IT governance CIOs participate into the execution of their organizations' strategies, to the achievement of organizations' business objectives as well as to the creation of product, service, process and other innovations.

2.2. The modified Leavitt model

We conclude that within the CIO's organizational role evolutions to a CIO's everyday tasks happen in order to improve the CIO's and the organization's performance. Even these merits the use of organizational diagnostic models, also known as organization development models, as compared to more IS and technology diagnosis oriented models such as Jaspersen, Carter and Zmud [37]. Our literature review suggests that changes in CIOs' everyday tasks are driven by certain identifiable factors. For these and for reasons given earlier we chose the Leavitt's model presented in 1965 [43]. Instead of case specific forces, Leavitt's model identifies four factors, which describe organizational development. They are structure, task, people, and technology. Leavitt's model is also known as the diamond model, where the shape comes from the interrelations between the model's factors. The diamond shape means that if one of the factors of the model changes, this has potential to affect all other factors of the model and they will also change. All relations between the factors of the model are bidirectional.

Leavitt's model could also be seen as an evolutionary boundary model. The specifics in the content of each factor

may evolve over time whereas the (boundary) structure of the model remains unchanged. Thus the boundaries of the model could move. For example, the boundaries of the model could enlarge (move outward) as the consequence of evolutions in the specifics of the model factors. Above we discussed the growth of CIO tasks. After 1965, new practices and constructs such as business models and corporate governance of IT have also been introduced and become established. These reasons motivated us to modify the wording of some factors in the model, that is, to include the evolution of those factors. Contemporary (IT) technology consists of technologies, ICT services, and information. We enlarged the wording of the technology factor to reflect this. For the same reason we modified structure into strategy, business model and governance; task into tasks and processes. Please, note that we regard this as an evolution of wording in the model, which reflects currently used constructs and practices, not a model revision the modified model is shown as Figure 1.

The strategy, business model and governance factor include the governance and management systems of an organization, its communication systems as well as its work, material and money flow steering structures. The task and processes factor refers to all tasks and subtasks and their sequences that are associated with the products and services of the organization including their design, sales, manufacturing, delivery etc. The people factor consists of people as actors in the organization and organizational arrangements used to carry out the tasks and processes of the organization both within the organization and between organizations. Finally, the technology, services and information factor includes all equipment, hardware, software, facilities, services, data and information used to conduct the tasks and processes of the organization.

The model shown in figure 1 is useful in describing and categorizing the findings of both the CIO role and evolutionary CIO studies. For example, Weill and Woerner [68] proposed four roles for CIOs on the basis how CIOs allocate their time between various tasks. These roles are embedded (strategy dominates time usage), ICT services (technology dominates), external people (people dominate) and enterprise process (processes dominate) CIO roles. Similarly, as an example of evolutionary CIO studies, Ross and Feeny [60] described changes in technology and how those changes had influenced strategy, people (CIOs) and processes. According to Ross and Feeny, technology changes have been the driving force for the work of CIOs from the very beginning [60].

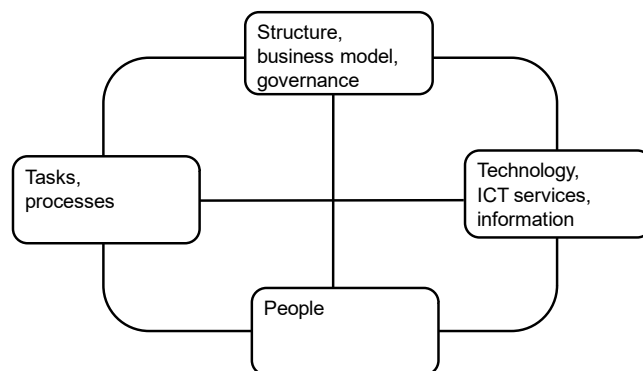


FIGURE 1: THE MODIFIED LEAVITT DIAMOND MODEL

By looking at the history of the IT function, one sees that it is among those functions that have changed most during its short existence as compared with other significant organizational functions such as accounting [1, 15, and 29]. IT has been considered to be in wider use in business processes and to be more integrated and more complex to manage [59]. Organizations have always developed operational processes but IT has provided entirely new means to automate and restructure them [42, 59]. For example, technology has enabled the global economy to flourish by providing networks for rapid exchange of vast amounts of data between organizations. For organizations, this has provided opportunities to redefine strategies, to increase revenue streams and profits. In addition to the transformation of existing markets into electronic markets, IT deployment has also helped to create totally new markets such as digital content [41]. The deployment of technology in alignment to business strategy enables an organization to differentiate its operations from competitors [33]. Consequently, CIOs not only need to consider a wider set of issues than most other executives but they are also the chief information system strategists in their enterprises. [29] In this capacity they meet a set of expectations, the content of which evolves constantly since the information needs of the organization and the technologies used in its systems are in constant flux [29]. The factors of the modified Leavitt's model capture forces mentioned in these studies.

In summary, we have discussed why we chose Leavitt's model as the theoretical basis for our research. We explained why and how the wording of the Leavitt's original model was updated to better suit the research on the CIO profession by reflecting the evolving boundaries of this profession. We also demonstrated with a few examples how to use the model to explain the findings of previous studies. We feel that the modified Leavitt model captures issues/topics investigated in earlier studies, which we have highlighted above while discussing them. We next show that the modified Leavitt's model provides the means to understand factors that shape and confine the tasks of the CIOs within organizations as they appear in our interview data. We also propose that the modified Leavitt's model captures how information technology developments impact the other organizational factors shown in the model and that therefore the model is well suited to describe both the role and the tasks of a CIO and changes in his/her role and tasks.

We finally propose that the model is able to explain why the lag between technology development and its deployment exists. The model suggests that persons responsible for IT deployment – most notably CIOs - need to consider strategy, the business model and governance, tasks and processes, and people issues in addition to technology implementation, all of which require time.

3. RESEARCH METHODS: THE CIO INTERVIEWS

To understand how the work of CIOs has changed over the years and to evaluate the usefulness of the modified Leavitt model in the analysis of these changes we interviewed 36 Finnish CIOs from six industries mainly during the years 2011 – 2013, with four interviews prior the year 2011. Industries are media, public sector organizations (government, agencies, municipalities), finance, manufacturing, wholesale and retail sale commerce (in Finland a few branded coalitions dominate the markets) and services. A summary over interviewees is shown in Table 2. Detailed data on each of the 36 CIOs is provided as Appendix 1.

Table 2 describes the number of CIOs interviewed in each industry and the time span of interviews. The table also shows the time period covered by the interviewees in their CIO profession and the average work experience of CIOs in years by industry, the distribution of gender and the age groups as well as the size of the enterprises measured by their revenue. All empirical data were collected with personal face-to-face interviews. An interview lasted typically two hours. We first selected industries and then stratified the collection of enterprises according to deemed privileged access to them. Since two of the authors have

worked as CIOs for several years and since one of the authors had participated to the selection of the CIO of the year in Finland and in Europe for 10+ years we knew most of the interviewees. We used this infrequent opportunity to invite recognized CIOs with long CIO careers from the leading organizations in their industries to interviews.

The industries were chosen to represent the diversity of IT deployment and the CIO profession. Interviewees include both group level and divisional, corporate and public sector as well as national and global level CIOs. We opted to interview several CIOs from one industry in order to remove possible organization related idiosyncrasies. The idea was also to collect data across a few industries in order to find similarities and differences between industries but also to understand whether the characteristics of specific industries impact how the CIOs of that industry perceive their role and tasks. During the time span, we conducted the interviews; the media industry experienced the pressures of business transition from print media to digital services. Public sector organizations faced severe cost issues and the transfer of services from manual to digital. Manufacturing companies had shown good results year after year and focused on further process improvements and on increases in service business. The finance industry had transformed most of its services into electronic channels but struggled with increased regulations, lower margins, the consequences of economic downturns and new entrants from other industries to the financial markets. The future looked promising for the commerce industry with expansion opportunities in new geographical markets. Cost pressures and business transition of digital services were typical challenges in the service industry.

TABLE 2: SUMMARY OF INTERVIEWS AND INTERVIEWEES (me = MILLIONS OF EUROS)

Industry: CIO #s	Dates of interviews	Time period covered	Average Years as CIO	Gender	Age at the time of the interview	Size of the company (revenue)
Media: CIO1-CIO5 (n=5)	03/11- 08/12	1997-2012	8	3 Males 2 Females	1 age 30-39 4 age 50-59	1 > 1000 me 3 100–1000 me 1 < 100 me
Public sector: CIO6-CIO10 (n=5)	10/11- 09/12	1984-2012	14.8	5 Males 0 Females	5 Age 50-59	2 > 1000 me 2 100–1000 me 1 < 100 me
Finance: CIO11-CIO14 (n=4)	11/11- 06/13	1987-2012	10.75	4 Males 0 Females	1 age 40-49 3 age 50-59 4 age 40-49 4 age 50-59 2 age 60<	2 > 1000 me 2 100–1000 me
Manufacturing: CIO15-CIO24 (n=10)	03/09- 11/13	1976-2012	10.55	9 Males/ 1 Female	2 age 40-49 4 age 50-59 2 age 60<	10 > 1000 me
Commerce: CIO25-CIO32 (n=8)	10/06- 06/13	1956-2012	14.63	8 Males/ 0 Females	2 age 40-49 4 age 50-59 2 age 60<	4 > 1000 me 4 100–1000 me
Services: CIO33-CIO36 (n=4)	08/07- 07/12	1991-2012	14.75	3 Males/ 1 Female	1 age 30-39 2 age 40-49 1 age 50-59	3 > 1000 me 1 N/A

We followed the methodological principles of semi-structured interviews as outlined by Yin [73] and expanded on by Myers and Newman [51]. With the interviews, we tried to capture the historical evolution of each issue to the extent that the interviewee had personal experience. Several questions were therefore formulated in two ways; how was the issue managed in the past and currently. Appendix 2 lists our survey questions.

The final interview questionnaire evolved over time. The first five interviews were used to learn what kinds of survey items are useful for our study. These five interviews constitute our pre-study. The first interviews were conducted with an open question formulation. Interviewees were asked to compare the past and the present for each topic, 46 in total. On the basis of the experiences of the first interviews, to avoid situations where interviewees told long

and as such interesting and amusing narratives sometimes for several hours, which often fell outside the scope of our research, we limited the interview time to two hours. In this way, we refined the survey instrument towards a semi-structured interview questionnaire with open-ended questions. Interviewees were still asked to compare the past and the present for each topic but now within a fixed/maximum timeframe. We added first 4 and then one question to the 46 questions on the basis of the pre-study and guided by the Leavitt / our research model. The final version had thus 51 questions. The last added question asked the interviewees to explain how IT technology has affected and affects the strategy and the business models of their enterprise in the past and currently. Of the 36 interviewees, 22 answered to this question and consequently, we do not have the answers of 14 interviewees to this question. All of these 22 interviews were conducted in the years 2012 -2013.

During the interviews, we used a projector and screen as we wrote down their responses *verbatim*. Thus in real time, an interviewee saw what was written as the answer to each question and was able to correct possible misunderstandings immediately. This technique shortened answers and an interviewee considered more carefully what (s) he said as compared to the convoluted stories of the pre-study interviews. The adopted approach also helped the interviews to focus on the questions of the questionnaire. In addition to the projector and the screen we used a digital recorder and recorded each discussion (interviewee permission was sought and obtained) including the five pre-study interviews. Recordings were used as backups and to complete transcripts written and shown to the interviewee during his/her interview. Each interviewee except the first five was also given the opportunity to modify the transcript of his/her interview. We did this by sending the written transcript to an interviewee for his/her final approval after we had verified and, if necessary, completed the already at-the-interview accepted transcript by listening to the recording of the interview. Two researchers did the verification and completion of the transcripts by listening recordings independently and by then comparing notes and agreeing on findings reach a consensus. Twelve of the interviewees used the opportunity to augment their interview transcript prior its final acceptance. From the verified and accepted transcripts, we then compiled a 36x51 excel sheet (matrix) to analyze the data. Two researchers verified independently that the matrix was based on the interviewee-accepted transcripts by comparing notes if needed. The verified matrix was then translated into English. During the final data analysis, three researchers analyzed the responses of the matrix independently and agreed on the classification of tasks and how they fall into the factors of the Leavitt / our research model.

At least the following related questions arise from the evolution of the survey instrument and the change of the interview procedure and protocol. Is it possible to use the data from the five first interviews as they were carried out earlier and with a different interview procedure and protocol? We opted to use also the data of the five first interviews. Most of the survey items are the same, 46 out of

51. Thus we do not have data on five questions from five respondents. Secondly, we investigate what factors influence and establish boundaries for the role and the tasks of the CIOs with a proposition that those factors have been the same over decades rather than what concrete issues CIOs meet at a specific time. By including all interviews we were able to cover the time from the 1960s to present. Why through away these unique insights? It is still worth to notice that the choreography of the early interviews was different and that this impacts the responses of these interviews. We had to do more work to interpret the long narrative responses that were transcribed into text. When the other 31 interviewees saw their responses verbatim on a screen their awareness over the response content was higher and they corrected immediately what the interviewer had written and were also given the opportunity to change their responses a second time prior to final acceptance.

Another important question is, are the responses of the interviewees true or even reliable, see e.g. points highlighted by Meyers and Newman [51]? One part of each interview question asked an interviewee to look back and contemplate, how the issue was managed in the past, that is, at the beginning of his/her CIO career. As the durations of the interviewees' CIO careers varied they were asked to look back for several years or even decades. Is it possible to remember past CIO tasks correctly or at all after many years? Is it possible to compare responses that cover diverse periods of time? It is possible and even likely that interviewees provided answers and told anecdotes that appealed to them for various personal reasons. Yet, even possible embellished or untrue anecdotes include data about the interviewee's role and tasks as a CIO. It is also possible that the interviewees did not remember or did not want to reveal all CIO tasks they had performed. The interviews of 36 persons, however, probably brought forward a significant number of CIO tasks and role descriptions. In addition, it is possible that interviewees could make timing errors. From the perspective of the present study possible timing errors concerning the execution of various CIO tasks are irrelevant. We investigate factors that influence and establish boundaries for the role and the tasks of the CIOs with the proposition that those factors have been the same over decades and those individual tasks can be classified on the basis of those same factors. We did not investigate how the interviewed CIOs understood the significance of their profession, what each of them did at a particular time, what typical CIO tasks were during a certain period of time or how well each of them performed as a CIO. Determining the reliability and truthfulness of responses to such questions would have been more difficult. The purpose of the 51 interview questions was also to help an interviewee to remember from multiple perspectives tasks and issues that were relevant for him/her as a CIO. We triangulated data reliability with the interview and data analysis procedures and protocols described above.

The CIO experience of six interviewees was less than five years whereas five had over 20 years of experience with the overall average of 12.25 years. Four interviewees (11.1%) were females. According to Pemberton (1992), a typical CIO is highly educated. In contrast to that finding, twelve

(33%) of our interviewees did not have a university degree. However, the remaining twenty-four interviewees had cumulatively 31 university degrees including four doctoral degrees. Three interviewees had retired and three more planned to retire in the near future. The status for 72 % (26) of the interviewed CIOs had changed, whereas the organization and the CIO status had remained unchanged for only ten interviewees. This finding is in line with Peppard et al. (2011). At the time of writing, two interviewees are deceased and six others have retired.

Those who had long history in IT explained that the main reason to acquire computers in the first place was to reduce accounting related manual work. At that time it was logical that the head of IT reported to the CFO. Even today, thirteen of the interviewees reported to CFOs, whereas eleven reported to CEOs and twelve to other C-level executives. Only a handful of them had been either executive committee or board members in the beginning of their CIO careers or were invited to participate in executive committee meetings and/or to business unit steering committee meetings. Almost all interviewed had experienced restructuring of their IT function organizations during the time they had acted as the CIO, but the reasons varied. Some restructurings were related to business strategy changes and some to mergers and acquisitions (M&A) including divestments.

4. FINDINGS

4.1. CIO role and tasks perceptions

We analyzed the interviews by counting how many similar answers we received to each question. More than half (24) of the respondents described their past and current role to be something other than a technology-oriented CIO role. The common feature of these responses is that the CIO work was described as a business executive role, which is related to the industry of the enterprise. For example, CIO29 said: *“Our executive committee only consists of book sellers, who have different areas of responsibility, such as IT, finance or logistics of the book selling business.”* The role and responsibilities of some CIOs transcended IT and included logistics, business intelligence, purchasing or process development to name a few examples. All ten CIOs of the manufacturing industry worked in global or regional enterprises and seven of them were either responsible for process development or heavily involved in it. CIO20 stated: *“There has been a clear demand for global processes and global IT among business leaders already for several years.”*

Although the business environment of the organizations within an industry was similar, the tasks a specific CIO performed differed. For example, CIO11 - CIO14 were from the finance industry. CIO11's main task was to develop enterprise architecture and data security, whereas CIO12's focus was on off-shoring activities and application integration. CIO13 focused primarily on internationalization as the company was involved in an M&A process. CIO14 did not work in the industry anymore.

We asked what have been and are the biggest challenges for the interviewee as the CIO. The change in business operations or in IT functions way of working was challenging for eleven respondents when they started their career as CIOs. Twelve thought them to be major challenges still today or at the end of their CIO career. Fourteen respondents mentioned that at the beginning of their careers the creation of IT services from scratch or the development of IT services to business had been demanding. Fifteen interviewees regarded the development of IT services to business still challenging. Nine respondents considered that cooperation with business had been the toughest challenge in the beginning of their career. Seven still felt the same way. Competence development was the next often mentioned challenge at the start of the career and it was almost as important currently. Twenty-six interviewees mentioned that access to deep technical skills had been important at the beginning of their careers. Project planning, project management, and supplier management were also mentioned several times and they were still considered important skills. Only four respondents felt that business skills had been important earlier, whereas fifteen considered them important currently. Probably the most significant change is the increase in the number of skills needed. *“Managing the whole”, “customer service skills”, “ability to demonstrate technology opportunities”, “innovation management”, “service management”, “network management”, “information management”, “international business-IT knowledge”, “architecture skills”, “data security”, “communication skills”, “negotiation and contracting”* and *“legal skills”* are just a few of the mentioned skills needed currently.

4.1. CIO tasks and roles classified with the modified Leavitt model

4.1.1. Description of the model factors

Strategy, Business Models, and Governance: We asked respondents to describe how much business executives and managers needed IT in the past and currently. Twenty-three interviewees told us that in the past IT was seen as some kind of necessary evil, a technology tool, a support function or a cost center. Only a few explained that in the past, IT was considered important or critical to business or for automation. Some also pointed out that IT people were considered “snobbish” like CIO12 who told us: *“We were respected because no-one understood what we were doing.”* Most of the interviewed CIOs think that current business executives believe that IT is deployed to create new digital services and new business opportunities. Echoing others, CIO21 said: *“Nowadays business leaders see two roles for IT. On (the) one hand, basic IT services exist in every enterprise and on the other hand, IT has the capability to create new strategic opportunities. I need to manage both these roles of IT in a balanced way.”* Thirty interviewees told us that they currently, that is, at the end of their CIO career or at the moment of the interview if they still held the CIO position, participate into the business strategy process. Some enterprises have a separate IT strategy, which is aligned with business strategy. In some

other organizations, business strategy also covers IT and there is no need for a separate IT strategy. A few CIOs explained that IT and processes are now recognized to be a critical part of the business strategy. Still, the interviews provide inconclusive evidence on this topic. Therefore it is safe to report only that CIOs understand strategy, business models, and corporate governance better than previously and that this factor clearly influences their work.

Tasks and Processes: The task and process factor was partly covered above with its interconnection to the strategy, business models and governance factor. According to our interviews, it appears that CIOs are heavily involved in M&A activities, especially within media and retail industries. CIOs' involvement in M&A's becomes understandable when one considers that it is necessary to secure the continuity of processes, which are usually heavily IT-dependent. Faster than normal changes to processes could also be required. As CIO15 explained: "We have done a lot of divestments, M&A's and (organization) structure changes within the last 15 years and I've been heavily involved in these." We also found that many CIOs considered processes to be a natural part of their current work, even though the relation of their role to processes was not asked directly in our questionnaire. CIO22 commented: "At first the challenge was to align IT and processes. Currently, globalization, open network, data security and information management are the ones." The tasks and processes factor clearly impacts the work of CIOs.

People: We asked how IT functions are valued earlier and currently and how well business managers understood IT in the past and now. During the early days of the CIO profession, those holding business manager positions had not received any IT education in universities or elsewhere. Twenty-three respondents thought that in the past business managers understood IT poorly or not at all. Similarly, IT organizations' contribution to business was poorly valued.

The current situation is totally different. Thirty-two interviewees expressed that business managers' current IT understanding is clearly better. Almost the same number (28) of interviewees felt that the IT function is valued higher. Several CIOs, like CIO15 and CIO33, said: "IT is a normal part of our business structure." CIO19 stated: "Should business slow down, which one is easier to replace; sales persons or IT systems?" As these quotations show, the people factor also shapes the work of the CIOs.

Technology, ICT Services and Information: Of the 36 interviewees we asked 22 to describe how technology is related to business strategy with the last survey item. Twenty-one responded that technology enables business or creates new opportunities for business and new technology-enabled services which can be launched into markets, and thus allowing the business to grow. For example, CIO3 said: "All the time, (the) bigger part of our business rests on technology... it has changed our value chain in the market." Only one CIO said that technology has no major role in their organization and one commented that technology has a negative impact on their business as it cannibalizes their current arrangements.

4.1.2. Results classified with the modified Leavitt model

We then used the modified Leavitt's model to classify the results of the CIO interviews. Three researchers reviewed the transcribed and translated interviews (36x51matrix) independently and classified the impact of each factor on a CIO's work into weak, mediocre or strong for each interviewed CIO. The interpretations were compared and agreed if there was a difference. The three interpretations were fairly consistent. Out of 144 (4 x 36) values, only 16 (11%) were discussed and there were no weak – strong differences between the individual interpretations. The cumulative outcome of classifications is shown in Table 3.

TABLE 3: SUMMARY OF RESULTS CLASSIFIED WITH THE MODIFIED LEAVITT MODEL

	Strategy, business model, governance	People	Technology, ICT services, information	Tasks, processes
Weak	6	6	4	8
Mediocre	11	19	10	12
Strong	19	11	22	13
Total	36	36	36	33

We discovered that the technology, ICT services, and information factor had the biggest impacted on the interviewed CIOs' work. Twenty-two CIOs expressed that technology strongly influences their work. The impact of the strategy, business model and governance factor was almost equally strong. Thus, both business strategy and technology drive CIOs work. This is in line with the earlier reported finding that several CIOs participate into their company's strategy process in a similar way to other business executives. Interviewees described the impact of the people and task as well as the processes factor to impact

their work less than the business strategy and the technology factors. However, people and tasks as well as processes are also important determinants for the work of CIOs. Almost all CIOs participated in the meetings of their company's steering group and/or had established IT steering groups to interact with other people. They also felt that business leaders understand IT increasingly better. Our questionnaire did not include questions, which directly and explicitly address the processes of an organization. Probably for this reason three interviewees did not mention

processes as Table 3 shows. Thirteen CIOs emphasized that their organization's processes impact their work strongly.

Tasks mentioned within the context of the strategy, business models and governance factor: Interviewees mentioned multiple specific everyday CIO tasks when they described the impact of the strategy, business model and governance factor on their work. We compiled tasks mentioned by the interviewees into Table 4. We also applied the role descriptions provided in the CIO role studies in the crafting of Table 4. A CIO role study often depicts tasks/activities that describe the alternative CIO roles proposed in the study, that is, the dominating focus area of the role or the area of tasks that consumes the biggest proportion of the CIO's time. The first column of Table 4 shows the tasks or activities described by CIO role studies and the second column lists related authors of the study. We then classified tasks mentioned by the interviewed CIOs using the same task/activity classification and placed the CIO# into Table 4 as the third column of the table. We added tasks that were not mentioned in CIO role studies at the end of Table 4. CIO role studies included six tasks and interview data added four tasks. As explained

earlier the placement of CIO#s into Table 4 was done first by two researchers independently using the original 36x51 matrix (in Finnish). After the matrix had been translated into English a third researcher did the same. Notes and interpretations were compared and discussed during both phases until a consensus was reached. An interviewee typically mentioned two or three strategy-related tasks. Especially those interviewees who had been CIOs several decades ago described that their task was to strategically manage IT – called EDP, IS or IT at a particular time.

Tasks mentioned within the context of the tasks and processes factor: Interviewees mentioned seven organizational tasks and process related everyday CIO tasks. Five of them were covered in the reviewed literature: landscape cultivator by [17]; facilitator by [55]; opportunity seeker by [17]; product developer by [28]; and enterprise process CIO by [68]). Interviewees also described process harmonization in M&A integrations and process governance tasks. Table 5 provides the summary. Table 5, as well as Tables 6 and 7, were crafter similarly to Table 4.

TABLE 4: CIO TASKS MENTIONED BY INTERVIEWEES FOR THE STRATEGY, BUSINESS MODEL, AND GOVERNANCE FACTOR

Strategy, business model, governance: Role proposed in literature and/or task described in interviews	Author of the CIO role study	Task referred by the interviewed CIOs
CIO's formal resource allocation authority	Stephens et al. 1992	Not mentioned explicitly in interviews
CIO as chief operating strategist	Gottschalk 2000	Not mentioned explicitly in interviews
Opportunity seeker (drive strategy) Technology provocateur (embedding IT into the business strategy)	Chun and Mooney 2009 Gottschalk 2000	CIO2, CIO3, CIO5, CIO10, CIO15 (Brand, challenge eBusiness, value chain)
CIO as product developer (helps define the company's place in the emerging digital economy) Innovator and creator (new revenue from new products etc.) – digitalization Innovator (IT enabled processes, innovative services, products) Business technology strategist (use technology as a tool to create competitive advantage)	Gottschalk 2000 Chun and Mooney 2009 Peppard et al. 2011 Carter et al. 2011	CIO1, CIO2, CIO3, CIO4, CIO5, CIO7, CIO8, CIO13, CIO14, CIO16, CIO17, CIO18, CIO21, CIO22, CIO24, CIO25, CIO26, CIO28, CIO30, CIO31, CIO33, CIO35 (digitalization; products, services, innovations, ...)
Decisional role activities (entrepreneur – resource allocator)	Carter et al. 2011	CIO2, CIO4, CIO7, CIO35 (cost savings)
Decisional role activities	Stephens et al. 1992	
Embedded CIO (focus on strategy, business process execution, innovation).	Weill and Woerner 2013	CIO6, CIO8, CIO9, CIO10, CIO13, CIO14, CIO15, CIO16, CIO19, CIO20, CIO21, CIO22, CIO25, CIO28, CIO29, CIO36
Mergers and acquisitions, major internal structural changes in organization & ICT, alignment of global and local, group and Bus		CIO1, CIO10, CIO11, CIO12, CIO13, CIO16, CIO18, CIO19, CIO22, CIO25, CIO27, CIO28, CIO32, CIO34
Customers or other stakeholders as the basis of business strategy with IT enablement		CIO7, CIO17, CIO26, CIO30, CIO36
Climate change, real-time economy and other global drivers		CIO19, CIO21, CIO33, CIO35
Managing technology challenges as a whole with a business strategy perspective		CIO3, CIO4, CIO12, CIO15, CIO21, CIO27, CIO32

TABLE 5: CIO TASKS MENTIONED BY INTERVIEWEES FOR THE TASKS AND PROCESSES FACTOR

TASKS, PROCESSES: Role proposed in literature and/or task described in interviews	Author of the CIO role study	Task referred by the interviewed CIOs
Landscape cultivator (applications and processes)	Chun and Mooney 2009	CIO3, CIO4, CIO5, CIO6, CIO15, CIO16, CIO21, CIO27, CIO29, CIO32, CIO36 (educator-facilitator, competence developer, ...)
Facilitator (of process improvement, empowering and enabling business with information capabilities)	Peppard et al. 2011	CIO1, CIO2, CIO3, CIO7, CIO8, CIO9, CIO11, CIO12, CIO15, CIO16, CIO17, CIO19, CIO20, CIO21, CIO22, CIO23, CIO25, CIO26, CIO29, CIO31, CIO33 (participates into/or facilitate process development)
Enterprise process CIO (manages non-IT tasks such as sourcing, shared services)	Weill and Woerner 2013	CIO14, CIO17, CIO26
Process harmonization in M&A integrations		CIO24, CIO33
Process governance (allocation of tasks and responsibilities to units & persons)		CIO1, CIO2, CIO9, CIO12, CIO15, CIO21, CIO27

Tasks mentioned within the context of the people factor: Interviewed CIOs described eleven people-related everyday CIO tasks all of which were covered in the reviewed literature. [63] investigated CIO’s level of peer acceptance; [11] showed the CIO as a leader and manager; for [28] the CIO was a change leader; [17] pictured the CIO as a landscape cultivator able to lead change; for [28] the CIO

was a coach; [13] called the CIO an informational spokesperson – monitor; for [13] the CIO became ALSO an interpersonal leader – liaison; [55] pictured the CIO as an evangelist; for [17] CIO was a landscape cultivator – educator; [68] showed the CIO as an external customer CIO; and for [17] the CIO was an innovator and creator. Table 6 summarizes these findings.

TABLE 6: CIO TASKS MENTIONED BY INTERVIEWEES FOR THE PEOPLE FACTOR

PEOPLE: Role proposed in literature and/or task described in interviews	Author of the CIO role study	Task referred by the interviewed CIOs
CIO’s level of peer acceptance	Stephens et al. 1992	CIO1, CIO3, CIO4, CIO5, CIO6, CIO7, CIO8, CIO10, CIO12, CIO13, CIO14, CIO15, CIO16, CIO17, CIO21, CIO22, CIO24, CIO27, CIO28, CIO29, CIO30, CIO33, CIO34, CIO35, CIO36 (Status in various committees and strategy process)
CIO as a leader and manager	Brown 1993	CIO12, CIO13, CIO14, CIO16, CIO17, CIO21, CIO24, CIO32
CIO as a change leader	Gottschalk and Taylor 2000	CIO9, CIO19, CIO34
CIO as a coach	Gottschalk 2000	Not mentioned explicitly in interviews, mentioned in the context of processes
Informational (spokesperson – monitor)	Carter et al. 2011	CIO1, CIO2, CIO3, CIO4, CIO5, CIO6, CIO7, CIO8, CIO10, CIO21, CIO22, CIO24, CIO27, CIO28, CIO29, CIO30, CIO31, CIO35, CIO36 (influence behavior, relationship building)
Interpersonal (leader– liaison)	Carter et al. 2011	CIO1, CIO3, CIO4, CIO5, CIO6, CIO7, CIO8, CIO10, CIO12, CIO13, CIO14, CIO15, CIO16, CIO17, CIO21, CIO22, CIO24, CIO27, CIO28, CIO29, CIO30, CIO33, CIO34, CIO35, CIO36 (participation into committee work and strategy process)
Evangelist (educate people)	Peppard et al. 2011	Not mentioned explicitly in interviews, mentioned in the context of processes
External customer CIO (works with external customers/partners, sells)	Weill and Woerner 2013	Not mentioned explicitly in interviews

Tasks mentioned within the context of the technology, ICT services, and information factor: Not surprisingly interviewees mentioned as many as fifteen technology, ICT services and information factor related everyday CIO tasks. Twelve of them were covered in the reviewed literature. [28] described CIO as a chief architect; [17] as a landscape cultivator with technical improvement and IT architecture management; [28] as a technology provocateur; [9] as ubiquitous presenter of technology; [9] as technology downturner; [17] as triage nurse and fire-fighter; [55] as an agility leader; [28] as a technological change leader; [55] as a utility leader; [68] as IT services CIO; and [13] as interpersonal technology leader. Interviewees mentioned also technological governance of IT and data, data security, and access as well as data analytics and data search. These findings are compiled into Table 7.

Finally, with Table 8 we return to Table 1 and show how according to our understanding CIO role studies reviewed in the present text can be placed into the modified Leavitt Model. Cumulatively Tables 3-8 and the CIO tasks depicted in them show how diverse the tasks of CIOs have been and still are.

The Clinger-Cohen recommendation for CIO competencies consists of 12 categories [18]. The categories are numbered from 1.0 to 12.0. Many - if not all - of the competence categories are related to more than one factor in the modified Leavitt model. This is consistent with the diamond shape of the model. Thus, if one of the model factors changes, this potentially affects all other factors through their bidirectional interrelations. For the present

study the most important point is that all the twelve competence categories fall inside the boundaries of the modified Leavitt model. The relations of the modified Leavitt model and the Clinger-Cohen competence categories could, for example, be described as follows (Note: this is only a suggestion as we have not verified these relations empirically):

- Strategy, business model and governance: Policy and organization (1.0 partly), information resources strategy and planning (4.0 partly), IT performance assessment: models and methods (5.0 partly), IT project and program management (6.0 partly), capital planning and investment control CPIC (7.0), acquisition (8.0 partly), information and knowledge management (9.0 partly) and enterprise architecture (11.0 partly)
- Tasks and processes: Process and change management (3.0), IT performance assessment: models and methods (5.0 partly), IT project and program management (6.0 partly) and acquisition (8.0 partly).
- People: Policy and organization (1.0 partly), leadership and human capital management (2.0) and IT performance assessment: models and methods (5.0 partly).
- Technology, ICT services and information: Information resources strategy and planning (4.0 partly), IT project and program management (6.0 partly), information and knowledge management (9.0 partly), Cybersecurity/information assurance IA (10.0), enterprise architecture (11.0 partly) and technology management and assessment (12.0).

TABLE 7: CIO TASKS MENTIONED BY INTERVIEWEES FOR THE TECHNOLOGY, ICT SERVICES, AND INFORMATION FACTOR

TECHNOLOGY, ICT SERVICES, AND INFORMATION: Role proposed in literature and/or task described in interviews	Author of the CIO role study	Task referred by the interviewed CIOs
CIO as a chief architect	Gottschalk 2000	CIO12, CIO14, CIO15, CIO17, CIO21, CIO23, CIO31 (Enterprise architecture, process, data, application, infrastructure, integration architecture)
CIO as a technology provocateur	Gottschalk 2000	CIO2, CIO3, CIO4, CIO6, CIO17, CIO10, CIO20, CIO28, CIO29, CIO30, CIO33, CIO36 (Challenger with eBusiness, digital products and services)
Ubiquitous presence of technology (impact on business – IT alignment)	Broadbent and Kitz is 2005	CIO5, CIO8, CIO13, CIO22, CIO35 (Usability, mobility, BYOD)
Technology downturner (Impact on business – IT alignment)	Broadbent and Kitzis 2005	CIO4, CIO7 (shared services) see also the entries of the next row
Triage nurse & fire-fighter (keep lights on and minimize costs)	Chun and Mooney 2009	CIO9, CIO11, CIO17, CIO18, CIO19, CIO20, CIO26, CIO27, CIO28, CIO31, CIO35 (Consolidation, cost cutting, centralization to reduce costs)
Agility (agile infrastructure, organizational information and technology requirements)	Peppard et al. 2011	CIO2, CIO3, CIO4, CIO5, CIO6, CIO8, CIO10, CIO11, CIO12, CIO13, CIO14, CIO17, CIO20, CIO21, CIO25, CIO30, CIO33, CIO35
Utility (technologies, services)	Peppard et al. 2011	CIO1, CIO5, CIO7, CIO8, CIO11, CIO13, CIO16, CIO23, CIO31, CIO32 (Legacy renewal, technological agility)

IT Services CIO (provides Its services, manages IT unit and vendors)	Weill and Woerner 2013	CIO1, CIO5, CIO7, CIO8, CIO9, CIO11, CIO13, CIO15, CIO16, CIO17, CIO18, CIO19, CIO20, CIO23, CIO26, CIO27, CIO28, CIO31, CIO32, CIO35 ((includes transformation from internal to external services)
Technological governance of ICT and data		CIO1, CIO15, CIO16, CIO19, CIO25, CIO26, CIO27, CIO29, CIO33, CIO34 (an aspect of IT governance)
Data security and data access		CIO10, CIO22
Data analytics, data search		CIO5, CIO12

TABLE 8: CIO ROLE STUDIES CLASSIFIED ACCORDING TO THE FACTORS OF THE MODIFIED LEAVITT MODEL

	Researchers	Research	Strategy, business model, governance	Technology, ICT services, Information	People	Tasks, Processes
One CIO type	Brown (1993)	Research integrates the organizational and individual perspectives as well as the CIO partnership role.	General manager			
Two CIO types	Broadbent and Kitzis (2005)	Research is recognizing different kind of organisations which require different behavior and actions from CIOs.	Demand-side leadership for shaping and managing expectations	Supply-side leadership for delivering cost-effective services		
Three CIO types	Stephens et al. (1992)	Researched how MIS managers and CIOs use their work time within IT and outside IT and how close the activities are compared with CEOs work.	CIO in decisional role	MIS manager	CIO interacting outside IT function	
Four CIO types	Chun and Mooney (2009)	Introducing the CIO types according to company's IT strategy and how the IT infrastructure is managed (divergent or orchestrated)	Innovator & Creator, Opportunity Seeker	Landscape Cultivator, Triage Nurse & Fire Fighter	Innovator & Creator, Landscape Cultivator	Opportunity Seeker, Landscape Cultivator
	Carter et al. (2011)	The study points out three traditional IT management roles: Decisional, Informational and Interpersonal, and suggesting a new business technology strategist	Decisional CIO/Entrepreneur & Resource Allocator, Business Technology Strategist	Interpersonal CIO/ Leader	Informational CIO/Spokepers on & Monitor Interpersonal CIO/Liaison	
	Weil and Woerner (2013)	A study of CIOs role from digital economy point of view;Identifying key activities for four type of CIO's and how CIO's should spend their time across these activities.	Embedded CIO	ICT services CIO	External customers CIO	Enterprise processes CIO
Five CIO types	Peppard et al. (2011)	A study of ambiguous role of a CIOs;" <i>CEO's need to understand what type of CIO is appropriate at a particular point in the organisation's journey</i> "	Innovator CIO	Utility IT Director, Agility CIO	Evangelist CIO	Facilitator CIO
	Guillemette and Pa	The objective of the study is to offer an explanation of the contribution of the IT function in organizations with a typology of ideal profiles.	Partner	Systems provider, Architecture builder, Technological leader	Project coordinator	Project coordinator
Six CIO types	Gottschalk (2000)	A study of IS/IT leadership roles, analysing how the individual, position and organisation characteristics predict the CIO role in an organisation.	Product developer, Technology provocateur, Chief operative strategist	Chief architect, Change leader, Technology provocateur	Change leader, Coach	Product developer

It is almost self-evident to claim that the evolution of CIO tasks will continue also in the future. Our point is, however, that the modified Leavitt model is likely to capture new emerging CIO tasks also in the future to be described by the

four factors of the modified Leavitt model. This four-factor model defines the evolving boundaries for the role and the tasks of CIOs in general and for a CIO in a specific organization. The role and the everyday tasks of a CIO

reflect the past, present and envisioned future strategy and objectives, the governance model and management practices, the technologies used, the structural and regional organization model of people, and processes of the organization that employs the CIO. The four factors of the modified Leavitt model thus provide lenses to understand the driving factors and boundaries of the volatile and evolving CIO profession. This is also the answer to our research question, “*What boundary factors shape CIO’s role and tasks in general and within an organization?*”

5. DISCUSSION AND CONCLUSIONS

Both the literature review and the interviews of the 36 CIOs showed that CIOs’ tasks have changed and grown significantly during the last four decades. Although information technology (r) evolution is an almost self-evident factor for the changes in CIOs’ tasks, it is not the only one. Technology is interrelated with changes in organizational strategy, tasks and processes and people and organizational changes. At the same time, the underlying role of the CIO has remained unchanged – to deploy IT as a strategy-oriented and business-focused technology-expert executive. Thus, as the answer to our research question, what factors shape CIOs’ role and tasks, we showed that the factors outlined in the modified Leavitt model perform this role. The model provides a solid basis to understand CIO profession and to describe factors that shape and establish boundaries for the concrete content of the CIO’s role and tasks in an organization at any specific time and over time. This finding is also the main contribution of our research. Both CIO role and evolutionary CIO studies describe the impact of specific technologies, organizational practices and other factors that prevail during specific periods of time, whereas the modified Leavitt’s model captures the factors that make the specific items of those technologies, organizational practices and other factors to emerge, evolve and then disappear. We feel that the modified Leavitt model will help to describe the everyday tasks of CIOs impacted by the digitalization of business, Internet of things, BYOD, robotics and other emerging technologies

The other contributions of our research relate to the findings of the 36 CIO interviews. One of the contributions and also surprising findings of our research concerns the significance of the technology factor. Evolving and emerging information technologies create new business opportunities for organizations and hence technology appears to dominate the evolution of CIOs’ work. We discovered, however, that the strategy factor is almost equally important for them and that processes and people factors also have a significant impact. Echoing other recent studies [4, 13, 31, 40, 55, 68], our empirical research revealed that CIOs’ work has a stronger business strategic focus than ever before. CIOs are more involved in the strategic management of their organizations and are able to provide greater value than in the past.

We also found a slightly contradictory position from the interviews. Even though CIOs were taking part in the business strategy processes, still only eleven out of thirty-six were reporting to a CEO and only five were members of group level executive committees or board of directors.

This might reflect the difference between the CIOs’ own evaluation and the CEOs’ and board of directors’ evaluation of the strategic importance of IT and his/her position.

Another surprising finding was that the industry had no clear impact within the organizations of the 36 interviews. Within all industries, the tasks of the interviewed CIOs varied greatly with no clear pattern. We also discovered that the tasks of some CIOs had changed several times during their career within an organization whereas the tasks of some other CIOs had remained stable. The reasons why the tasks of some CIOs changed several times were often related to business strategy changes, e.g. the organization wanted to expand its market share or grow in international markets. In more stable business environments, CIOs’ tasks were thus also more stable.

In our study, we couldn’t find any clear disjunctive factors that could explicate the differences in tasks of CIOs at the industry level. However, those factors were found at company level. While CIOs told us that they participate into business strategy processes, CIOs still do not have a clear formal position with the power of an executive committee member. CIOs also told us that the work of a CIO could be understood in many ways in the organization of the CIO. There is little knowledge about how these different perceptions about CIO work impact the work of CIOs especially after major business strategy related changes happen. In addition to Leavitt’s model, other organizational diagnostic models might provide additional insight to understanding the CIO profession. Future studies could consider these issues in more detail.

Our research is also subject to limitations. Due to the interview method and the relatively low number of interviewees, statistical analysis methods were not applied. Above we also discussed the limitations related to the inclusion of the five early interviews and ex-post interviews. Secondly, the length of the CIO experience and the ages of the interviewees varied. Younger CIOs with shorter CIO experience do not have the same perspective as older CIOs with extensive careers. The relatively small size of the Finnish economy with its relatively homogeneous leadership behavior could be related to this issue. Finally, although most of the organizations in the interview are global or regional, the empirical evidence is still from a single country origin.

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APPENDIX 1- CIO PROFILES

Sector	Date	Timeframe of the answers, then - now	Years acting as CIO	Gender	Age Group	Size of the company (revenue)
Media		average:	8	3 Males, 2 Females		
CIO1	09/03/11	2005 - 2011	6	Female	50-59	Large <500me
CIO2	26/06/12	2000 - 2012	2	Male	30-39	Large <500me
CIO3	21/06/12	1997 - 2012	15	Male	50-59	Large <500me
CIO4	07/08/12	2001 - 2012	11	Female	50-59	Large >1000me
CIO5	13/10/11	2005 - 2011	6	Male	30-39	Large <100me
Public sector		average:	14.8	5 Males, no Females		
CIO6	01/08/12	2006 - 2012	6	Male	50-59	Large >1000me
CIO7	24/10/11	1984 - 2011	27	Male	50-59	Large <500me
CIO8	27/07/12	1995 - 2012	17	Male	50-59	Large >5000me
CIO9	29/06/12	2008 - 2012	4	Male	50-59	Medium <50me
CIO10	12/09/12	1992 - 2012	20	Male	50-59	Large >500me
Finance		average:	10.75	4 Males, no Females		
CIO11	14/11/11	1999 - 2011	13	Male	40-49	Large >1000me
CIO12	26/06/12	1992 - 2012	12	Male	50-59	Large >5000me
CIO13	25/06/12	1996 - 2012	1	Male	50-59	Large <1000me
CIO14	12/06/13	1987 - 2009	17	Male	50-59	Large <500me
Manufacturing		average:	10.55	9 Males, 1 Female		
CIO15	25/10/11	1980 - 2011	22	Male	50-59	Large >1000me
CIO16	18/10/11	1987 - 2011	21	Male	50-59	Large >1000me
CIO17	29/06/12	2006 - 2012	7	Male	40-49	Large >1000me
CIO18	14/10/11	2003 - 2011	8	Male	60-69	Large >1000me
CIO19	16/11/11	1999 - 2008	9	Male	50-59	Large >5000me
CIO20	15/06/12	2010 - 2012	2,5	Female	40-49	Large >5000me
CIO21	14/08/12	2000 - 2012	4	Male	40-49	Large >1000me
CIO22	28/11/13	1976 - 2000	15	Male	>70	Large >1000me
CIO23	28/06/12	2008 - 2012	4	Male	50-59	Large >1000me
CIO24	06/03/09	1995 - 2008	13	Male	40-49	Large >1000me
Retail		average:	14.63	8 Males, no Females		
CIO25	25/06/13	1988 - 2005	17	Male	>70	Large >5000me
CIO26	30/08/07	2005 - 2007	7	Male	40-49	Large >5000me

CIO27	10/10/07	1998 - 2007	9	Male	50-59	Large >5000me
CIO28	07/08/07	1999 - 2007	8	Male	40-49	Large <500me
CIO29	26/09/11	1999 - 2011	13	Male	50-59	Large <500me
CIO30	25/06/12	2000 - 2012	12	Male	50-59	Large <500me
CIO31	04/07/12	1989 - 2012	26	Male	50-59	Large <500me
CIO32	26/10/06	1956 - 1981	25	Male	>70	Large >1000me
Services			average:	14.75		
				3 Males, 1 Female		
CIO33	18/06/12	1996 - 2012	14	Male	30-39	Large >1000me
CIO34	18/06/12	1994 - 2012	17	Male	50-59	Medium
CIO35	03/07/12	2002 - 2012	10	Male	40-49	Large >1000me
CIO36	10/08/07	1991 - 2009	18	Female	40-49	Large >1000me
Summary			average:	12.25		

(Source: author)

APPENDIX 2 - QUESTIONNAIRE

<Name, Date, and Place of an interview>

<Company, KPI's: personnel amount, revenue, profit>

Background (time span 10 years)

1. What is your education and how long you have been working in IT field?
2. In which years you led ICT department?/ From which year you have been leading IT department?
3. How many years you have been working as a CIO/ IT manager?
4. How many employees you had when your work started/ now?
5. In which role is your superior (CEO, CFO, some else)?
6. How has your organisation changed during the time you have been a CIO?
7. Why has it changed?

II Framework of leadership

8. Which were the biggest challenges in IT function when you started?
9. Your challenges now ?
10. What kind of competences were needed?
11. Competence needs now?
12. What was the top management's understanding of the need of IT then / now?
13. How would you describe a good leader?
14. What kind of steering groups there were and how they dealt with the IT matters?
15. What kind of steering groups there are now?

III Strategy questions

16. What is your company's strategy as of today?
17. Was the IT department able to handle strategy changes?
18. How is it now?
19. Was the company's management able to handle strategy changes?
20. Was ICT department taking part of strategy work / is it now?
21. If it is, how?
22. What kind of KPI's were used / are used now?
23. Did IT support effectively company's targets?

24. Does it now?
25. How technology's change affects to your company's strategy?

IV Valuation

26. How the IT department was valued then?
27. How it is valued now?
28. How would you estimate the IT savvyness (understanding of IT) among business leaders then?
29. And now?
30. What kind of a role and responsibility was given to IT department then?
31. And now?
32. Was the CIO also a representative of top management then?
33. And now?
34. Was CIO nominated to groups steering group?
35. And now?
36. Did top management understand IT's connection to productivity growth?
37. And now?
38. Did top management understand IT's connection to revenue building?
39. And now?

V Changes in time and place

40. Has your company had noteworthy/remarkable M&A's or divestments in your time?
41. IT's outsourcing?
42. How do you manage your network inside your company and with stakeholders?
43. What was your company's economical situation then?
44. And now?
45. How these changes have affected to IT department?

VI Challenges now and in the future

46. Your company's biggest challenges now?
47. Your biggest challenges in CIO's role now?
48. What tasks belonged earlier to your work? And now? And in the future?
49. How are you involved with leading the business?
50. How are you involved with leading business IT?

What is your outlook to the future?

REFEREE REVIEW PAPER

RESEARCH ON THE EVALUATION OF E-GOVERNMENT SERVICE QUALITY: AN ORGANIZATIONAL PERSPECTIVE

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ABSTRACT

The use of Information Communication Technology (ICT) can deliver the services and information to citizens, effective interactions with business and industry, citizen empowerment through access to information, or more efficient and effective public sector management in most countries not only developed countries but also in developing countries in a decade ago. Many nations government around the world apply ICT in delivering services to citizens, businesses and government, like others traditional services, e-service quality is always the highest requirement by users. During the past decades, many researchers have focused and evaluated the dimensions of e-service quality by using many approaches. This research also identified e-service quality, but selection a new method in developing measurement scales of e-service quality, which is organizational perspective and consider it as a key factor in e-service quality evaluation.

Keywords— e-Government, CIO, Service Quality

1. INTRODUCTION

In over the world, the application of ICT in the public sector during the past decade has brought a new method of delivering services at all levels, which includes citizens, businesses, and government alike. [1] It has brought many benefits to citizens and government itself, with the purpose to provide an efficient management of government information, giving better services and transparency to the community. Therefore, service quality has an important significance, especially the service quality in internet environment (e-service). Service quality is always the first priority from customers, from traditional services to online services. Service quality has a significant influence on many importance aspects, there are many prior studies indicated that service quality depends on many factors. In fact, the customers are more and more requiring the service with the highest quality, while the providers have to improve their service by upgrading operational processes, identifying problems quickly and measuring customers' satisfactions as well as other performance outcomes to meet the needs of customers' expectations.

Concerning this issue, there are a lot of studies have focused on e-government service quality by evaluating the

impact of service, system and information quality. However, among these studies, there is no research have addressed on organizational quality perspective or organizational impact on the evaluation of e-service quality. To find out the new approach to the assessment of e-service quality, this research focuses on the actions from the supply side and analysis the impact of organization – perceived organizational impact (POI) on the evaluation of e-government service quality.

The contribution of this research can be summarized in the construction of an integrated framework that deals with the problem of the quality evaluation of e-government service quality:

- The main purpose of this research is to identify the success factors in e-Government service and proposes a new assessment on the evaluation of service quality.
- Development of an instrument for e-government services quality assessment with the use of heuristic evaluation.
- Introduce the new methodology on evaluating of e-government service quality by using “necessary condition” and “sufficient condition”.

2. LITERATURE REVIEW

2.1. E-Service and e-Service quality

In the context of evaluation of information system quality, there are some principle approaches on quantitative models and qualitative models such as service management (Gronroos, 2000), (Zeithaml, Bitner & Gremler, 2002), quality management in services (Parasuraman, Zeithaml, and Berry, 1988) [2], and acceptance of information systems (Davis, 1989) [3], service management in information technology (Fitzsimmons & Fitzsimmons, 2004), quality used in governmental services (Balanced Scorecard, 1992; Six Sigma, 2001; ISO, 2006; Baldrige Criteria, 2006), approaches on assessing e-service quality, governance by e-government (Bhatnagar, 2004), (Jeong, 2006) and Waseda e-government ranking survey since 2005 [4].

Service quality is considered under many different perspectives and based on many approaches such as service performance, customer's perspective, and perceptions of service or customer expectations. According to Gronroos, service quality was described as the difference between the

expected service and the perceived service. Many prior studies defined service quality as the extent to which a service meets customers' needs or expectations [5-7]. Srivastava (2011) [8] describes e-government as the use of ICTs for improving the access to government services and delivering of value added target processes for the benefit of stakeholders. e-government service quality as it is referred to by some researchers is defined as users' overall assessment of quality in the virtual context and serves as one of the key factors in determining success or failure of e-government. It has an impact both on government and citizens [9]

E-service has been defined as web-based service [10] or interactive services that are delivered on the Internet. Various authors have conceptualized e-service as an information service, or as self-service. According to Yang and Yun, they mentioned that e-service is a citizen experience and perception of a new system used by public sectors. E-service quality can be understood as the evaluation of the efficiency and effectiveness of online actions.

2.2. Dimensions of E-service Quality

Most prior studies have indicated that e-service quality is influenced by information quality and service quality factors, with various domains of measuring, each study can refer different dimensions but common methods among them are using the perception of information system and service system as an approach.

To measure e-service quality, many researchers used the information system (IS) success model. It was proposed by Delone and McLean in 1992 [11]. This model explains the IS measures, which affect the use of information system in an organization and explains "information quality" and "system quality" as two determining factors influencing "use/intention of use" and "user satisfaction" of a system and ultimately yielding "net benefits" at individual level and organizational level. In 2003, this model was refined by Delone and McLean to accommodate changes brought by rapid growth in the online environment. The success factor "system quality" proposed to measure the desired characteristics of an e-commerce system such as usability, reliability, adaptability, and availability, while "information quality" embodied features of web content in the context of e-commerce. A new factor "service quality" was introduced to ensure relationship and care for the users [12]. In the context of e-government service, the government uses several information systems such as websites, portals, open government/ data, social media for Government to Government (G2G), Government to Businesses (G2B) and Government to Citizens (G2C) communication. Delone and McLean IS success model can be used to explain their impact on users.

Many researchers have focused on how ICTs improve the efficiency and effectiveness of a system. One of the famous models called Technology Acceptance Model (TAM), it was proposed by Davis [3] in 1989. TAM is an information systems theory that explains how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors

influence their decision about how and when they will use it. TAM focused on the influence of perception and emotion toward technology use, particularly the new technology adoption behavior of users. The model established the relation of end users' perceived usefulness (PU) and perceived ease of use (PEOU) of a technology-enabled system with users' behavioral intention to accept it. PU was defined by Davis as "The degree to which a person believes that using a particular system would enhance his or her job performance" and PEOU as "The degree to which a person believes that using a particular system would be free from effort". Delone and McLean IS success model and TAM model are very useful and important to evaluate information quality and service quality, two main indicators of e-government service quality. Based on these dimensions, Santos proposed eleven indicators, such as Ease of use, Appearance, Linkage, Structure and Layout, Content, Reliability, Efficiency, Support, Communication, Security, and Incentive.

Table 1 shows the number of prior studies using information quality and service quality on the evaluation of e-government service quality with the main indicators.

TABLE 1: E-GOVERNMENT SERVICE QUALITY DIMENSIONS

Studies	Approaches	Dimensions for evaluation
Aldwani and Palvia (2002)	Web service quality	Technical adequacy, Specific, Content, Content quality, and Web appearance.
Barnes and Vidgen (2002)	Website quality	Usability, Design, Information, Trust, and Empathy
Li et al. (2002)	Web-based service quality	Responsiveness, Competence, Quality of information, Empathy, Web assistance, and Call-back systems
Yang and Jun (2002)	E-service quality	Reliability, Access, Ease of use, Personalization, Security, Credibility, Responsiveness, and Availability
Cai and Jun (2003)	Online service quality	Content, Trustworthiness, Prompt/reliable service, and Communication
Santos, (2003)	E-Service quality	Ease of use, Appearance, Linkage, Structure and Layout, Content, Reliability, Efficiency, Support, Communication, Security, and Incentive.
Jun et al. (2004)	Online service quality	Reliable/prompt responses, Attentiveness, Ease of use, Access, Security, and Credibility.
Zhang and Prybutok (2005)	E-Service quality	e-service convenience, risk, e-satisfaction, and intention
Parasuraman et al. (2005)	E- service quality	Reliability, Responsiveness, Competence, Access, Courtesy, Communication, Credibility, Security, Understanding, and Tangibles
Lee and Lin (2005)	Online service quality	Web design, Reliability, Responsiveness, Trust, and Personalization
Yang et al, (2005)	Web portal quality	Usability, Usefulness of content, Adequacy of information, Accessibility, and Interaction

Bauer et al. (2006)	E-Service quality	Functionality/ design, enjoyment, process, reliability, and responsiveness.
Collier and Bienstock (2006)	E-retail service quality	Process dimension: functionality, information accuracy, design, privacy, and ease of use. Outcome dimensions: order accuracy, order condition, and timeliness. Recovery dimension: interactive fairness, procedural fairness, and outcome fairness.
Cristobal et al. (2007)	E-service quality	Customer service, Web design, Assurance, and Order Management.
Sohn and Tadisina (2008)	E-service quality	Trust, Customized communication, Ease of use, Website content Functionality, Reliability, and Speed of delivery.

2.3 Findings from Literature Review

Based on the literature review, this research found that all previous research focused on service quality and information quality when evaluating e-government service quality with the common indicators such as Site features, Security, Communication, Reliability, Customer support, Responsiveness, Information, Accessibility, Delivery, and Personalization. Service quality and Information quality are an only necessary condition.

To clarify the evaluation of e-government service quality, this research proposes a new factor – Perceived Organizational Impact (POI) and consider as a sufficient condition to evaluate e-government service quality.

2.4. Perceived Organization Impact – POI

According to Hien, N. (2014) the quality of service depends on not only information quality and service quality but also depends on organization quality. The term of the organization in this research included all internal processes to deliver e-service to citizens. It is also considered as one of the essential elements of quality and related to back office, e-governance, management, and support from the organization. The above studies have appreciable management implications and worth considers developing fast, inexpensive, trustworthy and reliable quality service models for e-government. The perceived organizational impact would be influenced by various aspects but in this research, POI refers to the roles of Chief Information Officer (CIO) in an organization.

According to Petter, 2007, the CIO can be defined as the highest ranking Information Technology (IT) executive who typically exhibits managerial roles requiring effective communication with the top management, a corporate board perspective in managing information resources, influence on organizational strategy, and responsibility for the planning of IT [13]. Today, the CIO must possess the leadership and communication skills to have the potential of doing “business” differently and more effectively, and leadership plays a great role in shaping and influencing organization and behavior and which will result in increasing organizational service quality. The role of the CIO in public sector has become as varied as the business models in place today and shown as the technology leader,

the business leader, the strategist and mentor, and the corporate influence.

CIOs are now expected to achieve quantum-leap efficiencies, produce previously unheard-of capabilities, create information out of disparate data sets, and provide citizen services that are so fast, accurate, and user-friendly that the public’s trust in government achieves record heights [14]. According to Obi, from the past decades, the roles of CIO are changing. In the 1980s, known as the first generation of CIOs, the main roles of CIO are to manage information systems and information distribution in offices. In the 1990s - the second generation of CIOs, the main role was to implement and make plans for information strategy as a part of management strategies. In the 2000s, the third generation of CIOs appeared with the main task focused on “management” and “strategy” as a mediator between ICT and Management departments. Now, the CIO’s traditional role, which is one of managing information, IT systems, and cost, has itself transformed to create a new competitive advantage, new products, and new services. The first area of focus for CIOs involving their role is leadership, applied not only to their own IT organization but equally, to the wider enterprise and even beyond it [15]

In this new world of technology-enabled transformation, government CIOs plays an increasingly important role. Keeping the government’s data centers up and running used to be good enough, but now, a CIO’s primary challenge is helping other government leaders see what’s possible—then driving that vision of transformation through an organization [16]. To face and meet the increasing citizens’ demand, the government also has to find new ways to create value for the business, treating users as customers and delivering a superior IT service quality.

In the public sector, government CIO plays a very important role and has been recognized worldwide. Since 2005, in the first International e-government ranking of Waseda Institute of e-government, the important role of CIO for e-government implementation was recognized. The CIO is expected to align management strategy with ICT investment in order to achieve a balance between business strategy, organizational reform, and management reform; hence, the Government CIO is considered by many governments to be one of the key factors in the success of e-Government implementation. In the Waseda e-government ranking survey, the CIO indicator measures firstly for the presence of CIOs in government; secondly, the extent of their mandate; thirdly, the existence of organizations which foster CIO development, and finally, special development courses and the degree/quality to which they teach CIO related curricula. In this survey, due to government CIO is a very important indicator, therefore, it has accounted 15% in total scores with 25 questions on CIO Presence, CIO Mandate, CIO Organizations and CIO development programs [4]. Based on this survey, the government CIOs being the most likely candidate for making effective decisions regarding the allocation of limited resources, the CIO is expected to integrate management strategy with IT investment in order to achieve a balance between the business strategy, organizational and management reform and improve e-

government service quality. Therefore, management, leadership, policy, and promotion are the roles of CIO that this research will discuss and evaluate.

The analytical perspective in figure 1 shows the new methodology on the evaluation of e-government service quality, but this research has focused on Organization Quality factor only.

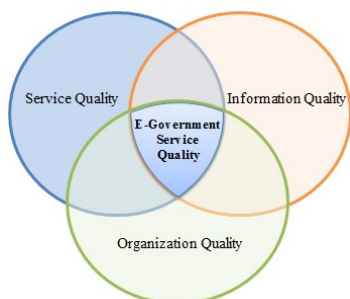


FIGURE 1: ANALYTICAL PERSPECTIVE
(Source: author)

2.5. The Underpinning for Indicators Selection

To find out the impact of organization on e-government service quality, this research proposes five indicators (Latent variables): (i) Management Optimization, (ii) Quality Management, (iii) Leadership, (iv) Policy, (v) Promotion and combining with two others latent variables on Perceived e-service quality (Reliability and Accessibility).

To ensure that, these latent variables are important for evaluating POI, this research implemented the survey with 21 professors, who participated in APEC TEL Workshop and 9th IAC Forum at the National University of Singapore in Singapore dated June, 17th, 2014. These professors came from 13 countries: USA, Philippines, Macao, Malaysia, Korea, Italy, Vietnam, Indonesia, Finland, Czech, Thailand, Singapore, and India. The survey asked them to test and select these indicators that affect to the evaluation of e-government service quality. The table 2 below showed the final respondent results from them.

TABLE 2: INDICATOR SELECTION

Constructs	Indicators	Percentage	Source
Perceived Organizational Impact	Management Optimization	33%	Self-developed, Waseda Ranking
	Quality Management	52%	Self-developed, Waseda Ranking
	Leadership	86%	Self-developed, Waseda Ranking
	Policy	62%	Self-developed, Waseda Ranking
	Promotion	43%	Self-developed, Waseda Ranking
Perceived e-Service Quality	Reliability	43%	Allard et al. (2003)
	Accessibility	57%	Allard et al. (2003)

(Source: author)

Based on the result, this research selected these indicators, identifies and uses them to evaluate the effect of POI on e-government service quality.

2.5.1 Management Optimization

All governments understand that ICT can help governments to improve their internal processes, optimize the productivity and efficiency of activities in their ministries and departments. To improve administrative systems, government services must be available to all stakeholders and make immediate and continuous gains. Management optimization refers to e-government planning and strategies with linkages at the national and local levels (e-municipality). This compasses the entire coverage government with well-defined targets.

2.5.2 Quality Management

It has four main components: quality planning, quality control, quality assurance and quality improvement. Quality management is focused not only on product and service quality but also the means to achieve it.

2.5.3 Leadership

In an organization, leadership is a process of social influence, which maximizes the efforts of others, towards the achievement of a goal in an organization.

2.5.4 Policy

The policy is a principle to guide decisions and achieve rational outcomes, in the context of this research, policy refers to the process of making important organizational decisions in all laws, legislation, strategy or plan on e-government development.

2.5.5 Promotion

The e-government promotion indicator is evaluated by using a comprehensive list of parameters which judge the degree of development in each sector as well as the current status of each development in e-government promotion. It includes activities aimed at supporting the implementation of e-government such as legal frameworks and mechanisms (law, legislations, plans, policies, and strategies). In other words, these activities are carried out by the government in order to support the development of e-services and in-house operations.

3. RESEARCH MODEL AND HYPOTHESES

3.1. A Conceptual Framework and Research Model

The conceptual model in this research is presented in figure 2. The proposed conceptual model includes five latent variables and based on main categories perspective: Perceived Organizational Impact.

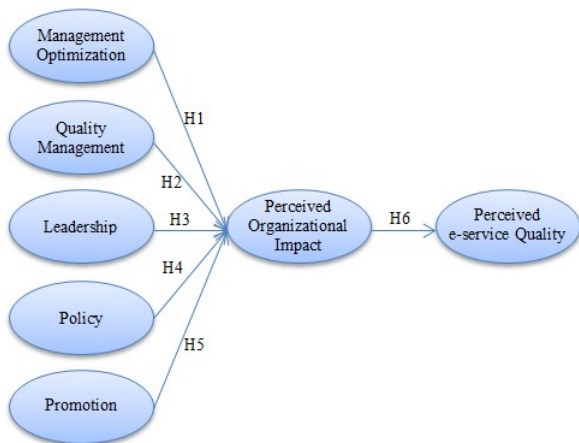


FIGURE 2: RESEARCH MODEL

3.2. Hypotheses

Based on the result of a survey from 21 professors who participated to APEC TEL and IAC Conference in Singapore in June 2014, this research selected five latent variables: Promotion, Management Optimization, Quality Management, Leadership, and Policy to evaluate perceived organization impact and e-service quality. Based on the conceptual model, there are six hypotheses are summarized:

- H1: Management Optimization positively influences the POI.
- H2: Quality Management positively influences the POI.
- H3: Leadership positively influences the POI.
- H4: Policy positively influences the POI.
- H5: Promotion positively influences the POI.
- H6: Perceived Organizational Impact positively influences the perceived e-Government service quality.

4. RESEARCH METHODOLOGY

4.1. Data Collection

The collection of raw data to verify all indicators and testing the hypotheses, the survey by a questionnaire distributed to persons who participated in International Conference on Information Systems Management and Evaluation (ICIME) in Vietnam. To verify all factors proposed in this research, the questionnaire was sent directly by email.

4.2 Methodology

The quantitative method was selected to identify hypotheses and fitness of model as well as to summarize the method on evaluation e-service quality by using service, information, and organization quality factors. For this purpose, much previous research literature was reviewed to clarify these characteristics. To test the hypotheses, a methodology called Partial Least Squares (PLS) was employed in this research to verify the path relationship and correlation. The PLS method is a useful alternative to Covariance-based Structural Equation Modeling (SEM) and it can be a powerful method of analysis due to the minimal demands regarding measurement scales, sample size, and residual distributions.

For testing the hypotheses and fitness of model as well as evaluating the appropriateness of five latent variables (indicators) and also getting the first results of evaluation of e-government service quality. The questionnaire includes 57 questions and based on a seven-point Likert scale. The scale was measured from 1 (strongly disagree) to 7 (strongly agree). These questions were sent directly by email to 130 participants who participated to the ICIME in Vietnam in 2013, the period of surveying from June, 17th to June, 26th, 2014.

5. DISCUSSIONS

5.1. Model Quality and Fitness

Construct reliability reflects the internal consistency of the scale items manifest variable measuring the same construct latent variable for the collected data (Straub, 1989) [17]. As for the reflective measurement model, it was suggested that Average Variance Extracted (AVE) and the composite reliability are higher than 0.5 and 0.7, respectively (Fornell and Larcker, 1981) [18] (Hair et al., 2006) [19]. In this table 3, the AVE of Management Optimization, Promotion and e-government quality latent variables are lower than 0.5, following the composite reliability of latent variables are 0.4693, 0.0693 and 0.0907 are lower than 0.7. It means there are three latent variables are not significant. Based on the result of Table 3, all other latent variables such as Leadership, POI, Policy and Quality Management are significant and explain the e-government service quality.

R2 shows how much the variance of the latent variable is being explained by the other latent variable. R2 is the coefficient of determination and equal 0.9687 for POI endogenous latent variable, this means that the manifest variables: Management Optimization, Quality Management, Leadership, Policy, and Promotion moderately explain 96.87% of the variance in POI. Finally, R2 for Perceived e-service quality is 0.7696 endogenous latent variable, it means POI latent variable moderately explain 76.96% of the variance in Perceived e-Service Quality.

The coefficient of determination (R2) describes the share of the variance of an endogenous construct, as explained by the relationship in the model. The R2 of POI (0.9687) and Perceived e-Government service quality (0.7696) are very high. According to Ken et al., 2013 [20], they mentioned that, if R2 higher than 0.75, it means the correlation relationship among latent variables is substantial and according to McFarland and Hamilton, if R2 higher than 0.3, it means the model is fitness.

TABLE 3: MODEL QUALITY

Constructs	AVE	Composite Reliability	R ²
	> 0.5	> 0.7 (Hair et al., 2006)	> 0.3
Leadership	0.6011	0.8150	
Management Optimization	0.3545	0.4693	
POI	0.9274	0.9746	0.9687
Polity	0.8712	0.9640	

Promotion	0.3650	0.0693	
Quality Management	0.8023	0.9417	
Perceived e-government quality	0.1366	0.0907	0.7696

(Source: author)

5.2. Path Coefficients Analysis

There are six relationships including five factors of POI mentioned in this research, which implies that there are six paths that need to be tested. The number on each path called the path coefficients. They explain how strong the effect of one variable is another variable. In general, path coefficient should be larger than 0.2 in orders to demonstrate its significance [20]. Based on the results in figure 3, the value of path coefficient of Management Optimization and Quality Management lower than 0.2 it means the effect of Management Optimization and Quality Management to Service Quality have an insignificant relationship with POI, while Leadership, Policy, and Promotion are significant relationships with POI.

To check convergent validity, each latent variable's Average Variance Extracted (AVE) is evaluated, based on the result of Table 3, the AVE of Leadership, POI, Policy and Quality management are greater than the acceptable threshold of 0.5. For outer model weight and significance, based on figure 3, the correlation between POI and Perceived e-service quality equal 0.877, it means convergent validity is established [21].

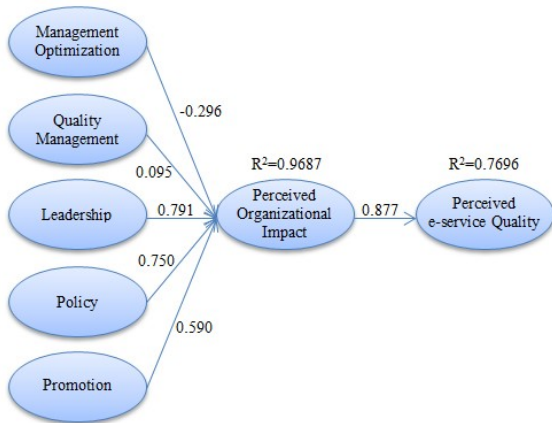


FIGURE 3: PATH ANALYSIS AND MODEL FITNESS (Source: author)

5.3. Hypothesis Testing

Table 4 indicates that 5 hypotheses were significantly supported by the data. In summary, Leadership, Policy, Promotion and Organizational Impact are identified as the main determinants of attitude toward perceived e-government service quality. This research indicated that perceived organizational impact affected to e-government service quality.

TABLE 4: HYPOTHESIS TESTING

Hypothesis	Hypothesized direction	Findings
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H1: Management Optimization → POI	+	Significantly Supported
H2: Quality Management → POI	-	Insignificantly
H3: Leadership → POI	+	Significantly Supported
H4: Policy → POI	+	Significantly Supported
H5: Promotion → POI	+	Significantly Supported
H6: POI → Perceived e-service quality	+	Significantly Supported

(Source: author)

6. CONCLUSIONS

This research selected 5 latent variables for evaluating e-government service quality, but only three latent variables are significant for data collection. The reason why two latent variables are insignificant and also the limitation of this research is the data collection from the survey is not enough. However, the model is fitness with all indicators that this research selected.

Based on the results of this research, besides the service quality perspective and information quality perspective that affected to e-government service quality, perceived organizational impact also influenced on the evaluation of e-government service quality.

For the future research, this research will select Japan as a case study for evaluating e-government service quality by sending a questionnaire to 500 persons who participated in International Academy of CIO conference in Japan from 2012 to 2014 and testing e-government service quality with three factors, service quality perspective, information quality perspective and perceived organizational impact.

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REFEREE REVIEW PAPER

JOB CHANGING BEHAVIOR OF MILLENNIAL ICT PROFESSIONAL WORKFORCE

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ABSTRACT

The millennial generation will shape the world of work for years to come. When it comes to their careers, the Millennials want to be productive in a different way. They have high expectation on how an organization will treat them. Their career aspirations, attitudes about work, and knowledge of new technologies will be the culture of the 21st-century workplace. There are currently about 20 millennials in Thailand which represents 30% of the population. In this study, we collected the data from Thai millennials who work in Information and Communication Technology (ICT) industry on which factors influence their decisions when it comes to job changing. The results have shown that supervisors' influence, relationship with colleagues, and work environment are the three most important factors when Thai millennial ICT professionals make decision about job changing. A number of interesting findings about Thai millennials ICT professional are also discussed.

Keywords-component; Thai millennial; job changing; ICT professional workforce

1. INTRODUCTION

By 2025, Millennials, those who were born between 1981 and 2000, will comprise more than half of the global population and 75 percent of the workforce [1,2]. When it comes to their careers, the Millennials want to be productive in a different way. They want to work when and where they work best, whether at home, on the road, after hours, or part-time, and they want recognition for what they do [1]. According to one Pew Research study, 80 percent of Millennials expect regular feedback and recognition, 70 percent expect flexibility and "me time," and one-third say they would choose these over higher pay. However, Millennials have demonstrated that they will change jobs more freely than past generations - turnover is nearly double the rate of Baby Boomers [1].

Millennials are population born between 1981 and 2000. Typically, they grew up with digital media, child-focused world, school shootings, AIDS, and 9/11 terrorist attacks [3,4]. As stated in Raines, "Millennials are sociable, optimistic, talented, well-educated, collaborative, open-minded, influential, and achievement- oriented. They have always felt sought after, needed, indispensable. They are

arriving in the workplace with higher expectations than any generation before them and they are so well connected that, if an employer does not match those expectations, they can tell thousands of their cohorts with one click of the mouse [5]."

Millennials firmly believe that because of technology, they can work flexibly anytime, anyplace and that they should be evaluated on work product not how, when or where they got it done [3]. A current Pew Foundation study reports that more than 80% of millennials sleep with a cell phone by the bed "poised to disgorge texts, phone calls, emails, songs, news, videos, games, and wake-up jingles. [6,7]" The prevalence of portable wireless communication devices has dramatically affected communication and collaboration patterns. Texting has become the preferred channel of communication between teens and their friends [7]. These changes have affected nearly every aspect of millennials' lives outside school.

Millennials are seeking much more in return for their hard work than a paycheck and they are often looking for an adequate work/life balance. In contrast to their boomer parents, Millennials seem to prefer "making a life" over "making a living [8]." In work, according to the generational differences chart [4], developed by The West Midland Family Centre, shows Millennials have a work ethic that is different than previous generations who had a "linear" working style and were used to a traditional working day. The study stated:

"They have high expectations of bosses and managers to assist and mentor them in attainment of professional goals, looking for meaningful work and innovation. They actually want long-term relationships with employers, but on their own terms. They want to be challenged, expect to work with positive people and company that can fulfill their dreams, and be treated with respect in spite of age. They would respond poorly to those who act in an authoritarian manner and/or who expect to be respected due to higher rank alone. They would like to have feedback and want recognition or reward for their deed."

The study by PwC also states that work/life balance has always been a priority for millennials with 95% of respondents in their study saying the work/life balance is

important to them and 70% saying it's very important [9]. According to Ernst & Young's report "Global Generations: A global study on work-life challenges across generations more millennials are moving into management [10]. Close to two-thirds (65%) of Gen X full-time employees manage the work of others, followed closely by millennials (62%). Coming in a distant third, less than half (46%) of boomers say they manage the work of others. This shift has taken place in the last five years, or 2009–2014 - 85% of millennial managers say they moved into management during this time. China has the largest percentage of millennial managers who moved into management (90%) in the last five years and the US the least (76%). However, US managers have more years of experience. Over twice as many US managers (46%) have been managing for over 10 years than managers in other countries (21% on average).

In Thailand, there are around 20 million millennials which represent about 30% of the population[11]. Thai millennials do not differ much from millennials in other parts of the world. As many as 77 percent of Thai Millennials claim that they have more choices of how to live their lives compared to the global 69 percent [11]. There are a couple of studies on the attitudes of Thai millennials on work and found that most millennials in Thailand value compensation, appropriate work scope, goos colleagues and supervisors more than job security or reputation of organizations they work for [12]. Prachak also studied the relationship between millennial workers and their current firms and found that Millennials value the importance of positive communication and relationship with others within firms more than compensation, position, or social status [13]. Finally, a recent study by jobsDB.com, a leading job listing portal in Southeast Asia, on what factors that make Thai employees change their jobs, found that the most important factors when employees in Thailand change their jobs are unsatisfied compensation, unsatisfied with current work, unclear career path, and unsatisfied with currently assigned roles [14].

In this study, we focus on the Thai Millennials who work in Information and Communication Technology (ICT) related field to determine which factors that have an influence on how they make their decisions when it comes to changing their jobs. The rest of the paper will describe scope and methodology, results, and finally, conclusion and discussion.

2. SCOPE AND METHODOLOGY

Data for this study were collected by authors on one of the largest IT Firms in Thailand that is interested in better understanding the views of the Millennials on jobs, organizations, careers and their perceptions of their organizations.

2.1. Population

The original data set included 65 employees of the firm. From this sample, we focused only on millennial respondents born after 1980. This population segment is important to organizations as they represent a major source of hiring for skilled jobs such as managers, pro-

professionals, and technical workers. The median age of the respondents was 28 years. Table 1 presents the demographic profile of the respondents.

TABLE 1: DEMOGRAPHIC PROFILE (N=65)

Demographic	Value	N	Percentage (%)
Sex	Male	30	46.15
	Female	33	50.77
	Not Specified	2	3.08
Age	25-21	21	32.31
	30-26	20	30.77
	35-31	24	36.92
Marital Status	Single	56	86.15
	Married	9	13.85
Having Dependent	Yes	4	6.15
	No	61	93.85
Education Level	Bachelor	45	69.23
	Master's degree or Higher	20	30.77
Work Experiences	< 1 year	12	18.46
	3-1years	24	36.92
	8-4years	18	27.69
	> 8 years	11	16.92
Roles	System Engineer	12	18.46
	Business Consultant	6	9.23
	Developer	22	33.85
	Quality Assurance	16	24.62
	System Analysis	6	9.23
	Others	3	4.62

(Source: Author)

2.2. Measures

In this study, we collected the importance of several factors that each respondent use to determine whether he/she will change his/her job. Factors that were used to ask each respondent are divided into groups; supervisor, colleague, career opportunity, work/life balance, direct/indirect benefit, and work attributes which they consider important to their work life.

Respondents were asked to rate each factor within a group according to Likert scale rating from Very important (5), Important (4), Moderately Important (3), Somewhat

Important (2), Not Important (1). An example of questions within a group is illustrated in Figure 1.

	Criteria	Degree of Importance				
		5	4	3	2	1
1. Please indicate the importance of these criteria of an organization you want to work for						
1.1	Reputation					
1.2	Growth					
1.3	Governance					
1.4	Internationality					
1.5	Goal					

FIGURE 1: EXAMPLE OF QUESTIONNAIRES

Likelihood of changing job was assessed using a single question. Respondents were asked to indicate whether they are likely to change their current jobs and how soon they would expect to happen.

2.3. Analytic Procedure

We first analyzed the attitudes toward job by performing simple statistical analysis by calculating average and variance of each factor. We then conducted a number of analysis to determine whether the dependent variables in the study which are attitudes toward job were affected by demographic profile of the respondent using cross tabulation techniques.

For likelihood of changing current job, logistic regression analyses were performed with attitudes toward job as independent variables.

3. RESULT

Respondents value the importance of supervisor as the most important factor in deciding whether to stay or leave the current job in our survey (avg = 4.36, s.d. = 0.510). The second and third most important factor is colleagues (avg = 4.30, s.d. = 0.569) followed by work environment (avg = 4.21, s.d. = 0.601). Personal life, career opportunity, recognition, direct benefits, organization profile are moderately important. Finally, indirect benefits, e.g. stock option, are the least important factor for deciding whether to stay or to leave current job. The results are shown in Table 2.

TABLE 2: FACTORS INFLUENCING JOB CHANGING

Factors	Average	SD	Degree of Importance
Supervisor	4.36	.510	Very Important
Colleague	4.30	.569	Very Important
Work Environment	4.21	.601	Very Important
Personal Life	4.19	.571	Important
Advancement	3.99	.540	Important
Job Characteristics	3.93	.468	Important
Recognition	3.91	.599	Important
Direct Benefits	3.88	.636	Important

Factors	Average	SD	Degree of Importance
Physical Environment	3.72	.610	Important
Organization Profile	3.71	.505	Important
Indirect Benefits	3.26	.860	Moderately Important

(Source: Author)

We then look into detail on the effect of demographic of the sample as indicated in Table 3 and 4. For importance of supervisor, our respondents expect a fair and well attitude supervisor. They do not particularly concern about the relationship with their supervisor. We also found that those who spend 9-12 hours in their office is more likely to concern about their supervisor's attitude than those who spends less time in the office ($t = -2.184, p = .033$).

TABLE 3: IMPORTANCE OF SUPERVISOR

Criteria	Average	Sd	Degree Of Importance
Fairness Of Supervisor	4.63	519.	Very Important
Attitude Of Supervisor	4.48	591.	Very Important
Relationship With Supervisor	3.98	882.	Important

(Source: Author)

On the importance of colleague, ICT professional value the important of teamwork, communication, and attitude of colleagues as very important to the millennials. Relationship with colleagues is moderately important except for those whose ages are between 26-30 ($t = 3.401, p = .040$) rate relationship with colleagues as very important.

TABLE 4: IMPORTANCE OF COLLEAGUES

Criteria	Average	Sd	Degree Of Importance
Teamwork	4.48	640.	Very Important
Communication	4.35	694.	Very Important
Colleague's Attitude	4.25	685.	Very Important
Relationship With Colleague	4.11	732.	Important

(Source: Author)

Finally, the work environment is another highly important factor for millennial ICT professional in this study. Two factors were rated most important for work environment are teamwork spirit and having a more casual environment workplace. Organization culture that matches their lifestyle is also important but not as much as the previous two factors. We further analyzed the effect of demographic on this factor and found that that millennial ICT professional whose age are 31-35 do not value work environment as a very important factor ($t = -3.335, p = .042$).

TABLE 5: IMPORTANCE OF WORK ENVIRONMENT

Criteria	Average	Sd	Degree Of Importance
Teamwork Spirit	4.34	691	Very Important
Casual Environment	4.29	723.	Very Important
Matched Organization Culture	3.98	787.	Important

(Source: Author)

As we mentioned in the previous section, in this study, we also collect whether this group of millennial ICT professionals will be leaving their jobs within one year. The results in Table 6 shows the result of this survey.

TABLE 6: JOB CHANGING BY DEMOGRAPHY

Demographic	Value	Will Not Change Job	%	Will Change Job	%
Sex	Male	18	50.00	12	50.00
	FEMALE	16	49.49	17	51.51
Age	25-21	8	38.10	13	61.90
	30-26	15	75.00	5	25.00
	35-31	13	54.16	11	45.84
Marital Status	Single	30	53.57	26	46.43
	MARRIED	6	66.67	3	33.33
Having Dependent	Yes	2	50.00	2	50.00
	NO	34	55.73	27	44.27
Education Level	Bachelor's	24	53.33	21	46.67
	MASTER'S	12	60.00	8	40.00
Current Job Experience	< 1Year	6	50.00	6	50.00
	3-1 YEARS	10	41.66	14	58.34
	8-4 YEARS	10	55.55	8	44.45
	> 8 YEARS	10	90.90	1	9.10
Changing Job Experience	Never	20	57.14	15	43.86
	2-1TIMES	13	52.00	12	48.00
	5-3TIMES	3	60.00	2	40.00
Job Role	Software Engineer	8	66.67	4	33.33
	Consultant	5	83.33	1	16.67
	Developer	12	54.54	10	45.46
	QA	6	37.50	10	62.50
	SA	5	83.33	1	16.67
	OTHER	0	0	3	100.0

(Source: Author)

As we can see from the table, there are numbers of interesting findings to point out here from our sample:

Younger millennial ICT professionals (21-25 years old) are more likely to change job than those who are older (62% vs 25% and 45% for 26-30 and 31-35 years old)

Those who work for their current employer longer than 8 years are less likely to change job (90% vs 10%) comparing to those who work for less than a year has 50% chance of changing to new jobs.

System analysts (SA) and a consultant are less likely to change his/her job. However, a quality assurance(QA) is more likely to change his/her job than other roles and those who has unidentified role in our sample has 100% chance of changing his/her job than other roles.

Those who work spend 9-12 hrs at the office are less likely to change job (64% vs 36%)

Sex, Marital status, dependency, and history of changing job do not really affect the decision of millennial ICT professionals to change job.

Other than analyzing decision to change job against demographic profile, we also try to determine a relationship between decision to leave his/her current job and their attitudes described earlier using regression analysis. The result is shown in Table 7.

TABLE 7: REGRESSION TEST RESULT

Factor	B	Se B	β	T	P
Job Satisfaction	-0.344	0.087	-	-	**0.000
Compensate-On	-0.344	0.053	-	-	0.002**
Mentoring/Coaching	-0.344	0.067	0.222.	2.011	0.049*

(Source: Author)

From Table 7, it turns out that those who value job satisfaction as the most important factor for millennial ICT professionals to stay or leave their jobs. The higher the satisfaction an ICT millennial is, the less likely that he/she will change his/her current job. Compensation and availability of mentoring/coaching at the current company also provide the same effect as job satisfaction on decision to changing job.

4. DISCUSSION AND CONCLUSION

The primary objective of this study was to investigate which factors that influence millennials on the decision to stay or leave their current jobs. We focused on describing the expectations and priorities of a group of young Thai ICT professionals, also referred as millennial ICT professionals, as they become majority in their workplace. Overall, our findings support our assumptions that Millennials do have great expectations when it comes to their careers.

First and foremost, they gave the highest importance on having a fair and well-attitude supervisor. Moreover, they also expect to have good colleagues to work with. They also value the importance of having a nurturing work environment that are casual and promote teamwork spirit.

These findings support the work of previous works finding that millennials may be more loyal to their colleagues and supervisors than to their organizations [Ng, Lancaster].

We also examine if there are differences in attitudes among the millennial ICT professionals that are attributable to demographic factors. We found that there are some differences exist in the attitudes within this group of millennials, based on traditional demographic groups such as gender, age, and marital status as well as work experience but found no significant differences within the group.

Finally, we found that job satisfaction, compensation, and availability of coaching and mentoring are the major factors that influence millennial ICT professionals' decision when they decide to stay or leave their current jobs. We think that future research on the detail of these particular factors will be worth pursuing. For example, how to increase job satisfaction among millennials ICT professionals? what kind of compensation that millennial ICT professionals are expecting? These suggestions for future work are important in helping employers attract and manage a new generation of workers.

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REFEREE REVIEW PAPER

TWITTER AND POLITICS EVIDENCE FROM THE 2016 US PRESIDENTIAL PRIMARY CAMPAIGNS

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ABSTRACT

Social media's influence in the 2016 US presidential election has been stronger than it has ever been before and has led to the traditional media and the Democratic and Republican parties to lose "dominance" of public opinion to the "digital revolution".

During their primary campaigns, candidates tweeted about 10 – 15 times a day to express their positions, to attack each other, to retweet endorsements, to encourage people to vote, to give news previews and a lot more. As a result, Twitter has become the most important communication channel for both Donald Trump and Hillary Clinton.

The more candidates used Twitter to broadcast their thoughts, the more people retweeted them spreading their messages and journalists mentioned tweets in their election coverage creating a virtuous circle that brought more and more attention to the micro-blogging platform.

This article analyzes the tweets of Hillary Clinton and Donald Trump in order to understand the communication strategies performed through this media.

Keywords— Twitter, US Elections, communication, content analysis

1. BACKGROUND AND LITERATURE REVIEW

1.1. Twitter and politics in US

The rise of Twitter signaled a change in politics as profound as the one which occurred in 1960 when John F. Kennedy showed the effectiveness of television as a campaign tool. According to political analysts, Kennedy successfully secured the presidency in 1961 primarily due to his effective campaign use of new mass media and his appeal to young adults. Forty-eight years later, Barack Obama not only became the first African-American presidential candidate but, following the path of President Kennedy, he was also the first to use a new form of mass media – this time social media – as a political campaign platform. “Thinking we’re only one signature away from ending the war in Iraq.” With this message in April 2007, then-senator Barack Obama began the very first Twitter campaign for president and, in the process, launched one of the first demonstrations of the power of the social media platform to influence politics and political debate. Obama’s

first tweet came little more than a year after Twitter founder Jack Dorsey’s first tweet on March 21, 2006.

When Obama started, only 69 members of Congress had Twitter accounts. Just three months later, that number had nearly doubled to 134 [1]. As of May 2011, 387 members of Congress were on Twitter, according to Tweet-Congress’s website. Moreover, to help politicians and government employees to better understand Twitter’s potential, former congressional staff member Adam Sharp (called by The New York Times “the human embodiment of Twitter”) was hired as Twitter’s Washington liaison, in order to help the “government better communicate with constituents.” [2].

While it might seem strange that politicians took so quickly to Twitter and other social media sites (given that most of them have existed for only a handful of years), the reason is simple: the websites’ popularity was too big to ignore. Already in 2011 more than 1 billion people were active on some social media.

However, during those years, Twitter’s potential was yet to be fully understood and exploited by politicians.

Even Obama’s 2012 campaign, a point of reference in the Western world and considered a model for web use in political communication, used social media unidirectionally. In general, politicians’ Twitter use was characterized as yet another expression of traditional top-down communication models. The conversational component was sacrificed in favor of those that enable the distribution of prepackaged messages, delivered by the politician as though to a passive television audience rather than to interactive users of social media. In other words, political leaders didn’t use Twitter to interact, engaging only in the one-to-many communication typical of broadcast media.

It has been nine years since Barack Obama’s first tweets changed forever the way in which politicians communicate and helped propel a young senator from Illinois into the White House. But the 2016 campaign saw a whole new level of use. Twitter’s early promise as a political tool had become ingrained as a political reality. Social media channels are now a primary focus of campaigns both for reaching voters and developing their campaign narrative. Among different social networks, it is Twitter that is shaping up as the primary social network for campaign outreach and testing supporter enthusiasm. Leveraged

effectively, a candidate's Twitter profile can drive engagement, convert the unenthusiastic non-voter into a motivated volunteer for the campaign, and drive free media attention to the issues and values of the campaign. In 2016, social media exerted an unprecedented influence on a U.S. presidential election, driving, rather than merely following, developments in the 2016 presidential elections.

1.2. Tools for tweets evaluation

Twitter is an excellent source of current information. Data extracted from Twitter is used by researchers to answer a variety of questions related to specific situations, events or behaviors. Depending on the aims, different tools can be used to collect data and this phase is the one which remains the most challenging aspects of Twitter-based research.

Both quantitative and qualitative activities can be performed.

There is not one accepted standard for the quantitative description of user activities on Twitter. The need is a flexible enough tool to be applied to a wide range of communicative situations [3].

Social network analysis (SNA) has emerged as a key technique in the social and behavioral sciences as well as in other major disciplines [4]. In the online environment, social network analysis has been used in research to examine social relationships (e.g., [5] and online communities (e.g., [6, 7]). It was employed to examine the network structure of an online community for smoking termination [7], the construction of online extremist political networks [6], online and social media roles in social-image construction [8], and the construction of an online knowledge-building community [9]. Furthermore, Clavio et al. [10] selected social network analysis to analyze the social network of a Big Ten football team's Twitter community, while Cheong, France et al. [11] focused on the tweets extracted during the Australian 2010-2011 floods.

A simple way to analyse temporal trends in a Twitter corpus would be to sample a specified number of tweets at different time periods, such as at the beginning, middle, and end, and then use a content analysis [12] to classify the samples. The objectives of a content analysis of Twitter data can be as diverse as the possible methodological procedures. Traditionally, content analysis does not necessarily require special software, and might as well be carried out manually or with common spreadsheet software. There is a wide range of Computer-Assisted Qualitative Data Analysis (CAQDAS) software that can be used for different types of digital content analyses. Whereas most of the common tools incorporate instruments to analyse quantitative (numeric) data as well as qualitative data (e.g., MAXQDA, QDAMiner, ATLAS.ti, Qualrus, NVivo), the range of the analytical features varies [13].

The most widely used way of evaluating tweets is text-based sentiment analysis which predicts the sentiment content of texts based upon features it identifies, such as the words used and the presence of emoticons. Automatic sentiment analysis has become popular over the past decade, especially for web data [14]. It focuses largely on

identifying positive and negative, as well as the absence of, sentiments using linguistic algorithms [15]. While SentiStrength has been developed for short online texts, Sentiment140 was particular implemented to analyse tweets, providing one sentiment value per tweet on a scale from 0 (negative) to 4 (positive).

It is important to assess also the specific capabilities of the sentiment analysis tools as for

example, Natural Language Processing (NLP) tools are not able to detect irony. Or as Friedrich, Natalie, et al. [16] show in their analysis current sentiment tools are not able to accurately detect sentiments for the specific context of tweets discussing academic papers.

Mohammad et al. [17] generated a sentiment lexicon from the sentiment 140 corpus [18] which contains positive and negative emotions. Through this methodology, they generated two large word-sentiment association lexicons, one from tweets with sentiment-word hashtags, and one from tweets with emoticons. In literature, the most frequently used lexicons include the NRC Emotion Lexicon [19] with about 14,000 words, the MPQA Lexicon [20] with about 8,000 words, and the Bing Liu Lexicon [21] with about 6,800 words.

In the political context, Karkın, Naci, et al. [22] use the critical discourse analysis (CDA) which "traces cultural and ideological meaning in spoken and written texts" [23] by involving the broader socio-political and socio-cultural contexts. They apply this methodology specifically because it considers that both discourse and ideology concepts together.

The sheer volume of users, tweets, and hashtags has made the site a suitable area also for quantitative data analysis and "big data" number-crunching.

Qualitative methods, such as interviews, ethnographic observations, and content analysis, provide a rich source of data that allow going beyond description. For instance, qualitative methods can help distinguishing general communicative or social media behaviour from behavior that is specific to a platform. Qualitative methods can also reveal much about social norms, appropriateness, or larger social concerns about technology [24].

Many academics have investigated the phenomenon of social media in politics and developed their theories. Many researchers suggest that a society's reliance on social media can positively influence civic engagement, reduce information costs and increase voter turnout [25]. Moreover, social media help engaging young people, as they are more comfortable with the technologies and have a higher desire of belonging to a social group [26]. However, other research highlighted also negative effects related to the increase use of social media. One fear is that social network users will continue spending more time interacting remotely with people rather than face-to-face, a trend that could inhibit people's "in person" social skills. Moreover, on such platforms, people seem more willing to express negative views (or even attack others) because of their increased sense of anonymity [27]. Another concern is that social networking sites encourage users to isolate themselves politically. Thus they are rarely exposed to

views that challenge their own [25, 28]. This belief is supported by one of the oldest theories of communication research which is selective exposure. Selective exposure is the tendency of people to expose themselves to information in accordance with opinions already held by them. Media environments that allow audiences a lot of choices seem to foster this tendency [29, 30]. This theory is one of the building blocks of communication research and has received a lot of attention in the context of news gathering on the internet, as this seems to be the media environment with the largest opportunities to choose different sources of information [31-33]. In this theoretical context, researchers have discussed the tendency of Twitter users to follow accounts of politicians belonging to parties they support and generally to use social networking services to find information in accordance with their political views [34, 35].

2. AIM OF THE STUDY

The purpose of this study is to highlight the main differences between the Twitter strategies of Clinton and Trump. Differences in terms of both the utilization of Twitter features such as link, media, and hashtag, but also in terms of what candidates are really talking about on the social network. Are they talking about political issues (such as healthcare or education)? Are they attacking other candidates? Are they asking people for their vote? And above all, which of this content type has the highest correlation with favorites and retweets (which means, what type of tweet users prefer to read and share on Twitter)? We want to underline that the aim of the study is not to find who has the better Twitter strategy, but simply to understand what candidates (and their teams) think is the best way to present their person and to exploit a tool that connects them with millions of people.

The main addressed questions are the following:

- Which are the main similarities and differences in the Tweets' "anatomy" of Hillary Clinton and Donald Trump?
- What are Hillary Clinton and Donald Trump really talking about on Twitter?
- Which effects does the Tweets content have on the favorites and retweets they get?

3. METHODOLOGY

In order to analyze the Twitter strategies of both candidates the first step consisted into downloading their tweets. Twitter provides developers with limited access to its databases through APIs (Application Programming Interface) that allow to obtain tweets containing specific keywords or hashtags and tweets posted by specific users. APIs alone, however, are not sufficient to get data from Twitter. What we also need is Python which is a general-purpose language that can be extended and embedded in other applications. Through Python we created a library to connect to Twitter API and download the data. The script used to download the tweets is shown in figure 1 and allowed the download of:

- The tweet ID, which is a unique number associated with each tweet;

- The text of the tweet;
- The date and time in which the tweet was published;
- The number of retweets each tweet obtained;
- The number of favorites each tweet obtained;
- The name of the user the account is replying to, if the tweet is a reply;
- The name of the user who tweeted;
- The used hashtags;
- The embedded links;
- The embedded media.

```
import tweepy
import sqlite3
import time

auth = tweepy.OAuthHandler(ckey, csecret)
auth.set_access_token(atoken, asecret)
api = tweepy.API(auth)

con=sqlite3.connect("Clinto-Trump_tweets_1.db")
cur=con.cursor()

cur.execute("CREATE TABLE IF NOT EXISTS
twitter_data(id_tweet,tweet,date,retweet,favorite,reply,brand,hashtags,links,media)")

handles=["realDonaldTrump","HillaryClinton"]
for hndi in handles:
    for status in tweepy.Cursor(api.user_timeline, id=hndi).items():
        tweet=status.text.replace('\n:').replace('\r:').replace('\r\n:')
        id_tweet=status.id
        date=status.created_at
        retweet=status.retweet_count
        favorite=status.favorite_count
        reply=status.in_reply_to_screen_name
        brand=status.user.screen_name

        hashtaglist=[]
        try:
            for hashtag in status.entities["hashtags"]:
                hashtaglist.append(hashtag["text"])

        except:
            pass
        hashtags=".".join(hashtaglist)

        linklist=[]
        try:
            for link in status.entities["urls"]:
                linklist.append(link["expanded_url"])

        except:
            pass
        links=".".join(linklist)

        medialist=[]
        try:
            for media in status.entities["media"]:
                medialist.append(media["expanded_url"])

        except:
            pass
        medias=".".join(medialist)

cur.execute("INSERT INTO twitter_data
VALUES(?,?,?,?,?,?,?,?)",(id_tweet,tweet,date,retweet,favorite,reply,brand,hashtags,links,medias
))
con.commit()
```

FIGURE 1: THE ADOPTED PYTHON SCRIPT

The download's result was a total of 3580 tweets for Trump and 3856 for Clinton. Tweets were then evaluated for the quantitative analysis using Excel and Kstat (which is a set of macros added to Excel that enable to perform a series of statistical studies) and for the qualitative ones using NVivo, a qualitative data analysis (QDA) computer software that supports qualitative and mixed methods research. It's designed to help organize, analyze and find insights in unstructured, or qualitative data like: interviews, open-ended survey responses, articles, social media and web content.

4. DATA ANALYSIS AND DISCUSSION

4.1. Quantitative Tweets Analysis

Trump has been active on Twitter since March 2009 while Clinton since April 2013. At the beginning of July 2016, Trump had 9, 6 million followers and Clinton had 7, 3 million. Both candidates had a consistent growth of their followers' since primaries began in February, respectively +37% for Trump and 27, 5% for Clinton. However, these data should be carefully considered, due to the fact that both candidates have been accused of buying fake followers in order to appear more popular.

TABLE 1. AVERAGE DAILY TWEETS PER MONTH

Average daily tweets	Clinton	Trump
October 2015	18,47	24,93
November 2015	14,33	18,1
December 2015	10,97	18,77
January 2016	16,77	14,52
February 2016	22,41	15,34
March 2016	16,03	12,87
April 2016	14,6	8,73
May 2016	11,23	10,45
June 2016	15,82	9,05
Average tweets Total	15,63	14,75

(Source: Author)

Table 1 shows the candidates' average daily tweets each month: Clinton tweeted on average 15, 63 times a day while Trump 14, 75. Considering the single months, we can't identify a specific correlation between Clinton's and Trump's data. In fact, there aren't specific months in which both candidates tweeted the most or the least. Moreover, the variance is pretty high for both, implying that they tweeted when they had something to say and not just to reach a predetermined amount of posts.

TABLE 2. AVERAGE OF DAILY FAVORITES AND RETWEETS (Source: Author)

Tweets/day	Clinton	Trump
Average Favorites	2487,26	8398,88
Average Retweets	1372,9	3160,08

Table 2 shows the average of daily favorites and retweets which confirm that, despite Clinton tweeted the most, it is Trump who on average gained the most favorites and retweets. The difference is really consistent, with the Republican candidate obtaining +130% retweets and +238% favorites compared to the Democratic one.

Table 3 and 4 show an in-depth time analysis of tweets, favorites, and retweets.

TABLE 3. TWEETS PER HOUR RANGE (Source: Author)

Tweets/hour range	Clinton	Trump
11.00am-2.00pm	319	750
3.00pm-6.00pm	979	700
7.00pm-10.00pm	1014	748
11.00pm-2.00am	1147	732
3.00am-6.00am	388	498
7.00am-10.00am	1	150

TABLE 4. FAVORITES AND RETWEETS PER HOUR RANGE (Source: Author)

	Clinton		Trump	
	Average of		Average age of	
Hour range	Favorites	Retweets	Favorites	Retweets
11.00am-2.00pm	2084,54	1147,81	8843,5	3296,65
3.00pm-6.00pm	2772,61	1737,48	8483,9	3398,17
7.00pm-10.00pm	2165,64	1187,99	9003,86	3494,95
11.00pm-2.00am	2616,95	1302,73	8428,09	3039,51
3.00am-6.00am	2560,30	1331,3	6896,93	2475,12
7.00am-10.00am	641	387	7606,03	2558,73

As Table 4 proves, the best time for Clinton to tweet was between 3PM and 6PM. In fact, during this hour range she got on average the most favorites and retweets. On the other side, for Trump, the most profitable time to tweet was between 7PM and 10PM. Moreover, Table 4 shows that, while Trump tweeted the most in the hour-range in which he got the most interest, Clinton tweeted the most between 7PM and 2AM and this could have had a negative impact on her retweets and favorites.

Table 5 and 6 respectively show the influence of links and media on retweets and favorites.

TABLE 5. INFLUENCE OF LINKS ON RETWEETS AND FAVORITES

	With Links		Without Links	
	Average of favorites	Average of retweets	Average of favorites	Average of retweets
Clinton	2241,27	1308,23	2751,83	1442,46
Trump	6766,69	2949,72	8859,87	3219,49

(Source: Author)

TABLE 6. INFLUENCE OF MEDIA ON RETWEETS AND FAVORITES

	With Media		Without Media	
	Average of favorites	Average of retweets	Average of favorites	Average of retweets
Clinton	2581,79	1340,39	2446,42	1386,95
Trump	9453,52	3845,89	8166,95	3009,26

(Source: Author)

Table 5 surprisingly shows that including links in their tweets didn't increase the retweets and favorites for neither candidate. On the other hand, Table 6 highlights that media embedding had a positive effect for Trump (+15, 8% favorites and +27, 8% retweets on average) while for Clinton there was almost no change between the two scenarios.

To sum up, we can say that a tweet with a media has a stronger impact on the users' response than a link, thanks to its immediacy and direct engagement (but in our case this is true only for Donald Trump).

Table 7 shows that Trump's most used hashtags are related to himself (#Trump2016,#votetrump), his campaign (#MakeAmericagreatAgain is his slogan) and his political party (#GOPdebate). On the contrary, Clinton's most used hashtags are related to both the democratic and the republican debates (#DEMdebate, #DEMTownHall, #GOPdebate) and to her campaign (#Imwithher is her slogan), while surprisingly there's no frequently used hashtag related to her name (like for example #HillaryClinton or #Clinton2016). Moreover, Table 8 shows that, on average, the presence of hashtags has a negative influence on both Trump's and Clinton's favorites and retweets.

TABLE 7. MOST USED HASHTAGS

Clinton		Trump	
Hashtag	N° Time used	Hashtag	N° Time Used
#DEMdebate	222	#Trump2016	475
#GOPdebate	172	#MakeAmericagreatAgain	327
#ImWithHer	142	#voteTrump	99
#DEMTownHall	56	#GOPdebate	36

(Source: Author)

TABLE 8. INFLUENCE OF HASHTAGS ON RETWEETS AND FAVORITES (Source: Author)

	With Hashtags		Without Hashtags	
	Average of favorite	Average of retwe	Average of favorites	Average of retwee
Clinton	1450,06	941,21	2893,51	1541,99
Trump	7783,98	2998,46	8630,17	3220,87

TABLE 9. REPLIES AND RETWEETS COUNT (Source: Author)

	N° Retweets	N° Replies
Clinton	848	124
Trump	96	10

TABLE 10. ACCOUNTS RETWEETED THE MOST (Source: Author)

Clinton		Trump	
Account retweeted	N° time used	Account retweeted	N° Time used
@TheBriefing2016	179	@EricTrump	14
@HillaryforNH	67	@DonaldJTrumpJr	7
@HillaryforIA	32	@JoeNBC	5
@HFA	25	@AnnCoulter	4
@HillaryforSC	24	@CLewandowski_	4

TABLE 11. ACCOUNTS REPLIED TO THE MOST (Source: Author)

Clinton		Trump	
Replied to	N° time	Replied to	N° time
@HillaryClinton	105	@elizabethforma	2

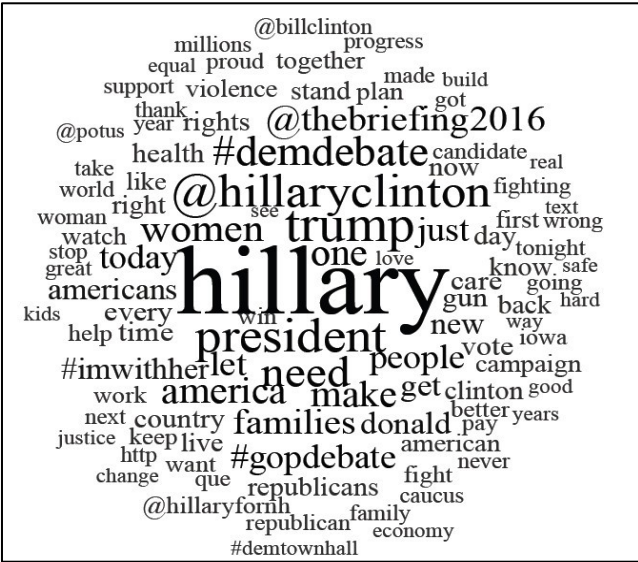
Table 9 shows that Clinton retweeted and replied to other accounts far more compared to Donald Trump (+783% retweets and +1140% replies). If we take a closer look to the account being retweeted by the two candidates we discover that Clinton retweeted for the most part accounts related to her campaign while Trump returned tweets from his sons, journalists, and TV hosts. Interesting it is also the fact that Clinton replied almost entirely to herself. This "reply-to-yourself behavior" could represent a shift in the way we view the tweet itself. In fact, when you can easily string tweets together, the 140-character limit becomes meaningless.

Putting together all data, the main trend that emerges is that, while Clinton had the most tweets/day, retweets, replies, media, links and hashtags, Trump had the most retweets and favorites. How can this be explained? We can't just say that Trump's higher success is due to his higher number of followers. First of all, different studies show that he has the higher number of fake followers and secondly a tweet can be liked and retweeted also by a person who is not following the account which posted it. Moreover, it must be clear that there's no evidence that more retweets and favorites lead to more vote and this is not what we are trying to imply. It's simply curious that, despite Clinton's intense use of all Twitter's functions commonly associated with a higher success [36], at the end

of the day it is Trump who brings home the most favorites and retweets.

4.2. Qualitative tweets analysis

Nvivo allowed us to perform word frequency analysis, which showed the most used words in a given text. All tweets collected for each candidate were uploaded in Nvivo and analyzed. Figure 2 and 3 show the results of the



queries:
FIGURE 2. CLINTON’S WORD CLOUD (Source: Author)



FIGURE 3. TRUMP’S WORD CLOUD (Source: Author)

The two word clouds show in a catchy way the candidates’ most used word, with the font size indicating their frequency of use. As we could expect both tweeted the most about themselves, with Trump writing “@realdonaldtrump” 704 times and Clinton writing “Hillary” 994 times. For the purpose of this analysis, in Table 12 and 13 we will group those words into general categories, referring to:

- Verbs (words that suggested action);
- America (words that were patriotic, spoke about the country);
- Time (references to today, yesterday, tomorrow and

- the like);
- Opponent (references to another candidate);
- Personal (references to the candidate making the tweet, usually a name or a personal attribute);
- Media (such as TV channels and newspapers).

TABLE 12. TRUMP’S MOST USED WORDS (Source: Author)

Trump	
Categories	Words
Verbs	Thank, make, get, like, vote, going, win, want, love, see, show, enjoy, watch, interviewed, support, join, got, need, won, run, made, beat
America	#makeamericagreatagain, America, Iowa, country, Carolina, New Hampshire
Time	Tonight, time, night, today, tomorrow, morning, day, soon, year
Opponent	Hillary, Cruz, Ted, Rubio, Clinton, Jeb, Marco, Obama, Bush, @jebbush, Carson, Kasich
Personal	@realdonaldtrump, trump, #trump2016, donald, republican, #votetrump, gop
Media	@foxnews, @CNN, media, @megynkelly

TABLE 13. CLINTON’S MOST USED WORDS (Source: Author)

Clinton	
Categories	Words
Verbs	Thank, make, need, get, vote, like, let, want, win, going, watch, know, care, love, see, keep, support, got, work, made, stand, help, take, join, fight
America	America, country, Iowa, Americans, America, New Hampshire
Time	Time, now, today, tonight, day, night, years, year
Opponent	Trump, @realdonaldtrump, #trump2016, donald, cruz, #gopdebate, republican, ted, rubio, republicans, gop
Personal	Hillary, @hillaryclinton, #demdebate, clinton, @thebriefing2016 #imwithher
Media	@foxnews, @CNN

As the two tables highlight, and contrary to what may seem from the word clouds, the 2 candidates’ most used words are very similar in all categories taken into account. In fact:

- Both tend to write a lot about themselves, using their account, their name and surname and hashtags related to them;
- Both wrote many times about their opponents but,

while Trump, as we could expect, mentioned Clinton and his Republican competitors, Clinton also mentioned more the Republican candidates compared to his direct competitor in the democratic primaries (Bernie Sanders);

- Both used words which refer to temporally close moments (tonight, today, tomorrow);
- Both tweeted a lot about America and states like Iowa and New Hampshire (which were the first two states in which primaries took place);
- Both mentioned CNN and Fox News, with Donald Trump talking also about media in general and Megyn Kelly, a journalist with whom he had a famous quarrel;
- Finally, regarding verbs, they both used words which remind action and change like: make, let, going, get, got, work, made, join, fight, run, vote. Moreover, they frequently use the verb “thank” to show gratitude to people who vote or endorse them.

Word trees (figures 4 and 5) depict multiple parallel sequences of words. They are used to show which words most often follow or precede a target word (e.g., "Clinton is...") or to show a hierarchy of terms (e.g., a decision tree). They enable rapid querying and exploration of bodies of text. We have exploited this tool to understand which words, sentences, and concepts each candidate associates the most to the opponent.



FIGURE 4. CLINTON'S WORD TREE – HOW TRUMP TALKS ABOUT HER

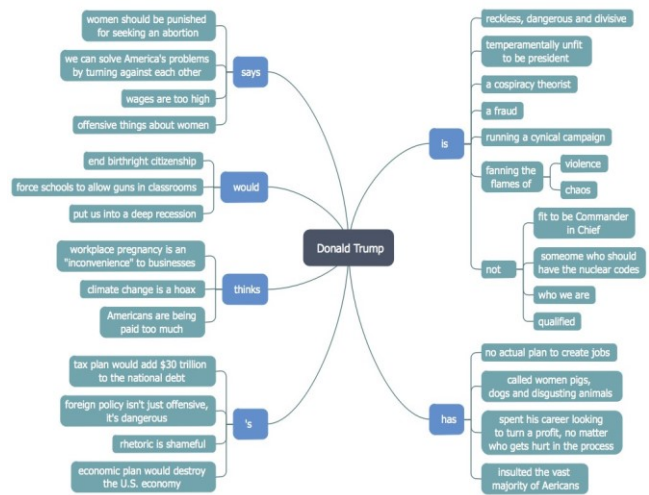


FIGURE 5. TRUMP'S WORD TREE – HOW CLINTON TALKS ABOUT HIM

Figure 4 and 5 give us an in-depth look on what Clinton bases her attack on Trump and vice versa. Starting from the Republican nominee's tweets, Clinton is described most as dishonest, not qualified, corrupted politician, who wants to abolish the Second Amendment (which protects the right of the people to keep and bear arms) and allows illegal immigrants into the country. Moreover, she's accused of having no talent, no leadership ability, and no judgment. On the other side, Trump is described as dangerous, reckless, divisive and for these reasons unfit to assume a role which requires handling critical situations. Also, he's accused of having dangerous political ideas like punishing women for seeking an abortion, authorizing guns in schools, denying climate change, and reducing wages.

4.3 Content analysis

The final part of our analysis consisted into assigning each tweet to a specific category to understand in which proportion candidates use Twitter to talk about different topics and themes. The categories proposed were not predetermined but emerged during the reading and were finally identified into:

- Attack: tweets which consist into attacking people who expressed opinions against candidates or criticized them. Example: “*Crooked Hillary Clinton is a fraud who has put the public and country at risk by her illegal and very stupid use of e-mails. Many missing!*” – Donald Trump;
- Compliment to others: tweets candidates write to express their support, gratitude, respect, and admiration toward other people. Example: “The POLICE in Paris did a fantastic job. Very brave - not easy!” – Donald Trump
- Endorsement/compliment from others: retweets of endorsement and/or compliments received or tweets candidates write to thank people for their endorsement/compliments. Example: “@NYTimes on Hillary: *“One of the most broadly and deeply qualified presidential candidates in modern history.”*” - Hillary Clinton;

- Event reminder: tweets candidates write mostly to remind people their TV appearance, events participation or voting places and hours. Example: “I will be interviewed by @LouDobbs tonight on @FoxBusiness 7PM ET” – Donald Trump;
- Issue: tweets written by candidates to express their position and opinion on specific political issues. Example: “*It's a simple idea: Those who have benefited the most from our economy should pay their fair share in taxes.*” – Hillary Clinton;
- Self: tweets candidates write to talk about themselves, their campaign, aims, and achievements. Example: “*I am not a single-issue candidate and I do not believe we live in a single-issue country.*” – Hillary Clinton;
- Thank: tweets candidates write to thank their supporter and people who voted for them. Example: “*Thank you New York, and Pennsylvania! #Trump2016*” – Donald Trump;
- Other: tweets which don't fall into any of the previous categories. Example: “*So much to be thankful for. Wishing a happy Thanksgiving to you and yours.*” – Hillary Clinton.

Tweets of both candidates were all divided into these categories. When a tweet could possibly belong to multiple classes it was assigned to the predominant one. For example, this tweet written by Hillary Clinton: “*Donald Trump said women should be punished for seeking an abortion. That's not a distraction, it's a disgrace*”, refers both to an issue (abortion) and an attack to his rival Trump. However, it's evident that the tweet was written more with the aim to criticize Trump's position than to express her own.

TABLE 14. TRUMP'S TWEETS PER CATEGORY

Trump		
Category	N° tweets	%
Attack	1508	42,15%
Compliment to others	74	2,07%
Endorsement/compliment from others	336	9,40%
Event reminder	442	12,35%
Issue	105	2,93%
Self	491	13,72%
Thank	492	13,75%
Other	130	3,63%

(Source: Author)

TABLE 15. CLINTON'S TWEETS PER CATEGORY

Clinton		
Category	N° tweets	%
Attack	952	24,74%

Compliment to others	148	3,85%
Endorsement / compliment from others	316	8,21%
Event reminder	243	6,31%
Issue	1164	30,25%
Self	620	16,11%
Thank	243	6,31%
Other	162	4,21%

(Source: Author)

Tables 14 and 15 show the result of the categorization and highlight significant differences between the two candidates. A vast majority of Trump's tweets (42, 15%) is represented by attacks to other people, not just politicians but also journalists, TV hosts, actors, musicians and anyone else who ever publicly criticized the Republican candidate. The New York Times has published and constantly updated a list of all people Trump has insulted on Twitter, which can be found at the following link:

http://www.nytimes.com/interactive/2016/01/28/upshot/donald-trump-twitter-insults.html?_r=0.

Beyond attacks, in 13,75% of his tweets, Trump talks about himself, mostly the fact that he's the only candidate who can “*make America great again*”, defeat terrorism, contrast illegal immigration and self-found his campaign. Almost the same amount of tweets is then dedicated to thank followers for their support and/or vote, while 12,35% of tweets were written to remind people about event participation (rallies, TV appearances, etc.).

All other categories were less represented, varying from 9, 40% of endorsement to 2, and 07% of compliments to others.

On the other side, Clinton adopted a completely different strategy, talking most of all about political issue and her positions on them (30, 25% of total tweets). From education to healthcare, from women's rights to gun control, Clinton dedicates almost a third of her tweets expressing the key points of her political agenda. A consistent amount of tweets was also dedicated to attack other people (almost entirely Republican candidates) but they were almost a half compared to Trump's ones. The Democratic nominee also devoted 16, 11% of her tweets talking about herself and the reasons why she would be the best president. Far behind these three most represented categories are all others, with “*compliments to others*” being the least used as for Trump.

TABLE 16. TRUMP'S AVERAGE RETWEETS AND FAVORITES PER CATEGORY

Trump		
Category	Average Retweets	Average Favorites
Attack	6227	15574
Compliment to others	3735	11094
Endorsement / Compliment from others	3285	9080
Event reminder	2383	7633
Issue	5077	12794
Self	4448	11273
Thank	3430	9852

(Source: Author)

TABLE 17. CLINTON'S AVERAGE RETWEETS AND FAVORITES PER CATEGORY

Clinton		
Category	Average Retweets	Average Favorites
Attack	3331	5181
Compliment to others	3152	5209
Endorsement / Compliment from others	2341	5023
Event reminder	1271	2096
Issue	2877	5945
Self	3626	8265
Thank	1737	4773

(Source: Author)

Besides the proportion in which candidates talk about different arguments, it's interesting to see which categories on average receive the most favorites and retweets. Table 16 highlights that Trump's tweets which receive the most interest from his followers are the ones in which he criticizes or attacks other people, often tying their names with negative adjectives like "crooked Hillary", "lying Ted", "low-energy Bush". These associations are repeated in multiple tweets with the aim to sediment in people's mind the idea that his opponents really hold these negative features. And followers seem to appreciate.

On the other side, Clinton received most retweets and favorites when she talked about herself and her campaign, while issues she wrote most about received on average far less interest. This implies that Twitter users appreciate far more catchy and controversial tweets compared to flat statements regarding political issues. The fact that Trump received a lot of interest also when he talked about issues is probably due to the fact that he always made bold statements like: "In my speech on protecting America I spoke about a temporary ban, which includes suspending

immigration from nations tied to Islamic terror.", which arose the interest of the Twitter community and triggered debates.

Beyond the average retweets and favorites, each category received it's also interesting to see which tweets gained the most interest among all, regardless the category they belong to. Table 18 and 19 show us the most retweeted tweets and the total number of retweets they got.

TABLE 18. CLINTON'S MOST RETWEETED TWEETS

Clinton	
N° retweets	Tweet
480251	Delete your account. https://t.co/Oa92sncRQY
55502	RT @POTUS: Gun violence requires more than moments of silence. It requires action. In failing that test, the Senate failed the American
43996	RT @BernieSanders: America's first black president cannot and will not be succeeded by a hater who refuses to
38859	To every little girl who dreams big: Yes, you can be anything you want%ÙÓeven president. Tonight is for you. -H https://t.co/jq7fKlFwGV
35754	Hi. https://t.co/11Fyyf5IQm

(Source: Author)

TABLE 19. TRUMP'S MOST RETWEETED TWEETS

(Source: Author)

Trump	
N° retweets	Tweet
171596	How long did it take your staff of 823 people to think that up--and where are your 33,000 emails that you deleted? https://t.co/gECLNtQizQ
84084	Happy #CincoDeMayo! The best taco bowls are made in Trump Tower Grill. I love Hispanics! https://t.co/ufoTeQd8yA https://t.co/k01Mc6CuDI
39708	Is President Obama going to finally mention the words radical Islamic terrorism? If he doesn't he should immediately resign in disgrace!

36362	Obama just endorsed Crooked Hillary. He wants four more years of Obama but nobody else does!
28835	What has happened in Orlando is just the beginning. Our leadership is weak and ineffective. I called it and asked for the ban. Must be tough

Clinton’s most retweeted tweet ever was “Delete your account”. The message was obviously addressed to Donald Trump, which spent months denigrating her on every social media and it translates roughly as your tweet or opinion is so bad that you should be immediately disqualified from further participation on the platform. After a long primary campaign in which Trump used Twitter to pump out an endless stream of taunts at rivals and gobble up news coverage, Clinton’s campaign rolled out a strategy to turn the presumptive GOP nominee’s own words against him — with some sly sarcasm and snark. In fact, the tweet may appear off the cuff but was actually planned and edited well in advance, making the Clinton-Trump war on Twitter an extension of the contrast between their distinct political styles: staff-driven and tightly scripted versus shoot-from-the-hip, aggressive and biting. “The Clinton campaign is particularly good at planning to be spontaneous,” says Twitter spokesman Nick Pacilio. Anyway, the idea worked well because the tweet was not just the most retweeted ever but was also taken up by almost every journalist of TV host who is covering this election, giving Clinton’s Twitter account great visibility and media coverage.

Other Clinton’s tweets which gained great success were a retweet of an Obama’s tweet asking for gun control after the Orlando shooting and one of a Sander’s tweet accusing Trump for not condemning the KKK. Also, the tweet Clinton wrote after a woman gained for the first time the nomination of a major political party was among the most appreciated ones. Finally, her fifth most retweeted tweet was “Hi.”, followed by a link which redirects to the message shown in figure 6.

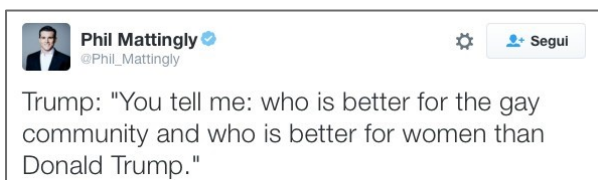


FIGURE 6. PHIL MATTINGLY’S TWEET ON DONALD TRUMP

The tweet is a funny way to say “Hey, here I am. I’m better than Trump”. The irony was well appreciated by her followers, who rewarded her with more than 35k retweets.

On the other side, Trump’s most retweeted tweet is the response to Clinton’s “Delete your account” in which he accused her of having all her staff thinking about that tweet and pulled out the scandal of the emails she deleted. The

second most retweeted tweet is a message (shown in figure 7) Trump wrote for the “Cinco de Mayo”, which is a Mexican celebration held on May 5 to commemorate the Mexican Army unlikely victory over French forces at the battle of Puebla in 1862. In the United States, however, Cinco de Mayo has taken on a significance beyond that in Mexico and has become associated with the celebration of Mexican-American culture. There are at least two interesting elements in this tweet which made it so popular. First, the fact that Trump spent most of his campaign attacking Mexicans and saying he wants to build a wall between the U.S. and Mexico, so it felt both hypocritical and funny that he wrote “Happy #CincoDeMayo!” and “I love Hispanics!”. Second, the photo itself and the quote “The best taco bowls are made in Trump Tower Grill” were quite hilarious and showed the candidate during a normal action – while eating – bringing him closer to common people.

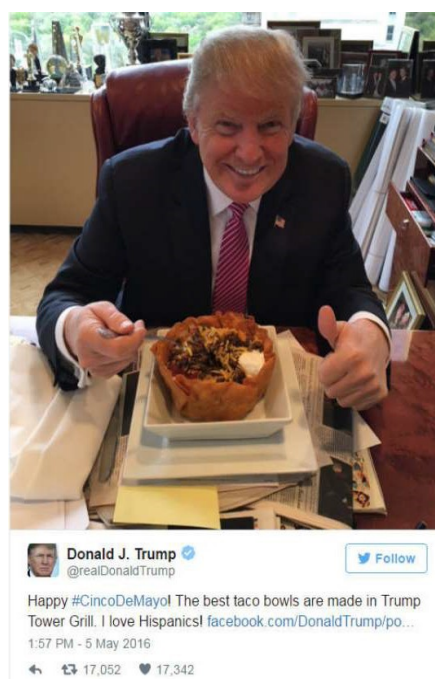


FIGURE 7. TRUMP’S TWEET FOR CINCO DE MAYO

The other Trump’s most retweeted tweets are all attacks to Obama, for his endorsement to Hillary Clinton and for his leadership, in Trump’s opinion too weak to contrast Islamic terrorism.

5. CONCLUSION

The main result that emerges from the previous analysis is that Clinton’s and Trump’s strategies differ both in quantitative and qualitative ways and these differences are emblematic of the divergences in their personalities and attitudes. Even if it’s obvious that candidates don’t tweet by themselves (at least not on a daily basis) it must be given credit to their social media staffs to have implemented Twitter campaigns which really reflect the candidates, their style, and attitudes. The social media is not used to make them look different from what they are but contrarily

highlights and focuses on candidates' peculiarities. Consistency, diplomacy, strong orientation on political issues and a little sarcasm characterize Clinton's tweets as they characterize the person. On the other hand, the aggressive, controversial and direct style which distinguishes Trump, in reality, is perfectly replicated in his tweets.

What also emerges from this work is that their Twitter strategies, even if different, reach both candidates' purposes. For Trump, this was mainly to be perceived as a fresh and unconventional candidate which can bring real changes and isn't afraid of not being politically correct. Moreover, his controversial tweets, far from being impulsive acts, are in fact the perfect example of another major Trump's purpose, which is making people (mostly the media) talk about him. This is particularly evident in a tweet he posted after his wife's speech during the Republican National Convention. By any reasonable measure, Melania Trump's speech was considered a failure since the only thing anyone remembered afterward was that it essentially copied a paragraph of Michelle Obama's 2008 Democratic National Convention address. To Donald Trump, however, it was a smashing success (see figure 8).

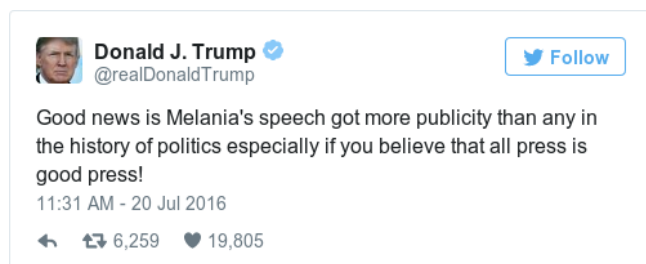


FIGURE 8. TRUMP'S TWEET ABOUT MELANIA'S SPEECH

Donald Trump, of course, truly does believe that "*all publicity is good publicity.*" It's how he's conducted his entire career. "*One thing I've learned about the press is that they're always hungry for a good story, and the more sensational the better*" he wrote in *The Art of the Deal* in 1987. "*If you are a little different or a little outrageous, or if you do things that are bold or controversial, the press is going to write about you.*" What, exactly, "the press is going to write" is of secondary concern to Trump. Despite his whining on his Twitter account about "unfair" coverage from certain news outlets, it's clear that the worst thing for Donald Trump is not to be written about at all. Trump's ability to get free media isn't just a personal point of pride, it's an important part of his presidential campaign strategy. Trump won the Republican presidential nomination by doing basically none of the things candidates are supposed to do to turn out voters. He simply relied on the media he was getting, and the excitement of his rallies, to inspire supporters to turn out to caucuses and primaries. And when Trump was running against 17 other Republicans for the nomination, all of whom were struggling to differentiate themselves from each other, that strategy worked. He was a well-exposed person before the election, of course, but his popularity on Twitter has grown dramatically since he announced his presidential run. The first measure of that

popularity is how many followers he has gotten. Back in August 2015, Trump had more followers than any other presidential candidate except Hillary Clinton. But by late September, he had also surpassed the Democratic frontrunner.

Another purpose Trump tried to reach through his Twitter campaign is to be perceived as a spontaneous and frank candidate, unlike most politicians who prefer to always be moderate and politically correct. Ivanka Trump told Fox News host Greta Van Susteren: "*You know, in a lot of politicians' campaigns, they don't write their tweets, they're managed by a team of 50 people who are testing and polling every word. That's not him. That's not the leader he wants to be*". In reality, it's almost impossible to believe Trump write all the tweets by himself but the fact that his collaborators maintain his particular style when tweeting is indicative of the importance they place on reinforcing his image of spontaneity.

On the other hand, Clinton main purpose was to be seen as a solid and experienced candidate, which has an awareness of the country's issues and knows how to deal with them. This is evidenced mostly by the high percentages of tweets she dedicated to political issues. However, her most liked and retweeted tweet is an attack to Donald Trump, suggesting that her followers appreciate also when she turns a little bit more aggressive toward her opponent.

This consonance between the Twitter strategy and the candidate is really important because, as we previously argued, in the 2016 presidential election Twitter had an unheard-of relevance. The importance Twitter exercises is proved also by the fact that both Michelle Obama and Hillary Clinton talked about it in their speeches during the Democratic National Convention. The DNC always has a huge media importance and coverage because, within a few days, it sees the alternation of speeches given by the most important leaders, exponents, and celebrities which support the Democratic Party. Michelle Obama, in a passage of her celebrated speech, said about Trump: "*I want someone who understands that the issues a president faces are not black and white and cannot be boiled down to 140 characters. Because when you have the nuclear codes at your fingertips and the military in your command, you can't make snap decisions. You can't have a thin skin or tendency to lash out. You need to be steady and measured and well-informed*". Also, Clinton used Trump's bullying behavior on Twitter to attack him: "*A man you can bait with a tweet is not a man we can trust with nuclear weapons*". These two citations, the most relevant among others, show that, as Twitter represent the thoughts and style of the candidates, it can also be used against them. Unlike speeches, in fact, tweets are written and thus cannot be denied (as politician often does with the things they said).

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PART II. CONFERENCE PAPERS

LISTEN TO THE NETIZEN: A GOVERNMENT APPLICATION OF INTERNET PUBLIC OPINION ANALYSIS IN TAIWAN

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Approximately 74% population of Taiwan has had the Internet experience, the number of Taiwanese Internet users is more than 17 million in 2014. With the rising tides of web 2.0, about 61.4% Taiwanese netizens regularly make use of blogs, social media and bulletin board systems (BBS) to share information and express opinions on the Internet. In addition to the traditional channels such as telephones and newspapers, the Internet has been emerging as the most challenging source of public opinions. The existing practice and literature, however, appear insufficient to provide systematic insight for conducting Internet public opinion analysis (IPOA). Fortunately, the new wave of Big Data Analytics (BDA) has shed light on alternatives to the previous concern. Big Data is an evolving concept that refers to the growth of data and how it is used to optimize business processes, create citizen value, and mitigate risks. As the data science has continued to progress, several BDA initiatives have recently emerged in public sectors within countries. In short, BDA gives us a new lens to explore new information which is hidden behind the huge volume of digital data.

In order to figure out a proper process for analyzing Internet public opinions on public policy, Taiwan eGovernance Research Center (TEG) initiated a research project in 2014 which was supported by National Development Council (NDC) of the Executive Yuan of Taiwan. The prototyping approach of this project was conducted from May to November of 2014, the research team collected and analyzed unstructured internet public opinions regarding Free Economic Trade Zone (FETZ)¹ charged by NDC that serves as planning and evaluation of economic and social development policy. Since March 2014, the FEPZs initiative was submitted to the Legislative Yuan of Taiwan for legislative review and approval hence it drew substantial public attention in Taiwan. Especially in the same period a huge protest movement conducted by students was also marched between March and April. The students declared the ruling party's lawmakers who unilaterally passed of the Cross-Strait Service Trade

Agreement (CSSTA) had violated legislative procedures. The students occupied the Legislative Yuan of Taiwan nearly one month and gave rise to tensions between the society and the government. One of the major reasons for CSSTA and FEPZs controversy stems from its free trade agreement (FTA) with Mainland China, by which suspicion has been raised for possible loss of political independence due to increasing economic dependency on Mainland China. It was also noting that the core members and supporters of the student movement, coined as Sunflower Student Movement², heavily utilized the social media, such as YouTube and Facebook, to record and promote the movement. Working with the authors, NDC, therefore, recommended FEPZs as the policy issue that deserves exploration of how IPOA may help collect and analyze public opinions.

Partnering with one of private IPOA service providers of Taiwan, the authors closely worked with the public officials in NDC and revised the IPOA implementation processes contingent upon their onsite evaluation. Based on several rounds of experimental reports and face-to-face discussion, an iterative process of IPOA implementation was developed to transform public opinions on the Internet into meaningful policy-relevant information for public officers of NDC. The key action of IPOA witnessed in the process, as in Figure 1, include the following components.

- (a) Public officers in NDC worked with the authors and IPOA technical provider to propose and decide FEPZs-related subjects and keywords, as well as frequency and time frame of the follow-up IPOA reports. Due to various wordings by the general public on the Internet, based upon trials and errors method both NDC experts and the research team developed a set of subjects and keywords that can effectively collect netizens' comments relevant to the targeted policy FEPZs from various sources of Internet media including news websites, forums, blogs, and social

¹ Refer to the official website of Free Economic Pilot Zones (FEPZs): http://www.fepz.org.tw/en_index.aspx.

² Refer to the Wiki website of Sunflower Student Movement: http://en.wikipedia.org/wiki/Sunflower_Student_Movement

media such as Facebook, Twitter and PTT particularly popular in Taiwan.

- (b) In addition, public officers in NDC had also to specify key events and stakeholders (either individuals or groups) related to FEPZs. The step also expanded the Internet media specified above as the events and stakeholders of policy authority's special interest which were not be included by default.
- (c) Trial IPOA results, including volume and sentiment analyses, were produced for further examination and

discussion by the NDC officials, public relations managers, public survey professionals. The preliminary results were improved after this process.

- (d) The ultimate purposes of IPOA results interpretation should be linked to strategy making and follow-up actions. In the final stage, collective sense-making and brain-storming activities from high-ranked managers and decision makers significantly determined the actual efficacy of the overall IPOA implementation.

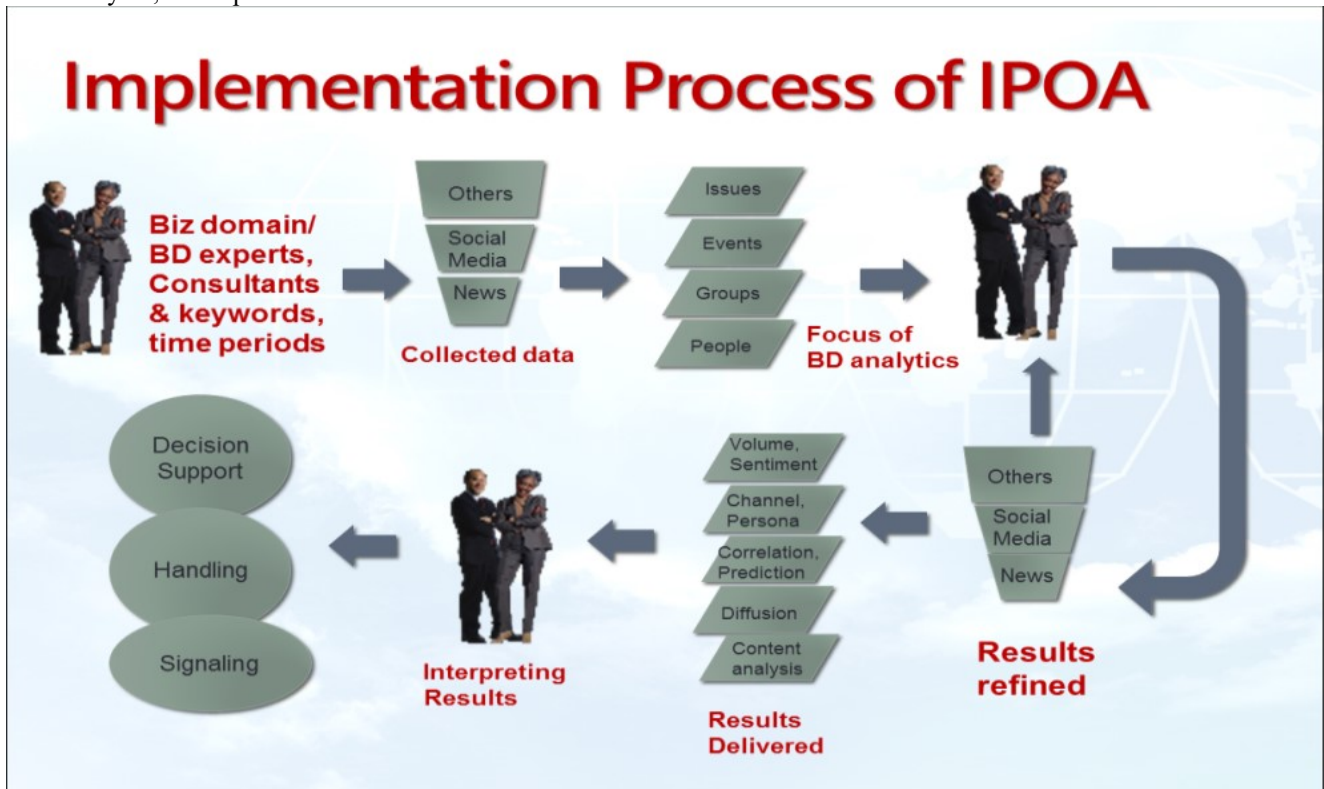


FIGURE 1: THE IMPLEMENTATION PROCESS OF IPOA

Weekly or bi-weekly reports were produced by the research team. The public officials in NDC closely worked with the research team and revised the IPOA implementation processes contingent upon their onsite evaluation. Besides, two rounds of focus group experts in various domains such as law, technology, public relations and political practitioners, were hosted to explore and resolve challenging issues along the prototyping process. The field experience contributes to the development of a step-by-step process to facilitate how career bureaucrats of policy domains interact with consulting professionals and the IPOA service provider. Unlike transaction-oriented information systems, developing IPOA is much similar to a decision support system that requires iterative communication and interpretation among three parties, including the service provider, the domain experts, and the public officers. Moreover, volume and sentiment analyses across time frames and media channels have effectively

provided fundamental insight for the public officials in charge of the policy issues.

Nevertheless, the IPOA results appear potential limitation while the policymakers aspire to dig into event correspondence and in-depth content related to the public attitudes and arguments toward the policy examined. Relevant issues deserve to be further addressed for a more rigorous IPOA with potential contribution to policy agenda identification. Particularly, explicit and implicit legal troubles mostly concern the public officials. Outsourcing and contractual arrangements also remain challenging for public agencies due to less and even lack of standardization and protocol. Lastly, we should continually introduce the state-of-the-art of BDA techniques to improve the research quality of IPOA, such as machine learning and crowdsourcing mechanism for better supporting the policy makers to listen to the netizens.

EVOLUTION OF E-GOVERNMENT IN THE LIGHTS OF IOT, BIG DATA, AND OPEN DATA

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Discussion among experts and audience during the 2nd APEC e-Government Forum and IAC Annual Meeting at Waseda University during September 28-29, 2015, in the session “Internet of Things, Open Data and Big Data” quoted the content for discussion as writing, “e-Government is evolved and the development will not stop. Some economies have had a high maturity level and completed the full e-Government lifecycle, from the initial stage to the connected stage. They may have a huge digital information as a result of their long story of e-Government implementation. This session will discuss the strategies to use the big amount of data to increase the quality of government services. This leads to the establishment of two professionals in data analytics arena; Data Scientist and Chief Data Officer. They are expected to provide institutions with the value-added on the data”.

The session concluded with the following challenges the governments around the world will try to tackle for leveraging their maturity with quality more than quantity under eco-system approach.

1. Major benefits for government to implement predictive analytics; collaboration between Open Data, Internet of Things, and Big Data

When a government sets target to reach, in traditional way most of the time budget allocation will be the very first point of discussion. In the to date world of the so-called “Internet Economy” things are changing in such a way that government has to use digital asset in term of data after long time slept quietly with only few use internally. Opening its data to citizens has proven success in creating new opportunities which lead to innovations that help boosting its economy’s GDP. In this regard, government can just improve its existing website or open up a new one where people can access easily to the well managed and meaningful data connected to its every available database. By doing so, its maturity level will be leveraged to the connected scenario. Together with the huge amount of data in the form big data, what has been accumulated in the social media and network activities, will make the government ready for implementing predictive analytics. Demands are ranging from an individual who would like to analyze traffic situation during rush hours, to the level of certain industry which would want to observe the country’s economic situation via a certain government open data while at the same time tracking customers’ consuming behavior from the open communities of social media platform. Concerns would lie upon those appropriate analytics tools which have to be simple and easy enough as needed by users counting from a single citizen to an engineer who performs such valuable analyses. With these

phenomena, the government has to encourage and welcome such applications development and host a platform where all walks of lives can access to share and use the developed applications. Eventually, the platform will serve as a service platform incumbent to all sort of internet related activities or the so-called “Internet of Things”. Benefits in many folds are obvious: the government will reach such mature e-Government development, citizens and businesses are well equipped with a digital environment where digital readiness lies and most of all the country will win the race in accomplishing the eco-system foundation.

2. How the Government to Use the Internet of Things for Public Service

The Internet of Things, though deployed already in some advanced governments is still new to many governments to realize its use and effects while the current “Internet Generation” folks have realized more or less in their day-to-day lifestyle and works. According to experts, IoT will influence governments’ direction in improving their public services to citizen when Broadband WiFi has been penetrated in ubiquitous pattern or here and there and everywhere throughout the country/economy. Key development agenda to move on includes citizen and business participation to help identify applications that help in their lifestyle and business betterment. Goals are still set among ease of use, cost reduction, social value and economic growth. Key success factors in the case of priorities are collaboration among data and systems, public-private partnership (PPP) for eligible business model and cloud integrated platform. Most importantly, quality of service is still key factor for sustaining the government services under the IoT condition. Above all, research on various angles of IoT applications are needed to best serve communities, both demographically and geographically.

3. Phenomenon of Chang in the CIO Core Competencies

There will be a certain extent of career evolution due to next decade of heavy data consumption, processing, and analysis when the government would need to have data expert in the form of “Data Scientist”, “Analytics Expert” and the “C” class namely CDO (Chief Data Officer). This phenomenon leads to a certain extent of change in terms of core competence as well as capacity building for CIOs. In short term, CIO has to be adaptable to learn more in know-how around big data for wise deployment in early stage. In long term, when intensive applications of open data already falling in a certain maturity stage, a CDO position may be in need to lead strategically over the data-driven government. In capacity building and intensive studies,

categorization on related programs to fit the manpower roles in accordance with whole process of data/information processing have to be reviewed to accommodate modern content of Big Data, Open Data, and IoT.

4. The Best Model to Implement the Capacity Building and HRD Program

In the new era of Internet Economy, government has to adopt a certain degree of change as well as reform which are in recent years prevalent among the leading countries/economies and capacity building and HRD are among priorities to take into account, in harnessing such emerging technology related initiatives like Big Data, Open Data and IoT. In the case of Thailand as an active member of APEC and IAC, a new round of education reform has been highlighted in its government policy to move forward for entering Digital Economy, absolutely aiming at progressive growth of GDP and increasing business competitiveness. The country's ICT infrastructure will be leveraged to cloud-based service with high-speed internet accessible country-wide while public sector services to citizens will be standardized as required by ASEAN region's provision. The IoT activities are also laid down to be promoted in the development roadmap in the ahead decade. Therefore, in the foreseeable development scheme toward the internet/digital economy of countries not only

Thailand but all over, will need the best model to implement the capacity building and HRD program in preparing their readiness of digital people in succeeding the goal and best practices implemented by the early adopters in the rings of APEC, OECD and IAC cooperation can be role models for economies in the following tiers.

To conclude, emerging technologies and related initiatives highlighted especially Internet of Things or IoT, Big Data and Open Data will be key considerations for government in improving public services to citizens. While IoT is evolving to cater citizens and businesses in living their lives and running online activities in entering internet economy, Big Data, through proper analytics tools can cater government agencies to know situation and respond rightly as demanding by their online customers/stakeholders, as well as Open Data can help promote innovations among citizens and businesses by releasing and sharing of valuable government data, it is about time government has to make use of such trendsetter technologies and initiatives by all means of convergence, collaboration, and integration. CIO roles and competencies plus capacity building at all levels of organization structure have to be reviewed wisely for government manpower readiness and cooperation among APEC, OECD and IAC members can help share the right model of development as needed by the later adopter.

DISRUPTIVE TECHNOLOGIES: TRANSFORMING HEALTH CARE, EDUCATION, AND GOVERNMENT

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ABSTRACT

Modern IT has changed our world dramatically during last years. We see how a number of traditional professions died, and how a number of new specialties and workplaces were born under pressure of new technologies. Technologies are moving so quickly, and in so many directions, that it becomes challenging to even keep in mind a general picture. In this article, we shortly discuss disruptive technologies and tried to formulate our vision how they could change the very core activities in every society – healthcare and education.

Keywords. Disruptive Technologies, Internet of Things, Big Data, Evaluation and Monitoring of Complex Processes, IoT Healthcare, Smart Learning in Education.

1. INTRODUCTION

The modern economy is technology-based and technology-driving in many respects. Following [2], we will articulate economical impact of disruptive technologies as a transformation the way we live and work, enable new business models, and provide an opening for new players to upset the established order. Examples of such technologies could be the semiconductor microchip, the Internet, or steam power in the Industrial Revolution. We agree with the MGI vision [2] that business leaders and policymakers need to identify potentially disruptive technologies, and carefully consider their potential, before these technologies begin to exert their disruptive powers in the economy and society.

The general picture of modern disruptive technologies is presented in [1]. Top-5 technologies with estimated potential economic impact across sized applications in 2025 more than \$1 trillion annually are: mobile internet (\$3,7 – \$10,8 trillions annually), Automation of knowledge work (\$5.2 trillion to \$6.7 trillion per year), Internet of Things (\$2.7 – \$6.2 trillions annually), Cloud technology (\$1.7 - \$6.2 trillions), Advanced Robotics (\$1.7 - \$4.5 trillions annually).

Internet of Things and Automation of knowledge work seems the most interesting from points of view: (1) impact to very fundamental activities in any society – health care and education, and (2) readiness-to-use. It means a very big impact in a very near future.

The rest of this paper is organized as follows: Section 1 proposes the main features of Internet of Things direction and case study from Neurosyntek (<http://sivpartners.com/wp-content/uploads/2012/12/NEUROSYNTEK.OnePager.pdf>) – Silicon Valley company with the most balanced and realistic vision of IoT

healthcare. Section 2 provides description of Automation of knowledge work direction and case study from Uchi.ru startup.

1.1. Internet of Things and Healthcare

The Internet of Things (IoT) is embedding sensors and actuators in machines and other physical objects to bring them into the connected world. IoT allows businesses and public-sector organizations to manage assets, optimize performance, and create new business models [3].

1.2. Internet of Things history and status

We can evolve the following important steps in Internet of Things (IoT) formation:

- 1999: Kevin Ashton (MIT), presentation for P&G - introduction of the term and concept (RFID for logistics);
- 2004: first article (Neil Gershenfeld, Raffi Krikorian, Danny Cohen. The Internet of Things. Scientific American, Oct 2004);
- 2008-2010: number of devices connected with the Internet became more than number of people on the Internet (IoT > IoP);
- From 2010: conference IoT under EC (commissars, professors, companies - SAP, SAS, Telefonica, Cisco, etc.);
- From 2011: Gartner select IoT as a «technology trigger»

With remote monitoring, the Internet of Things also has great potential to improve the health of patients with chronic illnesses and attack a major cause of rising health-care costs.

1.3. Internet of Things healthcare: NeuroSyntek case study

Features of data for IoT medicine are presented in Table 1.

TABLE 1. FEATURES OF DATA FOR IOT MEDICINE

Traditional medicine	IoT medicine
Data of medical analysis are precise and reliable	Data from mobile gadgets are inaccurate and susceptible to the environment
The diagnostic study is conducted for the discrete/ big time intervals, deep and based on a number of parameters	Data are available permanently, but the data are not deep. The number of parameters is limited
Subjective feelings can be discussed and clarified with the doctor	There is no possibility of dialogue with the doctor during the description of the state

The question is: what is the best for the diagnostic study (1) high-quality data rarely or (2) limited quality data permanently? If we see illness as a process (answer (2)), how we can manage this information?
 The company develops prototypes of systems for evaluation and monitoring of risks of cardiovascular disease [4] and prostate, based on technology for evaluation and monitoring of complex processes [5] and tested its. Levels of IoT Healthcare (Basic monitoring, Specialized monitoring, and Personalized monitoring) are discussed in the report.

2. AUTOMATION OF KNOWLEDGE WORK AND SMART LEARNING IN EDUCATION

Automation of knowledge work is a new enough direction based on advances in artificial intelligence, machine learning, big data, and natural user interfaces. McKinsey & Company, who have introduced this term, defines the “automation of knowledge work” as “the use of computers to perform tasks that rely on complex analysis, subtle judgments, and creative problem-solving.” [2].

2.1. Automation of knowledge work status

Overall, authors estimate the potential economic impact of knowledge automation tools in the types of work we assessed could reach \$5.2 trillion to \$6.7 trillion^[1] per year by 2025 due to greater output per knowledge worker. Knowledge work automation could have important effects

in education and health care, two large service sectors that are under pressure to improve productivity and quality. Knowledge work automation can augment teacher abilities and enhance or replace lectures with “adaptive” learning programs - dynamic instruction systems that alter the pace of teaching to match the student’s progress and suggest additional drills based on student responses. The economic impact of such tools in education would come from improving instructional quality and enabling teachers to provide more one-on-one attention and coaching. New self-teaching tools could also enable fundamental changes in scheduling: courses could be tied to subject mastery, rather than semesters or quarters, allowing students to progress at their own pace.

2.2. Smart learning in education: Uchi.ru case study

Cloud platform Uchi.ru allows to measure all student’s activities and results like time, number of right/ wrong answers, behavior (for example, playing with mouse, etc.); integration with PC/ tablet sensors, weather (Internet), and gadgets like health trackers, potentially allow to use a number of environment characteristics. Based on these initial measurements we can “calculate” current status of the students in terms of information processing capabilities, speed, attentiveness, endurance, and others. This understanding and personal history allow system to generate content which is optimal for the student for now. General presentation of Uchi.ru architecture is given in Fig. 1.

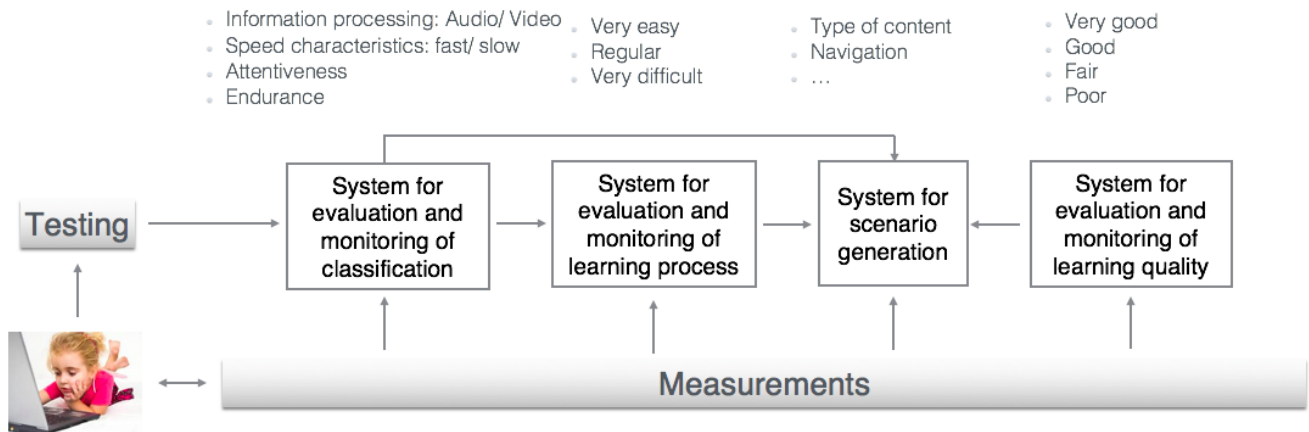


FIGURE 1. UCLRU ARCHITECTURE.

Features of initial measurements, their generalizations, fuzzy rule-based and similarity-based reasoning and adaptation, and application of personification and optimization technologies [6,7] have been discussed in the report.

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FROM INTERNET OF THINGS TO OPEN AND BIG DATA

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THE TECHNOLOGY LANDSCAPE

The Internet of Things (IoT) is being seen by many as the next industry revolution. The IoT market value forecasts are varied from various analysts and vendors. CISCO predicted the IoE value would be US\$14.4 Trillion by 2020 over a ten year period (i.e. average US\$1.44 trillion per year). Gartner predicted IoT product and service suppliers would generate incremental revenue of US\$300 billion by 2020. These predictions are changing with the continuously changing landscape.

We should anticipate that the predictions of IoT market growth will not be accurate. But the message is clear that the market is huge. CIOs and business leaders should establish IoT strategies for their organizations to stay competitive in the world of digital economy.

IDC defines IoT as “a network of networks of uniquely identifiable endpoints (or things) that communicate without human interaction using IP connectivity, whether locally or globally”. IoT is therefore, more than sensors, switches or System on a Chip (SOC). The IoT market can be classified into 7 segments, namely intelligent systems and devices, connectivity, platforms (device, service, and app enablement), analytics and machine learning, applications, IoT security and IoT professional services. IoT is therefore providing huge space for innovation.

IoT will be a great source in generating big data, especially from real-time data streaming devices and sensors. Together with the trend in government releasing data for business and public use (i.e. open data), organizations need to deploy data management, data analytics, machine learning etc. to better apprehend and derive high-value predictions for better decision making. Hybrid engineering capability (software engineering, hardware engineering, material science and engineering, etc.) will be needed to design and develop new products and services.

The Opportunity – A Singapore Experience

From a national perspective, the IoT, big data and open data have created an opportunity to re-energize the digital economy and digital society for the nation.

Here is a personal observation and opinion on how Singapore is re-inventing its e-Government program by building e-Government beyond the boundary of providing government e-services into improving lives of citizens by harnessing technology.

A Smart Nation program was launched by the Singapore Prime Minister in November 2014. It is an expansion and elevation of Singapore e-Government program. It is a rally

point in bringing everyone to engage in the government vision, goals, and plan to improve lives of citizens and to create greater opportunities for businesses and communities.

- It is a citizen-centric focus, in contrast against government-centric focus. This means the scope is expanded beyond the conventional e-government sphere of building trusted, efficient and effective public e-services.
- It is about improving lives through knowledge-driven smart public services using open data, IoT and big data, data analytics and machine learning.
- It is about automation of everyday life using IoT for home-automation, asset management (in terms of monitor, control and protect), transportation, environmental monitoring, intimate interaction with the government, and other aspects that provide an overall dramatic improvement of quality of living for citizens, including disabled and silver society.
- It is also about economy development with smart nation infrastructure, Industrial IoT, data ecosystem etc. to enable smart services, and at the same time nurture tech companies by immersing them in a start-up ecosystem.

The Singapore Smart Nation is an inclusive program which emphasizes co-creation amongst government, private sector and citizens. The Government Role is to lay the foundation by building the infrastructure, facilitating innovation and creating the ecosystem for business and citizen to participate, engage, experience and experiment. The key challenges facing the government are:

The IoT and Big Data Challenges

1. To build infrastructure and manage it cost effectively.
2. To establish IoT standards to enable seamless connectivity and data exchange.
3. To establish realistic test bed facility to bridge research to deployment gap and research to market gap.
 - e.g. In Singapore, the Jurong Lake District test bed will become a mini version of a "smart city" - with more than 1,000 sensors deployed to control and monitor everything from traffic to street lights, and crowded buses.

The Open Data Challenges

1. To maintain a balance between large number of little-use datasets and smaller number of high-quality datasets. The cost incurred to release a high-quality dataset with documentation, compliant to standards, and APIs is not a trivial sum.

2. The need to manage the complexity of data supply and data usage, such as manage demand against availability; motivate agencies to release data; establish policies on government-linked commercially owned datasets; manage data privacy; offer data mart (designed to serve a particular community of knowledge workers), manage data sharing and feedback, etc.
3. To facilitate applications development using open data and be sustainable in attracting customers and users.

Additional Smart Nation Challenges

1. To motivate and facilitate the industry, tech startups, and public agencies to innovate, develop, collaborate, co-create and implement sustainable smart products and services.
2. To nurture tech capability.
3. To provide incentive and organize accelerator programs to mentor tech startups to speed up the development of a new smart products and services industry.

An Example: Benefit of Predictive Analytics

1. Deployment of data analytics by the Land Transport Authority (LTA) has helped to map out commuter travel patterns and behaviour across Singapore, and to gain a better understanding of commuter patterns and traveling demand.
 - a) Bus planners can efficiently map out travel patterns, identify bus routes with higher loading and inject new bus routes and additional buses to improve bus frequencies.
 - b) This resulted in a 60% reduction in the number of bus services with persistent crowding despite annual increase in average daily bus ridership.
 - c) Average waiting time for popular bus services has also shortened by about 3 to 7 minutes.

Examples of Internet of Things, Big Data and Open Data

2. A huge data warehouse is built by the National Environmental Agency (NEA) by collecting real-time data from sensors installed throughout the nation on weather, air quality (PSI readings), water quality, lightning, flooding, dengue fever, etc. and mapping them over geometrical data. Together with NEA own apps, many popular phone apps are also developed by private companies.
3. More transport datasets have been released to the public via LTA Land Transport Data Mall. This includes real-time data on bus arrival timings, space availability, and taxi availability data. These apps are developed by LTA (e.g. MyTransport), industry and startups.

The Status of Singapore Open Data

1. Since 2011, the data.gov.sg portal has delivered more than 12,000 datasets contributed by over 60 agencies.
2. It is a conscious decision to be outcome-driven in releasing high quality, useful, well-managed and sustainable datasets (to avoid being quantitative driven).
3. About 10,000 metadata usages occur per month.
4. Currently, about 140 Apps are developed and offered in Apps Stores.
5. Under the Singapore Government Data Management policy, each agency shall appoint a Chief Data Officer (CDO). There are close to 90 data scientists/analysts in the government.

Singapore population 5,469m (residents 3.87m); The Singapore Public Service employs about 141,000 officers in 16 Ministries and more than 50 Statutory Boards.

CONCLUSION

Technologies are enablers for innovation such as smart nations, e-Government and Industry 4.0. The abovementioned technologies are just a tiny bit amongst a spectrum of human ingenious invention. Yet, technologies alone will not guarantee the success of implementation. The human factors are the key to all successful innovation. Facing the challenges created by globalization and digital disruptions, how best for humans to anticipate future needs when change is faster and less predictable?

ANOTHER POSSIBLE STEP IN THE TRANSFORMATION OF THE TELECOMMUNICATIONS SECTOR

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ABSTRACT

The operator of a major part of the national telecommunications infrastructure in the Czech Republic has recently become independent. The paper discusses the overall context and presents an attempt to universalize the implications.

Keywords. Telecommunications, operator, transformation, services, market, decrease, revenue, separation.

1. INTRODUCTION

The growth of the telecommunications sector in the last twenty years is unparalleled in the history of technology. The advent of the telegraph and telephone gave rise to organizations that operated the related infrastructure, which was vital to the economy of the state. Due to the requirement to extend these networks even to economically unviable areas, telecommunications monopolies were established. The parameters and volume of telecommunication services were determined administratively; there was no market for telecommunications.

The dismantling of the monopolistic telecoms began in the mid-1980s in the UK and USA, followed by the rest of Europe during the 1990s. The telecommunications market was fully liberalized around the year 2000.

The liberalization and deregulation of the telecommunications sector moved in lockstep with major technological advances. The resulting synergy was one of the main drivers of growth in the telecommunications market.

2. DEVELOPMENT OF THE TELECOMMUNICATIONS MARKET IN THE CZECH REPUBLIC

The move to introduce competition into telecommunications in Europe was initiated by the European Commission. In 1987, the Commission laid down a legislative framework, starting a ten-year process culminating in the liberalization of telecommunications services and networks in most EU countries in 1998.

The monopolistic telecommunications companies had to undergo significant organizational changes over a short period of time in response to the new legislation. These changes took place in four major steps:

- The separation of postal and telecommunications services;
- The transformation of the newly established (still state-owned) operator into a joint-stock company and its subsequent privatization;

- The institution of an independent regulator;
- And the opening up of the telecommunications market gradually to full competition – the most significant such measure was the granting of GSM operating licenses.

The development in the Czech Republic mirrored that in the rest of the world and in Europe and the Czech telecommunications market was fully liberalized in 2001.

Current (2014) penetration: mobile 136%; fixed decreased (from a peak of 36% around 2000) to 12%. In 2014, the total revenue of the Czech telecommunications services market amounted to about USD 4.2 billion. The incumbent telecommunications service provider had about a 50% share of the market; the market share of the second largest operator stood at slightly over 25% and the third mobile network operator's market share was about 15%. The combined market share of the remaining small operators was about 10% [1].

Mobile telephony represents the biggest part of the telecommunications market in the Czech Republic. In 2002, mobile telephony was responsible for about one-half of the total revenue of the Czech telecommunications market; ten years later, it amounted to almost three-quarters [1].

In the first years after 2000, telecommunication services were still to some extent associated with exclusivity, resulting in high prices. However, the emergence of competition and the pressure by the regulator on the operators to lower their prices led to a gradual decrease in unit prices. The decrease in the average revenue per user (ARPU) was not offset by an increase in subscriptions, resulting in a decline in the mobile telephony revenue [1].

If we compare the mobile telephony revenue in the Czech Republic for the years 2008 and 2013, we can see that the number of subscriptions rose 7%, but revenue dropped 42% and earnings before interest and taxes (EBIT) fell 48% [1]. The introduction of new services did not offset the decline in revenue.

3. SEPARATION OF THE RETAIL AND NETWORK OPERATIONS

Hot on the heels of the organizational changes mentioned above, came discussions about how to ensure non-discriminatory access to telecommunications network infrastructure to all players on the telecommunications market. This process was formalized in Europe at the end of 2007 by laying down rules mandating the separation of the retail and network operations mainly of incumbents.

A vertically integrated telecommunications company was required to establish a separate business division in a

process called functional separation [2] – the purpose is that all players on the market have equal access to the infrastructure.

In contrast, structural separation involves the transfer of network assets to a newly formed business so that the new companies, once established, function as separate and distinct entities. In case separate companies are formed, shareholders may be worried that the value of their shares might not be retained.

Many countries went down the route of separation. The separation of incumbent telecommunications service providers was pursued in UK, Italy, Poland, Sweden, Australia and New Zealand. However, in all of these countries, solutions were sought with the assistance, upon the initiative or according to rules laid down by national regulatory authorities.

In 2014, a two-thirds stake in the Czech incumbent telecommunications service provider was acquired by a Czech investment group that basically consists of one natural person. This facilitated the transformation of the operator and as a result, the company was split into two completely separate businesses effective from June 1st 2015 [3]. This was probably the first known case of voluntary structural separation in telecommunications, that is, a separation without any pressure from a regulator.

Two new telecommunications companies were established on that day with different lines of business:

- a retail operator with a 95% share of the fixed-line market and a 36% share of the mobile telephony market;
- and the wholesale operator of the nation's largest telecommunications infrastructure.

The business and management functions of the two companies are kept completely separate as are information support and control systems. The purpose of the new

infrastructure operating company is to provide network capacity to other operators on the Czech market.

4. CONCLUSION

The Czech telecommunications market has witnessed the formation of a separate telecommunications network operator who owns the largest infrastructure. The *raison d'être* of this entity is to provide connectivity to other operators on the market. Considering that the cost of operating networks is one of the major factors that affect the bottom line for telecommunications service providers, it can be advantageous for them to buy capacity from a telecommunications infrastructure operator. The number of networks connected can increase gradually. Fifth step of the telecommunications sector – return to the dominant network operator – will be done? Could we see a similar scenario to that which occurred in the railway sector, where infrastructure is now managed by a separate (state-owned) entity? This does not seem unrealistic and it certainly cannot be ruled out.

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TECHNOLOGY INNOVATION, NEW PATIENT'S BEHAVIORS, AND NEW HEALTH SERVICE PARADIGMS

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ABSTRACT

The authors present a positioning paper on the new healthcare marketing perspectives arising from recent technological developments in the healthcare industry, new patients' health behaviors and emerging health providers' value propositions.

This paper reviews literature and real life cases of new health information technology (HIT) advances in order to investigate the new health service models and to describe how the emerging healthcare paradigm is shaping communication and collaboration between users and providers.

In this scenario of continuous health-related innovations a new patient profile appears, different from the one traditionally conceived, who is willing to accept HIT applications and to switch to new and unconventional service delivery solutions in order to get a better service and care experience.

Major reengineering of healthcare services is now required to match patient's needs and it should be driven by a new powerful healthcare marketing approach, based on the full understanding of the new patients' value drivers and their involvement in the care process.

Keywords: Health 2.0, ICTs, Health Information Technology, Web 2.0, Patient 2.0, Patient-centered care.

INTRODUCTION

The World Wide Web, social media contexts and technology advances (e.g. mobile devices) have turned around the way people communicate with each other, broadening consumer ability to create and share product or service-related information (Labrecque et al. 2013).

ICTs have also transformed the healthcare industry and changed the relationship between patients and healthcare providers. Nowadays, new health service models arise, failing the traditional concept that medical care must be provided in hospitals and restricted to the sole patient-doctor relationship (Pralhad and Ramaswamy 2004). There are many ways that HIT can be used to improve the quality of care services. The web 2.0 technologies are becoming a forum for conversation and interactions between patient and doctor and among patients. Consequently, patients armed with the above new tools, appear to be more informed, networked, empowered, and active in their health care choices.

The purpose of this positioning paper is to show the emerging healthcare marketing perspectives in the light of a

new patient profile is emerging within the context of recent information and communication technologies (ICTs) developments.

METHOD

This research study was conducted to identify key published articles related to healthcare technology using the terms "Patient 2.0", "Health 2.0", "Web 2.0", "Telemedicine", "Mobile Health", "physicians", "participation in healthcare online", "social networking in healthcare", "patient empowerment", "virtual health communities". To retrieve published literature related to healthcare technology articles, we used electronic databases such as PubMed, Ebscohost, and Bocconi University library's online journal article database. Google, Google Scholar, Bing search engines and websites were also investigated. The search strategy was limited to articles that were published within the last twenty years in the English and Italian languages accordingly to health information technology developments.

A case study research was also conducted to provide a comprehensive technological roadmap based on healthcare organizations real life cases.

The conceptual framework guided the research in identifying the improvements and changes within the healthcare industry, from both providers and patients' sides, due to the impact of health information technologies advances.

The Emerging Patient Profile

Advances in communication technology have facilitated and partially caused a behavioral change in today's patients, leading to the so-called patient 2.0 phenomenon that also refers to the growing expectations on non-clinical care elements (Masters *et al.* 2010). This evolution is increasingly at the heart of healthcare, needing to reorient health systems toward new patients' expectations. Patient's behaviors and emerging healthcare habits are changing over time and can be summarized as follow:

- Patient education (Fox *et al.* 2000; Fox 2006; AlGhamdi and Moussa 2012);
- Patient empowerment (Nerney et al. 2001; Kjekken et al. 2006; Webb 2007);
- New patient-doctor communication dynamics (Eysenbach 2003; Forkner 2003; Masters et al. 2010);
- Engagement in health-related social media platforms (Charles et al. 2003; Eysenbach 2003; Eysenbach et al. 2004; Lober and Flowers 2011).

Patient Education

Today's patients want to know when, how, and why they need to make a lifestyle change (Cooper *et al.* 2001). They realize the benefits of health education: skill building and responsibility and get conscious that informed lifestyle choices, disease or condition better understanding improve health outcomes (Adams 2010). Patient education refers to an active patient self-management: educated patients interact with responsive health care teams, relying on better information and communication practices so that they become effective managers of their own health and they are willing to use technology applications to enable self-care (Coulter *et al.* 2008; Buccoliero 2010).

(See appendix – relevant case studies, Nos. 1, 2, 9, 10, 11, 25, 26, 27, 28, 30, 35, 41, 47; images Nos. 3 and 4).

Patient Empowerment

For years, patient empowerment has been subject of thinking and research. First discussions started in the mid-1990s (Saltman 1994). "The term "patient empowerment" describes a situation where citizens are encouraged to take an active part in their own health management and mainly deals with individual involvement in health decision making (Bos *et al.* 2008). Patients want to engage in dialogue in order to understand the risk-benefits of alternate modalities of treatment. Under this operating system, health care providers explain care alternatives to patients in order to provide patients the necessary resources to make informed choices about their healthcare that most closely aligns with their unique cultural and personal beliefs (Florin 2007). Therefore, patients and doctors get to reach a shared solution when they become equal and joint problem solvers. It is only with recent developments in the application of Internet, more specific Web 2.0, that patient empowerment becomes a "2.0" reality. Patient 2.0 Empowerment is the active participation of the citizen in his or her health care pathway with the interactive use of Information and Communication Technologies (Bos *et al.* 2008). ICTs enable patients to access to relevant, adequate and immediately usable health information simply "googling" the question (Dumitru *et al.* 2007) and to have a greater control over their own personal conditions of health (Nerney *et al.* 2001; Bellio *et al.* 2009) (Buccoliero 2010; Buccoliero Luca *et al.* 2013). They have access to more information than ever before, regardless of quality.

(See appendix – relevant case studies, Nos. 21, 22, 23, 35, 40, 41, 45, 46, 49; image No. 1).

New Patient-Doctor Communications Dynamics

Satisfaction with the doctor-patient relationship is a critical factor in people's decisions to join and stay with a specific organization (Goold SD and M 1999). Today's patients ask for direct and informal relationships with healthcare structures and professionals, also via non-traditional

channels. Examples of the ongoing needed methods of information exchange relate to direct messaging through a secure email (Yea *et al.* 2010) and apps for instant messaging (e.g. SMS) (Buschmann Iversen 2013).

(See appendix – relevant case studies, Nos. 1, 3, 4, 5, 21, 39, 41, 47, 49)

Engagement in Health-Related Social Media Platforms

Social networking is an effective means of communication in the modern-day world (Hennig-Thurau *et al.* 2013) and enables activities such as efficient interaction between physicians and patients and among patients. So, patients become 'active players' within the network, also by sharing their own health problems with others and seeking out information on the experiences of others (Eysenbach *et al.* 2004). Web sites facilitate the exchange of health information and personal stories in a way that transcends both medical textbooks and chatting with a friend on the phone, allowing the benefits of both: deepening knowledge and being supported from the community. Patients using Web 2.0 share connections through chat rooms and email and are able to build sophisticated virtual communities that enable them to share information about treatments (Sarasohn-Kahn 2008).

In conclusion, the emerging patients' behaviors can be perceived as a natural consequence of today's digital world developments and can be summarized as follow:

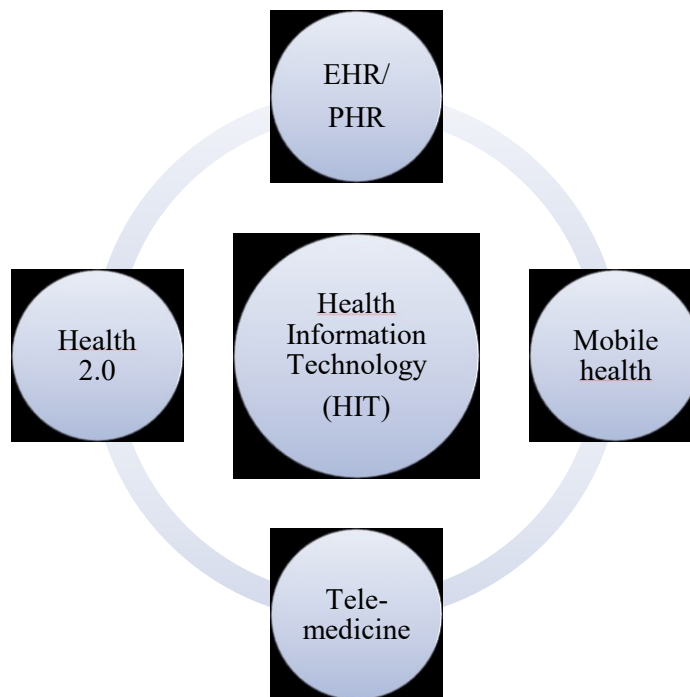
- The patient 2.0 is empowered: asks health practitioners to be involved in the decision-making process;
- The patient 2.0 is more connected: actively participates on online health-related communities to get information and support from other patients;
- The patient 2.0 is more informed: seeks health-related information online. The patient 2.0 wants an immediate communication via messages delivered almost in real time.

(See appendix – relevant case studies, Nos. 7, 8, 24, 35, 47, 48; image No. 5).

Healthcare Technology Advances: a Look at Recent Healthcare Management Trends

Health information technology (HIT) is information technology applied to health care and deals with all computerized systems intended to manage health information and patients' health conditions (Chaudhry *et al.* 2006). A wide range of healthcare tools has been developed to improve the quality of healthcare and patients' experience. Below the main findings regarding the emerging medical technology advances, with reference to international studies (see figure 1).

Figure 1. Overview on Health Information Technology Advances.



Concepts of EHRs

Many different concepts of EHRs exist, the most important conceptual difference being PHR (Personal Health Record) vs EHR (Tang *et al.* 2006):

- EHR systems mainly support health care professionals by providing them with the information needed;
- PHR systems are intended to capture health data entered by individuals and provide information related to the care of those individuals.

Whatever the name of the record will be, it should be a “container of links to all medical information about the citizen”. The citizen must be able to add his input (comments, lifestyle, etc.), to make corrections as well as to decide who is going to see which part of his data and if/how his data will be used” (Bos *et al.* 2008) (See appendix – relevant case studies, Nos. 1, 2, 17, 18, 19, 20, 35, 36, 37, 41, 43, 44, 49).

Mobile Health

The Mobile health (or mHealth) is a component of eHealth (Vital Wave Consulting 2009) and refers to the practice of medicine supported by mobile devices, enabling the potential for further and faster healthcare delivery. Mhealth technologies are wide-ranging (patient monitoring devices, data collection software, mobile applications, etc.) (Adibi 2015) and can better reach areas, people with previously limited exposure to certain aspects of healthcare, allowing (World Health Organization 2011):

- Communication between individuals and health services;
- Consultation between health care professionals;

- Intersectoral communication in emergencies;
- Health monitoring and surveillance;
- Access to information for health care professionals at point of care.

Smartphone health applications (apps) also developed as part of the wider Mobile Health movement. Health-related smartphone apps are portals to a multitude of health interventions with unprecedented proximity to health consumers. Health apps mainly promote a healthy lifestyle and sometimes lead consumers’ behavior toward using specific therapy/treatment or stopping their current one (BinDhim and Trevena 2015). With regard to smartphone health applications during the last years, a lot of innovation appeared, exploiting the synergies between phones, the internet and new technological devices.

(See appendix – relevant case studies, Nos. 1, 2, 21, 35, 39)

Telemedicine

“Telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve a patient’s clinical health status” (American Telemedicine Association). Information technologies are used to provide clinical health care at a distance. The access to care is so improved eliminating the distance barriers between providers and patients. The use of telemedicine services allows healthcare providers to give the patient an immediate support at a distance, and this is particularly important in an emergency. In addition, studies show that telemedicine applications allow for more effective and efficient diagnosis and disease management, in favor of all people involved (Güler and Übeyli 2002; Bashshur *et al.* 2014). Among the main advantages for the healthcare

provider, there are a better use of health resources (time, money and personnel), quickly service delivery, and the reduction of cases of hospitalization. The latter benefit is especially important in the case of management of chronic patients (Güler and Übeyli 2002). In fact, chronic conditions have a big impact in terms of costs of health systems responsible for their management (Wootton 2012). The main benefits for the patient are: the ability to access in an easier and faster way to the care, this is especially important for persons located in rural areas poorly connected to health care institutions; mortality reduction, continuity of care, even outside the hospital environment; reduced waiting times; minor hospitalizations and, finally, the prompt de-hospitalization thanks to systems that support the patient in the therapeutic process directly in his home (Bashshur *et al.* 2014).

(See appendix – relevant case studies, Nos. 3, 4, 5, 6, 39, 41).

Health 2.0

Web 1.0 describes the search for information about a subject, Web 2.0 mainly refers to an ‘architecture of participation, namely the use of tools such as blogs, podcasts, online forums, Really Simple Syndication (RSS), social networks, Wikis, and other disruptive technologies that emphasize user-generated content phenomenon. Indeed, Web 2.0 doesn’t deal with any technical application updates, compared to the preceding Web 1.0, but it simply describes how recently people use and make web pages (Aghaei 2012).

Health 2.0 is a term related to the term Web 2.0. Health 2.0 describes how patients are using the Internet to take charge of their own health care, and how some pioneering providers are using the same tools to collaborate with their patients. Health 2.0 is a term introduced in the mid-2000s, as result of the wider Web 2.0 movement. No absolute definition of Health 2.0 exists, however, it is possible to state that it mainly refers to the transition to personal and participatory healthcare. Everyone is invited to see what is happening in their own care and in the health care system in general, to add their ideas, and to make it better every day (Normann *et al.* 2012).

Health 2.0 describes a change in the way people interact with health information online, moving from passive consumption to active creation of content (Giustini 2006; Eysenbach 2008). Health is a logical area in which individuals want to seek opinions from others and communicate their experiences (Gill *et al.* 2013). A shared understanding of the issue has brought to the identification of new patient’s health habits and to the awareness that health service providers need to be prepared, starting from their academic education, in order to face this new requests (Masters *et al.* 2010). (See appendix – relevant case studies, Nos. 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 21, 29, 31, 32, 33, 34, 35, 38, 39, 40, 41, 42; images Nos. 2, 6 and 7).

CONCLUSION

Today’s patients ask for unconventional healthcare services and for a closer relationship with their providers. The

emerging patient profile appears to be more demanding and “empowered” compared to the one traditionally conceived. Hence, new service requirements are consequently needed in order to meet the growing patient’s expectations since healthcare providers understand that the major challenge of the early 21st century is to provide health care that delivers more value for patients.

In this scenario, the above-described objective should inspire a new marketing approach in the healthcare sector since marketing plays a key role in building compelling hospital value propositions that match patients’ value drivers.

New managerial figures to support and improve patient experience, such as the Chief Consumer Officer (CCO) or the Chief Experience Officer (CXO), should be introduced also in the healthcare sector, as it is happening in other industries.

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A MULTIYEAR SURVEY OF PUBLIC VALUE AND ELECTRONIC GOVERNANCE IN TAIWAN

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1. BACKGROUND AND MOTIVE

International organizations have invested significant efforts in the development of frameworks and indices for the assessment of e-government performance around the world. Since 2003, the United Nations (UN) has continued to build upon and rectify paradigms and theories for the stages of e-government evolution and e-government readiness indices. Studies by the World Economic Forum (WEF) on the development of information and communications technologies (ICTs) and the readiness of major economies have also become recognized as an essential component in the evaluation of a nation's competitive capacity. In addition, an annual report by Waseda University Institute of e-Government made similar findings.

In order to integrate with current trends of international and Taiwanese e-governance and to develop Taiwan's e-governance measurement framework, the National Development Council (NDC) has delegated the Taiwan E-Governance Research Center (TEG) to conduct extensive research projects on the subject area. This research hopes to provide a comprehensive picture of Taiwan's national digital status, and recommendations for future e-governance policy developments and research directions.

2. THE FRAMEWORK OF PUBLIC VALUE SURVEYS IN TAIWAN

This project developed the first stage of the public value based e-governance framework based upon past literature and data collected using an Analytical Hierarchy Process (AHP) model and completed the first annual collection of qualitative evaluative data. The public value based e-governance framework covers three major values: political, social and operational. These values are in turn, further

divided into nine dimensions: efficiency, user-oriented service, transparency and accountability, citizen participation, accessibility equity, trust, self-development, quality of life, and environmental sustainability. Measurement of sub-dimensions and indicators of the public value based e-governance framework would allow for the further development of national digital status indices and serve as important references for Taiwan's approaches in digital developments and e-governance related policies in the future.

However, the public value based e-governance framework requires a longitudinal study, containing multiple years of survey data, coupled with constant revisions, in order to enhance its reliability and validity. In addition, the development of ICTs and web technologies, along with the widespread use of portable and mobile internet devices, and the prevalence of web 2.0 social media platforms, are gradually changing the way in which public opinion is expressed and civic participation is conducted. Techniques for the collection and analysis of internet public opinion and Big Data are also becoming increasingly popular, thus, research intended on measuring the national digital status should explore appropriate strategies to incorporate and integrate these new developments and approaches.

Research procedures used in this study include the following: examination of the developed public value based e-governance framework and the development of related international digital indices through literature, and the analysis of multi-year data. This research hopes to provide, a comprehensive picture of Taiwan's national digital status, and recommendations for future e-governance policy developments and research directions.

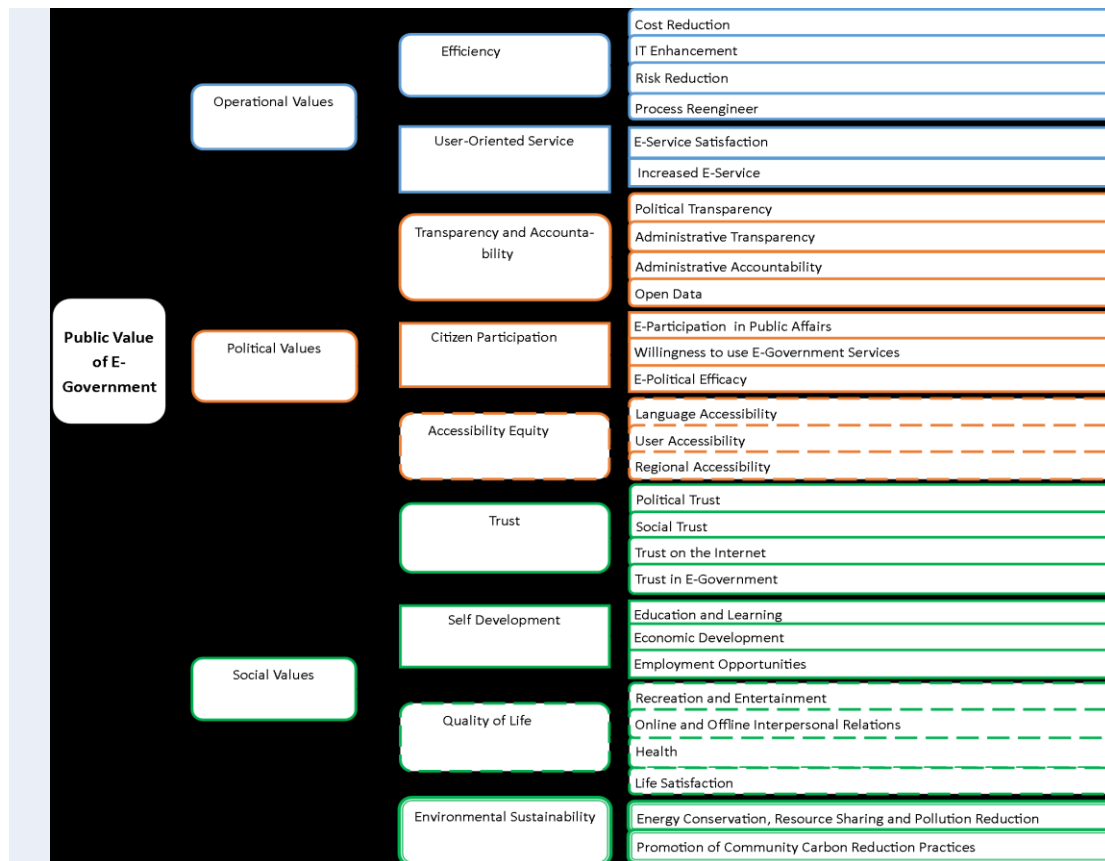


FIGURE 1: THE FRAMEWORK OF PUBLIC VALUE OF E-GOVERNMENT

3. METHODS

This research builds upon the results of Chen et al. (2014), utilizing the public value based e-governance framework in the examination of the dynamics of Taiwan's national digital development dimensions and e-governance related subjects. This research hopes to internalize new developments, in areas of technology and methodology, in the understanding of the extent of implementation of public values pursued by the development of e-governance.

During the collection and comparison of multi-year data on e-governance public value indicators, 1,134 and 1,002 samples were collected by telephone survey.

TABLE 1 FREQUENCY TABLE OF TWO YEARS SURVEY

	2013	2014
Sex		
Male	508 (44.8%)	438 (43.7%)
Female	626 (55.2%)	564 (56.3%)
Age		
15-19	80 (7.1%)	104 (10.4%)
20-29	109 (9.6%)	124 (12.4%)
30-39	191 (16.8%)	152 (15.2%)
40-49	232 (20.5%)	184 (18.4%)
50-59	266 (23.5%)	199 (19.9%)
60+	256 (22.6%)	239 (23.9%)
Internet usage*		
Non usage	355 (31.8%)	295 (30.1%)
Light	80 (7.2%)	51 (5.2%)

Middle	125 (11.2%)	69 (7.0%)
Heavy	555 (49.8%)	565 (57.7%)

* Light user means Internet surfing 1 or 2 days per week; Middle user means Internet surfing 3 or 5 days per week; Heavy user means Internet surfing 6 or 7 days per week.

4. RESULTS AND FINDINGS

Operational values

The questionnaire items which operationalize the operational dimensions mostly yield positive responses from respondents. These include e-government efficiency, process reengineering, satisfaction toward the data and service provided by government websites and the increase of services brought by the use of the internet by the government. Of these items only satisfaction toward information provided by the government is lower than data from Chen et al. (2014).

Political values

The questionnaire items measuring the transparency and accountability dimension, which includes information accessibility, speed of online services and the ease with which the person in charge can be contacted, all show much room for improvement. Online civic participation measuring the civic participation dimension reveals that citizen participation is still not high enough. Willingness to use e-government services also slightly decrease compared with the results from Chen et al. (2014).

Social values

The questionnaire items in the trust dimensions reveal that citizen trust in the government and the internet are both very low. However, citizen trust in e-government is much higher. The percentage of respondents who have never utilized an e-service is slightly lower for the self-development and quality of life dimensions. Of all items measuring the economic development index, the item for

buying things online scores the highest. Between items measuring the quality of life index, the items for viewing videos online and for gaming online score the highest. The negative effects of the internet on family relations are also significant, but overall, the effect of the internet on citizen happiness is positive.

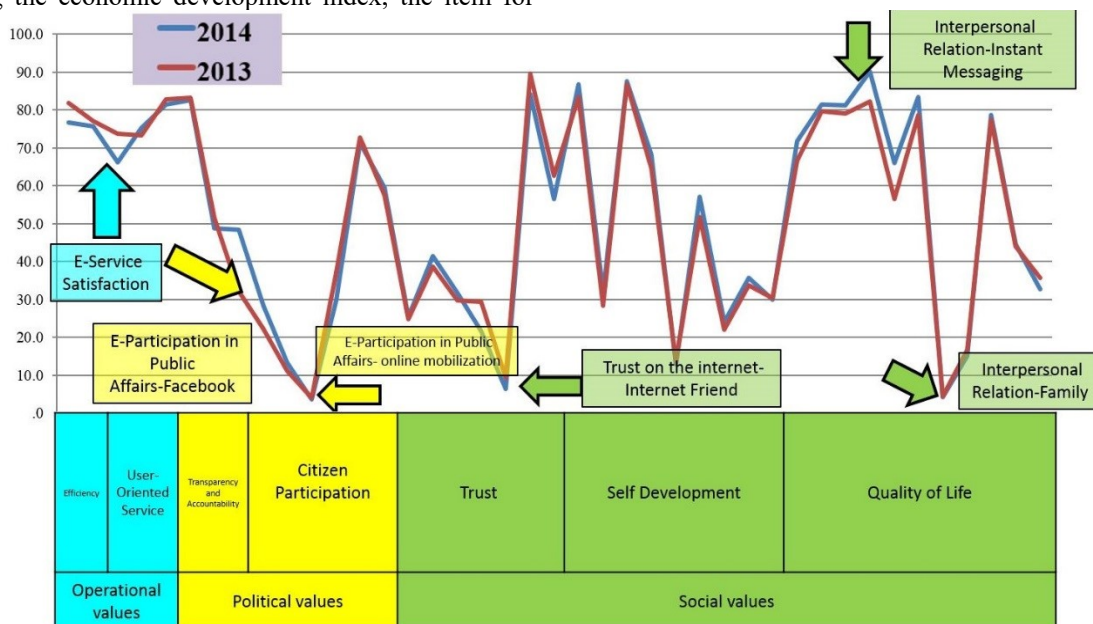


FIGURE 2 THE DIFFERENCE ON THREE DIMENSIONS OF TWO YEARS SURVEY

5. FUTURE RESEARCH DIRECTIONS

The following research and policy recommendations are suggested in light of the discoveries made in this research.

1. Continued adjustment of the public value based e-governance framework and its indices: The framework should be revised by specialist meetings and conducted according to the data collected from international developments and the data collected in Taiwan, every two to three years. The revision processes should be similar to the adjustment processes adopted in UN and WIP projects. The methods for data collection should be changed to keep pace with the development of technology, the way in which public opinions are expressed, and the development of public opinion surveys.
2. Creating and opening up to the public, a public value based national digital status tracking database system: The database should integrate current international assessment databases, subjective e-government user data, and objective indicators. The database should also include data analysis, comparison, and sharing functions, in accordance with the open data trends in the international community.
3. The increase of the use of cell phone surveys for subjective assessment research: Cellphone surveys should be used to contact respondents who lack a land line (telephone) and do not use the internet. This would complement the home telephone survey. In surveys with a high number of survey items, a method should be developed to combine both the cellphone and internet

surveys when they are used together.

Strengthen international cooperation and enhance international assessments: This research has linked international assessment indicators with e-governance public values. It is hoped that the next step would be the conducting of cross-national empirical research based on the public value based e-governance framework. In addition, the WIP annual conference will be hosted in Taiwan in 2016. TEG should utilize this opportunity to strengthen our exchanges and cooperation with the international community.

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COMBINATION OF HEALTH MANAGEMENT AND PENSION SERVICES: “HUALING HEALTH 365” PROJECT

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1. OVERVIEW

In China, the average life expectancy of the population is nearly 74 years old at present and is forecasted to be 80 years old in 2050. China has stepped into the age of the population of longevity.

Although Chinese people live longer, it is very common that the old people are not healthy. According to the World Health Organization statistics, the health life expectancy of the world's 49 high-income countries is 70 years, while China is only 66 years old. The rate of the health of over 60 years of age in the world's major developed countries is more than 60%, while is only 43% in China. The low health level of the elderly population made a great deal of medical and health resources to be consumed, and which has increased the economic and social costs of coping with an aging population. If the health level of the elderly cannot be promoted, China will become the country with the most serious aging problem in the world.

Since 2012, the State Council has continuously issued a series of major policies involving elderly people such as “Opinions on Accelerating the development of aged people service industry”³, “Some opinions on promoting information consumption to expand domestic demand”⁴ and “Several opinions on promoting the development of health services”⁵. Which provide a good policy environment for the development of the elderly health services and the increasing of the elderly health level.

By constructing the national center of intelligent management cloud platform about the elderly health, the “Hualing Health 365” project provides quality and universally benefited health care for the elderly population through monitoring health status and disease prevention, screening, chronic disease management and other health care services.

In May 2014, the office of the National Committee on Ageing officially launched the project of “Hualing Health 365” in China.

2. THE COMPOSITION OF “HUALING HEALTH 365” PROJECT

The project of “Hualing Health 365” is constituted by two parts of the technical platform and the service system.

The intelligence management cloud platform of national elderly health “Hualing Health 365” project utilize cloud computing, internet of things, mobile internet, big data and other technologies to construct a pension and health service cloud platform which is interconnected nationwide. The platform provides health management, health care and other aspects of cloud services to the government management departments, pension institutions, community home care providers, medical service organization and the elderly and their relatives. Include:

2.1 Information acquisition system

With the expansion of the platform coverage, we will build up the information database of the elderly population.

2.2 Health management service system

Health data information systems is being deployed in the cloud to provide health information analysis and processing services through the working mode of two mode combination that is the centralized artificial intelligence and distributed expert studio automation plus manual mode.

Old people and their families and those of the organizations providing services for the elderly such as medical institutions, government departments all can through the PC terminal and mobile terminal obtain health data or other services.

Three service system

National pension health three level service systems “Hualing Health 365” project provides sound health services for the elderly by on health and related peripheral data acquisition, processing, and application.

By building a three-level pension health service system, which is composed of basic old-age health service subsystem, basic level + regional medical service subsystem, and top level medical expert service subsystem, a national integrated pension health service system is established.

³ “Opinions on accelerating the development of aged people service industry”, No 35 Document in 2013 of the State Council, released on the sixth day of September, 2013

⁴ “Some opinions on promoting information consumption to expand domestic demand”, No 32 Document in 2013 of the State Council, released on the eighth day of August, 2013

⁵ “Several opinions on promoting the development of health services”, No 40 Document in 2013 of the State Council, released on the 28th day of September, 2013

Level	Participant	Data uplink workflow	Data downlink workflow
First	Health services worker	Collect objective data Collect subjective data	Implementation of health service program about the outer part of the hospital
Second	Primary + Regional medical resources	Interpretation of health data Health warning Health guidance Medical guidance	Refinement to health services program Implementation of health service program about the content of hospital services
Third	Expert medical resources	Training and assessment, Quality monitoring, Difficult question answer	Education and training, Develop health services guidance about chronic disease management, disease prevention and screening, etc.

2.3 Service team construction and resource integration

The expert team be composed of those of doctors with a sense of social responsibility and higher medical level and who are widely recognized by the people, has a wealth of training and quality control experience.

The primary physicians are screened by the experts according to their own service requirements and provided with regular training.

The pension service specialist is selected and employed by the pension agency or the pension service provider and certificates in accordance with the training evaluation system developed by the experts.

In the core of health care resources, "Hualing health 365" project and the national and regional medical institutions have established the close cooperation relations.

In October 2014, "Hualing Health 365" had an extensive exchange respectively with the government of Japan Ministry of Internal Affairs and Communications, Ministry of Health, Labour and Welfare, NTT, NEC, Hitachi and other government departments on the practical application, products and technology of information technology in the field of pension health.

2.4 Service contents and methods

- ◆ The information collection:
 - Medical vital signs data acquisition includes blood pressure, oxygen saturation, heart rate, electrocardiogram, blood glucose.
 - The basic personal information collection
 - The basic personal health information collection
 - Personal medical history and existing information collection
 - personal medical records
 - The individual sports, diet, sleep, defecation, and health related information collection
 - The collected information is automatically

uploaded to the "National elderly health dynamic electronic information database"

-
- The medical team of experts of public health data service:
- Based on the "national elderly healthy intelligent management cloud platform", medical experts formed real name experts studio and develop health consulting service standards, according to the standards the studio's doctor give health assessment report and interpretation after collecting the elderly health data. The contents of the report include health status analysis, health warning, health guidance, medical guidance, etc.
- The expert are responsible for their studio's health assessment services and make quality control for it by carrying out random spot checks on a certain proportion for the studio's work and which can help the doctors of the studio to enhance service levels.
- If there is doubt about a case, studio physician can put forward the guidance request to the experts and get an answering from the experts.
- Provide online psychological assessment services for the elderly
- Based on personalized data reserves and demand, the expert studio can provide accurate personalized health service for those of the elderly with the demand of value-added services which includes a higher frequency of the guidance, personal chronic disease management, health guidance and other services.

◆ The disease screening service

For those of aged patients diagnosed by examination, according to the principle of grading treatment, the treatment and rehabilitation services provided by the experts themselves or local doctors in the studio.

- ◆ The chronic disease management and rehabilitation

services.

Provide integration health services of online and offline for the elderly on chronic disease management, disease rehabilitation other long-term personal health services and so on. Real-time remote vital signs monitoring function.

When an emergency event occurs, the 365 platform can be used to transmit the vital signs of the elderly who are in a sudden illness to the cloud platform in real time. Any cooperative medical institution on the platform can observe the vital signs of the elderly through the Internet and provide targeted guidance for the nursing staff of medical institutions before the ambulance arrived at the scene.

The 365 project has gathered together the national famous expert to develop various specialized health services.

3. THE IMPLEMENTATION OF “HUALING HEALTH 365” PROJECT

3.1 Project implementation model

The public service platform of "Hualing Health 365" project was constructed in PPP mode.

By building “one database and one platform” that is “National elderly health dynamic electronic information database” and "national elderly healthy intelligent management cloud platform”, a pension information service system was constructed which is interconnected across the country and provides pension health information cloud services for all levels of government.

Based on this, according to the different needs of local governments, provide comprehensive and extended pension information services by cooperating with the other local public information service platform.

From the 2000 year starting a pilot to the 2014 year, "Hualing health 365” project has provided service to many cities such as Beijing, Shanghai, Chengdu (Sichuan province), Dongying (Shandong province), Wuhan (Hubei province) and Harbin (Heilongjiang province).

3.2 “365” project implementation effect

Over the past year and a half, the project has established a total of more than 20 thousand people of dynamic electronic health records and completed a total of more than 90 thousand copies of health assessment report.

Promotion model:

- According to the local reality, the local government purchase 365 yuan per year care health service for all or part of the old people in the area.
- Pension service agencies (including a nursing home, community service centers, home care providers, etc.) buy the health service module to provide services for the elderly.
- The elderly individuals buy personal care health services.

Pension and health service worker customize special Hualing health two-dimensional code for the elderly and attached it to the elderly card or bus card. When older people is in need of medical attention or in case of an emergency, doctor or helping people can through the

mobile phone scanning Hualing health two-dimensional code directly obtain the information about the old man's name, emergency contact information, basic medical history, history of allergies, surgical history, the current situation and other medical data, and thus greatly improve the effectiveness of emergency medical assistance.

After the old man's health data uploaded to the cloud database, first of all, the emergency department experts through the online studio give a data interpretation and then based on the new data, expert studio gives a health assessment report according to the changing trend of the historical records of vital signs and health status. Normally, evaluate once a month.

4. THE CHARACTERS OF "HUALING HEALTH 365" PROJECT

"Hualing Health 365" front end touches elderly health information collection points which are scattered throughout the area and connect with pension and health service network, and backend connects to the national high-quality health care resources. Concretely, the characteristics include:

4.1 The pension health information service platform of "Hualing health 365" integrates online and offline resources and in which the data is interconnected nationally, and thus it is the only one in the country. To get service easily from medical professionals across the country is no longer a dream.

4.2. Across pension services, health services and information services three service areas. Based on the organic combination of the three kinds of service functions, the platform forms a sound system of old-age health information service and breaks the geographical and industry data barriers to achieve a one-stop service.

4.3. The equipment sales or software sales is not the purpose, while the core competitiveness is to create a perfect service function that is, according to customer needs and technology development, by SAAS mode, to provide cloud services which are sustainable development and self-improvement.

4.4. The service system not only won the recognition and support of many well-known medical experts, but also integrated the local grassroots medical institutions wherever the project was executed, and combine with pension services to build a perfect three-level pension health service system.

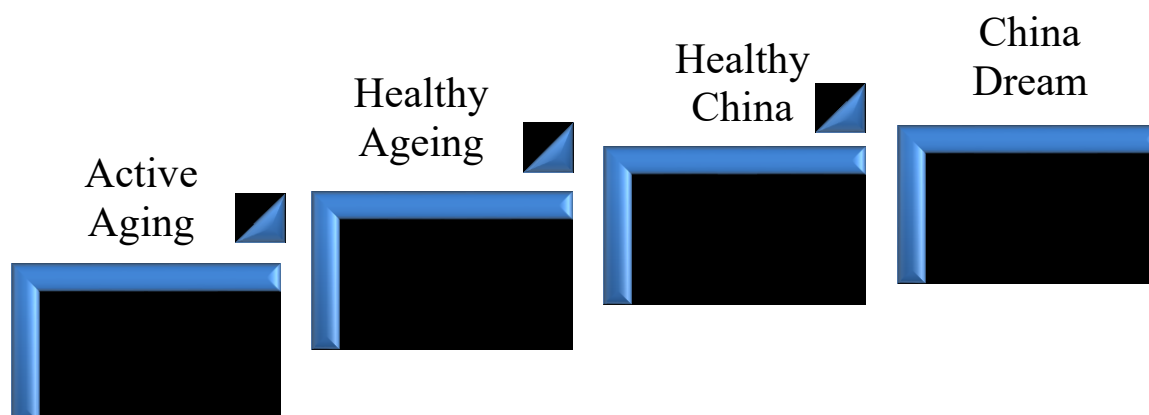
4.5. Real-time remote monitoring system with emergency rescue function and health data recognized by the national emergency experts can be used in the elderly emergency treatment to improve the aid effectiveness and success rate.

4.6. Maintain interoperability with medical data in medical institutions and for the elderly integrate their own health and medical data.

Standardized and open technology and service system, through the standard data interface, can easily access to various measuring instruments and sensors, including wearable devices. Open data-link service system can be accessed by quality serviceability of various places and aspects, and so build a large pension services platform

participated by parties in different regions and different fields.

5. THE SIGNIFICANCE AND PROSPECT OF "HUALING HEALTH 365" PROJECT



By providing the health management services which are widely accepted and benefited by the general public and increasing the level of the prevention and management of chronic diseases in elderly patients outside hospital by acting in concert with medical department and medical service, "Hualing Health 365" can improve the health life expectancy proportion of life of the elderly and create basic conditions for the well-being of high quality of life in old age.

Based on advanced information technology, internet of things, big data technology and high-quality medical resources, "Hualing Health 365" project build a national data interoperability pension health information service system which composed of one database and one platform that is "National elderly health dynamic electronic information database" and "national elderly healthy intelligent management cloud platform". Which can achieve the national and even global quality health care resources in the form of Internet + to benefit generally to the elderly people in the country by the most convenient means and most economical way, and promote informationalization and intelligence of pension health information service.

"Hualing Health 365" project build an information platform for the majority of medical institutions and medical personnel to make them serve the old people across the country without borders, and which provides a broad stage

for legally increasing service income by enlarging serviceability which based on medical skills.

Through the implementation of "365" project in the PPP mode, governments at all levels free access to health information cloud services, greatly reduce the hardware investment and system maintenance costs, utilize the savings funds directly for the purchase the pension health management services and effectively improve the health of local elderly people.

Meanwhile, the increased investment in health prevention will ultimately reduce local health care spending to achieve double harvest of social and economic benefits.

Ministerial, provincial, municipal, county level until the streets at all levels of government departments can obtain pension and health management cloud services within their respective jurisdictions from "365" cloud platform. Government departments can also through the integration of the existing information management platform or proposing demand, upgrade from the pension health information management platform to the government department's pension information management platform.

"365" project incorporates the offline resources of medical institutions around the elderly, achieves the organic integration and interoperability of health data and medical data, and integrates their own personalized large health databases for the elderly.

PART III. GENERAL PAPERS

(NON- REFEREE REVIEW)

EXAMINING THE RELATIONSHIPS BETWEEN E-GOVERNMENT, E-PARTICIPATION, AND CORRUPTION: A CROSS-COUNTRY ANALYSIS

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ABSTRACT

Almost all government institutions around the globe have used information and communication technology (ICT) for enhancing the public service delivery on top of the e-government development. In addition to that, many researchers have claimed that the use of ICT in a government agency would help the government to uncover corruption by way of increasing transparency, thus, improving accountability. However, the nature of corruption, which is hidden, exclusive, and clandestine, urges an extraordinary cooperation among government agencies and stakeholders. Some corruption actions are found pervasive while others are hard to find. The ICT based interaction between government and citizens is expected to reduce corruption through the lens of transparency. Moreover, there is an ICT based reporting channel namely e-participation. E-participation extends the ability of government to receive more voices from stakeholders. This study hypothesized that e-government should be complemented by e-participation to eradicate corruption effectively. This study found that among those ICT based interactions, the interaction between government and other public bodies is the least significant in reducing corruption. However, the significance of such interaction differs between countries with high e-participation adoption and low e-participation adoption.

Keywords— e-government, e-participation, corruption

1. INTRODUCTION

E-Government refers to any use of information and communication technologies (ICT) by government institutions that enable them to transform their way to communicate and interact with citizens, businesses, and other government institutions [1]. The transformation is aimed to improve the quality of public service delivery. These transformations are coined to three notations, i.e., G2C for Government to Citizens, G2B for Government to Business, and G2G for Government to Government. E-Government enables government institution to serve a

variety of different outcomes; better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management [1]. IT enables government institution to be more collaborative with stakeholders and with other government institutions [2]. Moreover, the resulting benefits of e-government can be less corruption, increased transparency and accountability, and cost reductions.

Previous studies have found that e-government, with other observable items, significantly reduce corruption. Despite the immense studies on e-government and its impact on corruption, the study that investigates the impact of each transformation on corruption is a nullity. Andersen (2009) argues that e-government can be considered a solution for the corruption faced by developing countries [3]. However, according to ACFE on its Report-to-the-Nation (RTTN) 2014, IT only contributed 1.1% in detecting fraud, including corruption [4].

Corruption, by its nature, is exclusive, hidden, and clandestine. Perpetrators always concealed corruption act by hiding information, hence, creating asymmetric information. Having clandestine, corruption requires the government to employ more eyeballs for uncovering corruption. While e-government is bounded exclusively for a government institution to operate, e-participation is more freedom in which either government or society could initiate it. This study attempted to differentiate the role of e-government from e-participation in anti-corruption disciplines. This study posits that e-participation is not necessarily an implementation of e-government under G2C. E-participation is the complement for e-government to be more transparent and accountable. Moreover, e-participation is also an additional unit to engage more individuals to detect irregularities or misconducts of government officers.

This study will examine the contribution of G2C transformation, G2B, G2G, and e-participation in improving the perception of corruption in a country. Also,

this study will find out the role of e-participation in combating corruption.

2. E-GOVERNMENT, E-PARTICIPATION, AND CORRUPTION

2.1. A Literature Review

UNDP defined corruption as the “misuse of entrusted power for private gain.” This definition is for replacing the previous one in which corruption is the “misuse of public power, office or authority for private benefit — through bribery, extortion, influence peddling, nepotism, fraud, speed money or embezzlement” (UNDP, 2008, p7). Also, OECD defines corruption as the “active or passive misuse of the powers of Public officials (appointed or elected) for private financial or other benefits” [6].

Corruption is well-acknowledged as a global problem around the globe with a detrimental effect on economic growth, government efficiency, state management, and social welfare [7]–[9]. Corruption is higher when the transparency is low, the discretion is high, and the monopolistic practice does exist. Corruption would likely occur when an organization or a person has a monopoly power over goods or services, has discretion to decide who will receive it and how much that person will get, and neither it is transparent nor accountable [10]. Corruption is caused by the lack of transparency and accountability. Figure 1 explains Klitgaard’s argument in an equation. Those who conducted corrupt activities would likely conceal such activities by creating asymmetric information, thus, reducing transparency and accountability.

$$\text{Corruption} = \text{Monopoly} + \text{Discretion} - \text{Accountability (in governance)}$$

FIGURE 1. CORRUPTION EQUATION

Recent issues related to corruptions, frauds, and demands on government to work more transparent and accountable have increased the urgency of using ICT in government agency [11]. A concept of using ICT for governmental purposes is commonly labeled as e-government. E-government enables government agencies to transform their way of communication and interaction with citizens, businesses, and other government institutions [1]. These interactions are notated using G2C for the interaction of government with citizens, G2B for the interaction of government with businesses, and G2G for the interaction of government with other government agencies.

Like other IT, however, effective use of e-government depends on several factors such as technology, stakeholders, environment, and organizational culture [12]. Governments can take the benefits of e-government to strengthen democracy and to promote efficiency and effectiveness by establishing a system of transparency, public participation, and collaboration [13]. However, collaboration among government agencies is one of the common issues faced by governments in developing countries [14].

Many scholars argued that e-Government is the main component of improving the public service delivery and increasing transparency. E-Government increases

standardization of the process of public service delivery, thus, minimizing the room for the discretion of government officials [15]–[18]. Also, e-government reduces the uncertainty in the completion of the citizenry services. As a result, those who apply for a government service can predict the time needed by the agency to accomplish the request [19]. In all, e-government can be regarded as a platform for transparency that accordingly limits the use of discretion power of government officials. Referring to the Klitgaard’s equation on corruption, increasing transparency and reducing the discretion will lessen the corruption.

Most literature has proved empirically that e-government has a negative impact on corruption significantly. E-Government could reduce corruption by enhancing the effectiveness of internal and managerial control in an organization [20], [21]. Using the pervasiveness of Internet, e-Government enables a government agency to engage more citizen in participating in a decision-making process. Also, the Internet has enabled the government to disseminate any specific information to citizen broader and faster. E-Government and the Internet altogether contribute significantly to curb corruption [3].

Despite any efforts for examining and investigating the relation between e-government and corruption, there is still room for questioning the impact of the interaction between government and its stakeholders on corruption. The study about examining the impact of G2C, G2B, and G2G simultaneously on corruption is still none. The outstanding literature on e-government and corruption discussed mainly the G2C, G2B, or G2G separately [22]–[27]. The proposition on the importance of examining the impact of these three interactions is based on the assumption that G2C, G2B, and G2G jointly extended the more eyeballs on government activities, thus, narrowing the chance of corruption. In addition to those three interactions, there is one particular instrument that, along with the affordability of Internet, should take into account for extending the more eyeballs, i.e., e-Participation.

Linus’ Law states that the more people watching the source code of software, the bugs in that software are shallow [28], [29]. In this study, the corruption is also a shallow problem when there are enough eyeballs. Therefore, the vast number of eyes, aided by ICT, make the amount of data less daunting. Furthermore, to get more eyeballs on government activities, the government uses e-Participation for attracting more people to freely express their opinion about government activities [30].

United Nations in its biennial report on e-Government Survey has separated the e-Government Index and e-Participation Index. E-Government Index was composed of three indicators; Infrastructure, Online Service, and Human Capital Index. E-Participation uses three level of adoption; e-Information, e-Consultation, and e-Decision Making [31]. From this point of view, e-participation is considered as a part of e-government that extends the application of G2C. Using e-participation, G2C is not only about online citizen service but also promoting the e-democracy [32].

Using the UN’s definition of e-Participation, e-Participation exists in many forms such as e-voting, hotline channel, whistleblowing system, and community-based online

channel. The first three forms are commonly a government initiative to support e-Democracy [32]. From this point of view, e-participation is the extension of G2C. Due to the affordability of the Internet and personal devices, social media take place in the area of government-citizens interaction. The case of Weibo in China is a good example of framing the social media as a tool for improving a government-citizen collaboration. Another example of a popular platform that mediates the communication between government and citizen is the online petition at <http://change.org>. It is a global platform for empowering the voice of people around the globe with country borderless. As of October 2016, there are 162,810,897 people sign petitions to solve social issues in many countries. Moreover, Change.org has successfully achieved 19,444 goals in 196 countries. Some other initiatives are ipaidabribe.com and bribespot.com. However, they have not got their main stage yet. All in all, the advance of ICT has brought e-participation to be more pervasive.

Association of Certified Fraud Examiner (ACFE) noted that e-participation is essential for detecting organization misconducts. Instead of using e-participation, ACFE used the term “hotline reporting”. In the report titled “Report to The Nation”, ACFE concluded that the most effective tool for uncovering corruption is tips or complaints, as shown in Figure 2. According to the report, tips had led the organization to detect misconducts. Tips came from both internal and external parties. Moreover, the report also said that 49% source of tips is from internal and the rest came from the vendor, competitor, or other else. Furthermore, the report investigated the impact of the presence of hotline reporting on the effectiveness of detection method. The finding is that the hotline had a substantial impact on the detection through tips [4]. A comparison between organizations with and without hotline reporting is shown in Figure 3.

Like a hotline reporting, e-Participation has a potency for playing a critical role in government anti-corruption program. It enables the government to gather any information from internal and external. There are two terminologies for describing the e-participation system for reporting any misconducts, i.e., Whistleblowing system and complaint management system. The whistleblowing system is very specific for reporting misconducts. The source came from the internal organization or any related parties which involved in a governmental function (Francis et al. 2015; Johansson & Carey 2015; Tudu & Pathak 2014). The complaint management system enables the government to engage more audiences. It is not only about reporting misconducts but also about satisfaction on the government services (Bendall-Lyon & Powers 2001).

Empirical studies about the relation between e-participation and corruption are still rare. Existing literature related to that area is mainly based on a case study. These case studies, however, enrich the literature with compelling evidence that e-participation has a role in fighting corruption. Gu (2014) conducted research on the use of Sina Weibo, a Chinese microblogging, in creating and strengthening a mutual communication between Chinese government and citizens. The Chinese government uses

Weibo to solve social issues faster and more effective. Sina Weibo has successfully promoted the mutual supervision and co-governance between government officials and citizens (Gu 2014). The success of Weibo in China is a paradox in which Weibo encompasses the state Internet censorship, as China is very strict on the social media censorship (Schmidt & Cohen 2013).

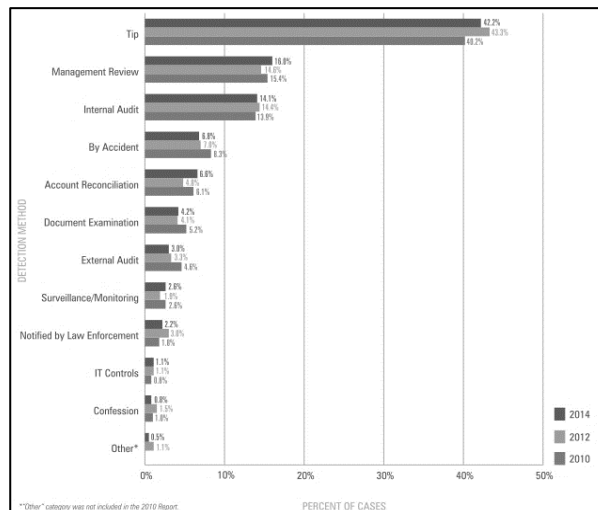


FIGURE 2. INITIAL DETECTION OF OCCUPATIONAL FRAUD
(Source: Report-To-The-Nation 2014, ACFE)

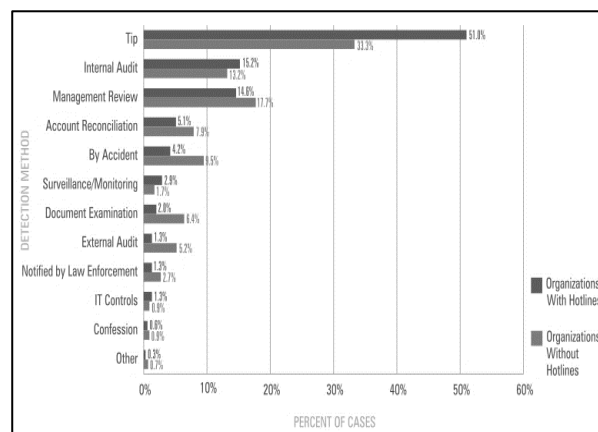


FIGURE 3. IMPACT OF HOTLINES
(Source: Report-to-the-nation 2014, ACFE)

Another successful implementation of e-participation is the LAPOR portal in Indonesia [33]. LAPOR is a complaint management system initiated by Presidential Task Force for Development Monitoring and Oversight. LAPOR is a hub that connects citizens to government agencies. Most government agencies in Indonesia has taken an active role in following up any complaints or information from the citizens. These two examples have shown that government and stakeholder have an equal opportunity to create the e-participation system. Weibo has proven that community can attract government to participate in a non-government system, therefore, creating a mutual control system between government and stakeholders. LAPOR, on another side, is compelling evidence that government can attract citizens to spontaneously inform the government about anything related to government officer misconducts, a broken

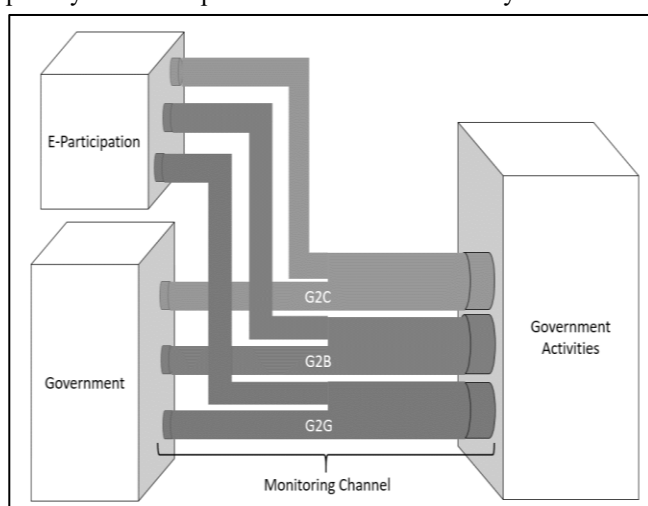
infrastructure, or any aspiration about their surroundings. LAPOR, into some extents, is able to take the role as a G2G platform since LAPOR has established a specific channel to each government agency in Indonesia.

All in all, e-government and e-participation have different role and position in the area of fighting corruption. However, e-government and e-participation have the capacity to strengthen monitoring capacity of government for discouraging government officials from any misconduct that may lead to a corruption case. This study will attempt to examine how strong the e-government and e-participation in broadening the monitoring channel for the government. Also, this study will slice e-government into three components; Government-to-Citizen (G2C), Government-to-Business (G2B), and Government-to-Government (G2G). The slicing of e-government is essential for measuring the impact of e-participation on those three components.

2.2. Conceptual Framework

Based on the previous literature review, e-Participation is not the initiative of the government. Therefore, it is not limited to a specific government agency. E-Participation does not consider the attribute of the stakeholders such as citizenship, residential, and legal status. In contrast to e-Participation, e-Government commonly addresses specific stakeholders. For example, G2C service in a local government is fully-functional available for citizen belongs to the respective local government. E-Government needs e-participation, which is based on stakeholder's demand, to be reachable by stakeholders borderless.

Furthermore, stakeholders demand e-Participation as a neutral channel to take part in specific areas of government functions such as monitoring, reporting, and complaining. E-Participation extends government's field of view for gaining stakeholders opinion on government performance, in this study, related to anti-corruption strategy. Figure 4 portrays the conceptual framework of this study.



**FIGURE 4. CONCEPTUAL FRAMEWORK
3. RESEARCH MODEL AND HYPOTHESES**

3.1. Three Interactions in e-Government

The prominent definition of e-government is the one come from World Bank in which e-government is the use of information and communication technology in a government institution for improving the way of its interactions with citizens, business enterprises, and other government institutions [1]. The following section will explain each of these interactions, which commonly refer to G2C, G2B, and G2G.

3.1.1. Government-to-Citizen (G2C)

E-Government has gained public attention along with the New Public Management (NPM) since 2000. Using the advent of ICT, the NPM practitioners inject government processes with ICT under the umbrella of e-government development. The prime objective is to improve public service delivery from the government to its citizens in term of speed, accuracy, and convenience. The common examples of G2C interaction in e-government application are land record management system, citizenry services, and license registration services. These applications provide the citizen with faster delivery service. The online services enable the citizen to predict the completeness of whole process more accurate. Also, the system allows a government, as a service provider, to send notifications to citizens regarding the progress of the service. This systemic procedure will discourage citizens to spend extra time nor extra money to get the result, thus, reducing the opportunity for corruption [19], [22]. This lead to the hypotheses:

H1: The country with high level of G2C will achieve the better perception of corruption.

3.1.2. Government-to-Business (G2B)

The common practices of G2B are e-Procurement, e-Customs, and e-Tax [14]. E-Procurement reduces the opportunity for vendors to meet physically with the procurement officers. Moreover, e-procurement ensures the equal treatment to the bidders, thus, eliminating unfair competition among bidders. Since the process is open to all bidders, there is no asymmetric information occurred, thus, increasing transparency and accountability [34]. Similarly, e-Customs gives a fair treatment to trade companies so that they do not have a chance to race in offering speed money to the officers in the customs office. In addition to that, implementation of e-customs reduces the complexity of customs procedures. Under those circumstances, it diminishes the opportunity for a customs officer to gain extra money. This lead to the hypotheses:

H2: The country with high level of G2B will achieve the better perception of corruption.

3.1.3. Government-to-Government (G2G)

While the current technology enables one government to exchange information with other government institutions in a real time, such practices are still not common in e-government development [14]. A few countries have attempted to strengthen their data exchange using ICT. Japan, as a top country with high technology adoption, has developed Certification of the Final Account Computer System (CEFIAN) system, an inter-government data

exchange for government financial audit purposes. Estonia has X-Road as a platform for linking various e-services in both public and private sectors. Also, the United States and Singapore have an interoperability among government agencies. When government agencies connect their information system among others, the opportunity to falsify government financial transaction for private gain is very limited. This lead to the hypotheses:

H3: The country with high level of G2G will achieve the better perception of corruption.

3.2. E-Participation

Apart from e-government, e-participation provide the individual with alternative channels to take part in some portions of government process such as decision-making process, policy analysis, and government performance evaluation process. Borrowing the concept of Linus's Law that posit the more eyeballs, more bugs are shallow, e-participation is a tool for the government to engage more eyeballs for daunting the corrupt officers [28], [35]. This lead to the following hypotheses.

H4: The e-Participation moderates the relationship between G2C and CPI.

H4a: The higher e-Participation, G2C is positive towards CPI

H4b: The higher e-Participation, the relation between G2C and CPI is stronger

H5: The e-Participation moderates the relationship between G2B and CPI.

H5a: The higher e-Participation, G2B is positive towards CPI

H5b: The higher e-Participation, the relation between G2B and CPI is stronger

H6: The e-Participation moderates the relationship between G2G and CPI.

H6a: The higher e-Participation, G2G is positive towards CPI

H6b: The higher e-Participation, the relation between G2G and CPI is stronger

3.2. Research Model

The following picture depicts the hypotheses model in this study.

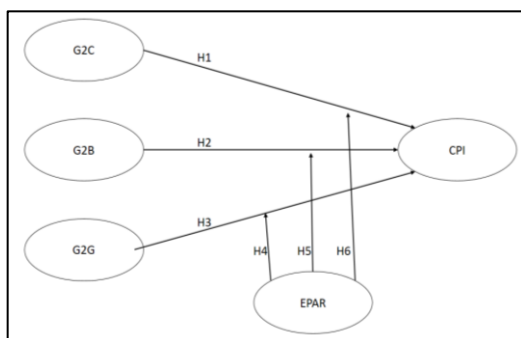


FIGURE 5. RESEARCH MODEL

4. DATA AND MEASURES

This study employs the secondary data from Network Readiness Index (NRI) 2014 released by World Economic Forum(WEF), e-Government Development Index (EGDI) 2014 published by United Nations Department of Economic and Social Affairs (UN-DESA) and Corruption Perception Index (CPI) 2014 released by Transparency International. Due to the completeness of all variables, this study analyzed 141 countries.

Among five variables investigated in this study, three of them will use proxy variable since there are no available measures on them. These three variables are G2C, G2B, and G2G. EPAR and CPI, are directly taken from EGDI's e-Participation Index and Transparency International's CPI. G2C, G2B, and G2G variable will use some indicators from NRI.

EGDI is the World Bank project for assessing e-government development in countries around the globe. It comprises three indicators; Infrastructure Index, e-Government Index, and e-Participation Index. This study uses e-Participation Index from EGDI for EPAR variable. Since this study would like to investigate whether EPAR moderates the relationship between three interactions in e-government and perception of corruption, EPAR was recoded into a dichotomous value, i.e., zero (0) for below the mean of e-Participation Index and one (1) for above the mean of e-Participation Index. Since the sample mean of e-Participation Index is 3.3, for a country with an e-Participation index greater or equal to 3.3 will be recorded as 1 and the rest will be recorded as 0.

NRI is an assessment of a country's readiness and measurements for taking the benefit of ICT usage in society. NRI is composed of ten pillars that represent ICT impacts. They are Political and Regulatory Environment, Business and Innovation Environment, Infrastructure and Digital Content, Affordability, Skills, Individual Usage, Business Usage, Government Usage, Economic Impacts, and Social Impacts (World Economic Forum 2014). These pillars are categorized into four sub-index, i.e., Environment Index, Readiness Index, Usage Index, and Impact Index. For the purpose of this study, three pillars from Usage Index are used as the proxy variables for three interactions in e-government (G2C, G2B, and G2G). These three pillars are Individual Usage, Business Usage, and Government Usage.

The proxy variable is a variable that takes place another variable in which that variable is never observed nor difficult to measure. Some examples of the proxy variable are Gross Domestic Product (GDP) per capita for portraying the quality of life, TOEFL score as a proxy for English proficiency, and changes in height for hormone level. Three out of ten pillars from NRI have the closest relation with three intended variables to be measured, thus, taking them as proxy variables for three interactions in e-government. This study uses Individual Usage, Business Usage, and Government Usage as a proxy for G2C, G2B, and G2G, respectively. These proxies are needed due to lack of available measures on G2C, G2B, and G2G. Table 1 and Table 2 show the list of variables and descriptive statistics of these variable, respectively.

TABLE 1. LIST OF VARIABLES

Variables	Source	Range Value
G2C	Individual Usage from NRI 2014	0 - 7
G2B	Business Usage from NRI 2014	0 - 7
G2G	Government Usage from NRI 2014	0 - 7
EPAR	e-Participation Adoption Level	0 .OR. 1
CPI	CPI from CPI 2014	1 - 100

TABLE 2. DESCRIPTIVE STATISTICS

Variable	N	Mean	Std. Dev	Min	Max
G2C	136	4.12538	1.57809	1.31044	6.86385
G2B	136	3.83883	0.83268	2.53567	6.13235
G2G	136	3.96254	0.90759	2.24353	6.25784
EPAR	136	0.53676	0.49865	0	1
CPI	136	46.33333	19.357	17	91

5. TESTING THE IMPACT OF E-GOVERNMENT AND E-PARTICIPATION ON CORRUPTION

Before assessing the research hypotheses, the test of collinearity is undertaken by calculating the Variance Inflation Factors (VIF) of each independent variable [36]. Hair et al. (2014) suggested that VIF score of 4 or below indicates the absence of collinearity. Table 3, indicates that collinearity is not present in the research model.

TABLE 3. VARIANCE INFLATION FACTORS

CPI	
Independent Variable	VIF
G2C	2.840
G2B	3.021
G2G	2.755

(Source: Author)

After examining whether the model has collinearity issue or not, the structural model is assessed. The assessment involves calculating the significance and relevance of the hypothesized relationships between the research variables. It was conducted using Lavaan library in R language.

Table 4 presents the results of the analyses.

TABLE 4. PATH COEFFICIENT (Source: Author)

Variable	CPI	t-Statistic	p-value	Sig.
G2C	4.171	4.773	4.75e-06	***
G2B	12.023	7.039	9.51e-11	***
G2G	1.730	1.156	0.25	

. significance at p=10% * significance at p=5%; ** significance at p=1%; *** significance at p=0.1%

Multiple R-squared: 0.764, Adjusted R-squared: 0.759

Table 4 also shows that G2B demonstrates the strongest influence with a path value coefficient of 12.023 at 99% confident level followed by G2C with a path coefficient value of 4.171 at 99% confident level. The influence is significant at the level of 0.1%. In contrast, the result shows that the influence of G2G to CPI is not significant at the confident level of above 10%.

Moreover, based on the value of R2 (0.764), these predictors altogether represent 76% of all variables that influence the Dependent Variable. As a result, only 24% variables unobserved through this model. In other words, among all variables that impact the Corruption Perception, G2C, G2B, and G2G altogether take a portion of 76%. Therefore, only 24% potential variables are not included in this study.

The last procedure is comparing the level of e-Participation readiness in countries, i.e., countries having high e-participation in contrast to countries having low e-participation. The high e-participation group is the countries whose e-participation index above or equal the mean of EPAR, as shown in Table 2, and vice versa for Low e-participation group. This study used a Multiple Linear Regression – grouping analysis. In this process, the path coefficients of the research model of countries with high e-participation index are compared to path coefficients of countries with low e-participation index.

The results of the assessments are presented in Table 5. It shows that having a high, as compared to a low, e-participation index significantly moderates the effect of government to citizen interaction (G2C).

TABLE 5. GROUP ANALYSIS

	High EPAR		Low EPAR		ΔCoeff.
	Coeff.	Sig.	Coeff.	Sig.	
G2C → CPI	6.693	***	3.768	***	77%
G2B → CPI	11.905	***	7.745	*	54%
G2G → CPI	0.814		3.959	.	80%

. significance at p=10% * significance at p=5%; ** significance at p=1%; *** significance at p=0.1%

(Source: Author)

6. FINDINGS AND DISCUSSION

6.1. Effect of Government-To-Citizen Interaction Using e-Government (G2C) on Perception of Corruption (CPI)

Results of the analyses indicate that having access to citizenry government service using ICT in obtaining online public service lead to the more positive perception of corruption, which supports H1. The analysis reports the estimated path coefficient of G2C and CPI as 5.8418 ($p=0.1\%$). This finding is aligned with similar studies on the role of online public service in combating corruption [22]. G2C reduces the opportunity for government officials to accept a benefit from a citizen in exchange for process prioritization. As shown by the case of OPEN System in South Korea and Bhoomi Project in India, the use of ICT in delivering public service lessens the information uncertainty regarding the completeness of public service delivery. ICT enable government agency to publish specific information to the citizens. As a result, the citizens are well-informed about the service that they have applied such as an explanation of the process stages, notification of the ongoing process, and clarification of the disputes that may exist [19], [37], [38].

6.2. Effect of Government-To-Business Interaction Using e-Government (G2B) on Perception of Corruption (CPI)

The most discussed G2B system in many literatures is about e-procurement system in government. As its original purpose is for reducing corruption in government procurement, the result of the analysis shows its positive impact. The analysis indicates that having procurement and taxation service using ICT lead to the more positive perception of corruption, which supports H2. The analysis reports the estimated path coefficient of G2B and CPI as 5.8418 ($p=0.1\%$). This finding is aligned with similar studies on the role of e-procurement in combating corruption [22]. G2B part of e-Government help government agencies not only in streamlining the procurement process but also in creating fair competitions among vendors [25], [34], [39]. While the fair competition occurred, the monopoly practices will shallow. Hence, the corruption will be diminished.

6.3. Effect of Government-To-Government Interaction Using e-Government (G2G) on Perception of Corruption (CPI)

Among three interactions in e-government, G2G is statistically the least significant factor to reduce corruption. As shown in Table 4, G2G has the p-value of 0.25 which is significant at 75% confidence level. Despite its low significance, G2G has a positive impact on the perception of corruption at the coefficient of 1.730. The result of this analysis follows previous research focusing on G2G. The objectives of G2G in e-Government development are to reduce the red type, to increase efficiency, to streamline the process business, and to increase productivity [40]–[42]. Only a few literatures on G2G address the initiatives for eradicating corruption. Most of the research discussed G2G within one agency in which G2G is to integrate all information system in a government agency such as integrating the Human Resource Information System with Finance Information System, connecting Core Business System with Performance Management System, and linking

Asset Management System with Accounting Information System. Those linkages are hidden from stakeholders, as a result, it does not give impact on the perception of corruption. However, G2G has its uniqueness for detecting corruption that involved government officers from two or more different government agencies. G2G strengthens government's monitoring capacity on other government agencies, thus, addressing bureaucratic corruption [26], [43].

6.4. Effect of e-Participation in Influencing G2C, G2B, and G2G Relationship with the Perception of Corruption (CPI)

To test the fourth hypothesis, two groups of Multiple Linear Regression were performed using mean split samples for e-Participation. In this process, the countries are split into two categories, i.e., countries with high adoption of e-Participation and countries with low adoption of e-participation.

As shown in Table 5, the level of e-participation moderates the G2C significantly since the change in e-participation will increase the coefficient of G2C by 77%. In addition, the level of e-participation does not influence the significance level of G2C on CPI. With or without e-participation, G2C is still the most significant factor of e-government on combatting corruption. Citizen-centric e-government is the most efficient for eradicating corruption [44].

On G2B, EPAR moderates the impact of G2B significantly at 54% increasing. Also, G2B will be more significant if e-participation adoption is high as shown in Table 5. In low e-participation countries, the significance level of G2B is at $p=5\%$ and $p=0.1\%$ in high e-participation countries. This result infers that the presence of e-participation will add more eyeballs to government side on e-procurement, as the most common implementation of G2B. More people are able to monitor the government procurement process, thus, discouraging unfair and monopolistic practice [45]–[47]. Also, it eliminates the room for discretion. As mentioned in the corruption equation model, the lower monopoly and/or discretion will lessen corruption.

On G2G, surprisingly, the presence of e-participation reduces the coefficient of G2G on CPI significantly at 80%. Also, the presence of e-participation lessens the significance level of G2G as shown in Table 5. In the high e-participation countries, G2G is not a significant factor. The result implies that with high e-participation, G2G is not significant for increasing the positive perception of corruption. Instead, G2G is highly expected to make government process more efficient and faster by integrating government information system [40], [48], [49]. The implementation of the lapor.go.id portal in Indonesia could be a good example to illustrate the result in which e-participation may reduce the role of G2G in reducing corruption. Similar implementation may also have occurred in other countries.

Lapor.go.id is the e-participation system initiated by Presidential Task Force on Development Monitoring and Control (UKP4). The system enables the citizen to report anything related to the performance of public services and

government officials. The report could be in the form of complaint, suggestion, or specific information. Through the specific workflow in the system, the report is distributed to respected government agencies for a follow-up [33]. Should the report involved two or more government agencies, they coordinate seamlessly through the system. This scenario shows that G2G is implemented through e-participation.

7. CONCLUSIONS

Utilizing Multiple Regression Analysis – Group Analysis, this paper attempts to enrich current literature on e-government as a tool for combating corruption by constructing three interactions in e-government and testing the relationship between those interactions and perception of corruption. Also, this study put e-participation as a variable that controls the impact of each interaction in e-government on corruption. Like a CCTV at public places, e-participation is a space for more people to act like CCTV; a special CCTV that gawps government officer’s misconducts.

Among those three interactions in an e-government enactment, G2G is not significant for curbing corruption. G2C and G2B are significant for increasing the perception of corruption. However, the level of significances differs among two groups of countries, i.e., high e-participation and low e-participation adoption countries. The result of a group analysis has shown that e-Participation adoption moderates G2G and G2B significantly, and not significant for moderating G2C.

In many cases, the government extends the reach of G2C by actively involved in social media. Social media is a kind of open space where there are many sources of potential eyeballs for making corruption suppressed. E-participation, to some stages, acts as a hub for many government agencies to collaborate seamlessly for solving social issues, thus, replacing a dedicated G2G channeling. As the statistical result says that the higher e-participation, the G2G becomes not significant for combating corruption.

China and Indonesia have experiences of how government strengthens the monitoring capacity through an interaction using a crowdsourcing platform. The Chinese government has shown the success collaboration with the citizens using Weibo, a non-government microblogging system. China case highlights the use of e-participation to strengthen the G2C interaction to be more powerful for detecting corruption. On another case, Indonesia introduces the LAPOR Portal as an e-participation system initiated by the government. Indonesian case highlights the use of e-participation to grease both G2C and G2G interaction. In addition to government-endorsed e-participation platforms, there are numerous community initiatives such as chage.org and ipaidabribe.com that encourage people around the globe to raise the voice for solving social issues in which corruption is one of the issues

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E-ADMINISTRATION OR E-GOVERNMENT – A PRELIMINARY STUDY ON NATIONAL INITIATIVES IN CHINA

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ABSTRACT

Since the first launch of “Three Golden” projects in 1993, China has activated national initiatives regarding e-Government issues including continuous plans and specific administrative regulations with a history of over 20 years. However, the performance of Chinese e-Government keeps being estimated to a low position in related international rankings. Before figuring out the cause of dismal evaluation, there is a necessity to discuss the connotation and history of e-Government in China to help outsiders acquire a better understanding of the situation. This paper provides an overview of e-Government initiatives to have an insight into the priorities of government, which might be affected by the ideology of authoritarianism in China. It also identifies the essence of e-Government in China to a close stage to e-Administration by taking a cue from typology theory of citizenship management using ICTs. A clear image of government’s purpose and practice in existing initiatives can

make a contribution to the future policy-making and improvement of China e-Government evaluations. Furthermore, this case can contribute to research for other authoritarian regions who may face a similar situation in promoting e-Government.

Keywords— e-Administration, e-Government, China, typology of citizenship management, ICTs

1. INTRODUCTION

The e-Government initiatives in China have launched from 1993, including continuous plans and specific administrative regulations with a history of over 20 years. In the same year 1993, the former U.S. Vice-President Al Gore initiated the famous “information superhighway” term which was considered as the beginning of high-speed network infrastructure building. Compared with America, China started information system construction almost at the same time. However, after 20 years America has kept top 10 for at least ten years in international e-Government rankings. United Nations (UN) [1] and Waseda University in Japan (Waseda) [2] both have published International E-Government ranking periodically. According to their research, China has been evaluated a low rank during the past 10 years (wandering in the 70th of all 193 countries in UN’s ranking and 30th of 60 countries in Waseda’s ranking). Tracing back to the history of Chinese-Government’s initiatives, various projects and plans on e-Government have been published every year, with actual

implementation according to the documents. Then, what leads to the low performance in rankings though it seems like feasible enactments and endeavors have been carried out? The answer could be found after the analysis of national initiatives and their connotative objectives considered ambiguous so far.

In the following sections, the paper will provide an overview of e-Government history in China, moving forward to the contents to grasp the essence of national initiatives, which might be affected by the ideology of authoritarianism in China. By consulting typology theory of citizenship management using ICTs, It is suggested that the essence of e-Government in China is close to e-Administration stage. The nature of national initiatives may be explained as a critical factor impacting upon the performance of Chinese e-Government in the international rankings. Also, similar situations can happen in other authoritarian countries in promoting e-Government development.

2. HISTORY OF E-GOVERNMENT NATIONAL INITIATIVES IN CHINA

E-Government initiatives in China have been activated firstly in 1992, under the direction of the Chinese Communist Party (CCP), the State Council general office initiated the ICT plan to build an office automation system [3]. In the next year 1993, China initiated the Three Golden Projects to build sophisticated information network throughout the country [4]. The “Three-Golden” projects literally mean golden bridge/card/gate (Jing Qiao/Jing Ka/Jing Guan), to establish the fundamental national information infrastructure by building digital currencies/trading/personal identification systems, etc. In 1999, “Government Online” project (Zheng Fu Shang Wang) was launched as one of the vital plans at an early phase to bring the central governmental departments and local governments of the first-level administrative divisions online [5]. In December of the same year, China government founded an organization called national information leader group which consisted of Vice Prime Minister and members of the standing committee. This organization has become the top decision-making body for master plans, information policies and standards of e-Government in China [6].

Table 1 below has shown a timeline of national e-Government initiatives in China, though the official word “E-Government” indeed appeared in 2002 later. In addition, the table has summarized exist law/project/general

plan/administrative regulation into 3 sections to gain a clearer impression of the entire development course.

TABLE 1: TIMELINE OF NATIONAL INITIATIVES REGARDING E-GOVERNMENT IN CHINA

Year	Name of Statement	Nature
1993	“Three-Golden” project	Project
1999	“Government Online” project	Project
2000	Tenth Five-Year Plan	General Plan
2001	National information system construction plan 2001-2005	General Plan
2002	“E-Government construction” announcement	Project
2003	Foundation of national open information leader group	Administrative Regulation
2004	The law of E-Signature	Law
2005	“E-certification service” “central government portal site”	Administrative Regulation
2007	“Government Open information”	Regulation
2008	“Digital City Plan in 30 cities” “National E-Government project-Archives Management”	Project Administrative Regulation
2009	“External internet construction of E-Government” “Evaluation Indicators for government portal site”	General Plan Administrative Regulation
2010	“Website-domain-name security improvement” “Information development in rural districts Plan 2010~2012”	General Plan
2011	“Twelfth Five Year Plan of National E-Government “ “E-Government platform charge specification” “Government Open information in county level based on E-Government platform”	General Plan Administrative Regulation
2012	“Twelfth Five Year Plan of National E-Government information development”	General Plan
2013	“Key business for Government Open Information” “National E-Government construction improvement”	General Plan Administrative Regulation
2014	“Information for citizens Plan”	General Plan
2015	“E-certification Regulation”	Administrative Regulation

2.1. ICT infrastructure development

Project of ICT infrastructure development was the first initiative related to e-Government launched in 1993 named

“Three Golden” Project, After which China-government began to set up ICT infrastructure development goals in general plans, for instance, the Tenth Five-Year Plan (2001-2005), one of a series of social and economic development guidelines shaped by the Communist Party of China(CCP). “Prospering national economy and social IT maturity levels” was listed among the total 12 basic tasks [4].However, for the specific objectives of infrastructure development, there are no quantified goals mentioned in the plan rather than simple guides such as “improving infrastructure development level constantly” in the twelfth Five Year Plan of National E-Government information development [5].

2.2. BPR (Business Process Re-engineering)

BPR in China still has lacked a comparatively legible definition compared with comprehensive theories evolving in advanced countries. Instead, there rises the concepts as known as GPR (government process reengineering) or Reinventing Government prevalent in government’s political philosophy which have similar contents with BPR [6]. However, some of the viewpoints from academics regarding the relationship between Reinventing Government and e-Government differ in prospective, considering e-Government as a suitable tool to achieve Reinventing Government [7]. Among all the initiatives have been published by the Chinese government so far, there are only two regulations, “E-certification service” in 2005 and “National e-Government project-Archives Management” in 2008 mentioning internal process reengineering inside departments of government. Furthermore, there are obviously no lucid national plans of management optimization in e-Government field.

2.3. Online Service

Government website construction has been valued as a persistent goal for e-Government implementation in China. Distinct key plans including “Central government portal site” in 2005, “Government portal site construction” in 2006, “Evaluation Indicators for government portal site” in 2009, “E-Government platform charge specification” in 2011, stipulating national standard for government website construction by regulations. According to Waseda-IAC e-Government Ranking, online services refer to the systems of e-procurement, e-tax, e-custom, e-health and one-stop service.[8] The Ministry of Industry and Information Technology (MIIT) has brought out “Evaluation indicators for government portal site” in 2009, putting forward 3 main indicators known as “government open information” “E-procedure” “G to C (government to citizen) interaction” and 3 sub-indexes of each [9]. It was the first time to observe the standard of measurements quantified more specifically in sub-indexes written as “volume of open information by request”.

Government open information has shown its significance in the blueprint of e-Government. Nevertheless, it should be paid attention to the distinction between “open information” and “open data”, which both may reflect the openness of a government but taking into account different tiers and amounts of released information to citizens. China has put

effort to opening information with the unique Decree issued by State Council in 2007, named “Government Open information” Referring to the regulation, it shaped the scope of information to be opened in diverse government level, together with the basic process and procedure. Each prefecture should present annual reports to central regarding the progress of local government information opening implementation [10]. In the next years, general plans expressing specific criterions of the working process such as “Government Open information in county level based on E-Government platform” in 2011 and “Key business for Government Open Information” in 2013 have been enacted abidingly.

3. REVISION ON TYPOLOGY THEORY OF CITIZENSHIP MANAGEMENT USING ICTS

3.1. The typology theory of citizenship management using ICTs

The typology theory of citizenship management using ICTs has been put forward after two year research-action study in the town of Vandoeuvre (France), in which they elaborated four types eventually: e-Administration, e-Government, e-Governance and The Learning City. (Fig.1)

	E-Administration	E-government	E-governance	The Learning City
French Republican principle	Government for the people	Government of the people	Government by the people	Government according to the people
Citizenship's component	Rights	Duties	Participation	Moral values
Role given to the citizen	Consumer	"Passive" agent	Actor "Active" agent	Defining the rules to follow
Underlying logic	Delivering services, improving satisfaction of citizens, presenting local government policy	Improving the chance of a policy's success	Encouraging deliberation, participation and development of local democracy	Learn how to learn. Deciding according to mutually determined criteria
Role of local elected	Regulating, improving administration performance	Understand the opinion of the citizens using consultation. Improving acceptance of a policy by citizens.	Protecting free expression, regulating infrastructures	To be created

FIGURE 1: “FOUR TYPES CITIZEN RELATIONSHIP MANAGEMENT USING ICTS” [11]

This classic theory of four-type-citizenship management using ICTs has inspired subsequent research with its distinct description on the relationship types between citizens and government in ICT utilization. Okewu et al (2015) have introduced e-Administration, e-Government, and e-Governance to the reusable components for e-Democracy diagram [15]. Though adequate discussion regarding to “The learning city” category were not observed, classification of the former three “e-Administration” “e-Government” and “e-Governance” has

provided illuminating thoughts for exploring citizen-government interactions.

	EAdministration	E-Government	E-governance
Role given to the citizen	Consumer	Passive agent	Actor Active agent
Citizenship's component	Rights	Duties	Participation
Underlying logic	Delivering services, improving satisfaction, presenting government policy	Improving the chance of a policy's success	Encouraging deliberation, participation and development of local democracy
Corresponding ICT's role	Online administrative services E-procedures Government open information	E-consultation, using an e-voting methods and tools.	Collaborative tools. Online construction of collective propositions
E-service level	Emerging	Enhanced	Transactional, Connected

TABLE 2: REVISION TYPOLOGY THEORY OF CITIZENSHIP MANAGEMENT USING ICTS

3.2. Revision typology theory of citizenship management using ICTs

Though e-Administration has still remained one of the basic concepts for e-Government development theories, the term of e-Administration has faded away gradually and replaced by E-Government or E-governance in theoretical and practical domains. More studies have emerged with the discussion in the difference between e-Government and e-governance through citizen/organization centricity [16]. But the concept of e-Administration still leaves its rationality behind as to be discussed in the following chapter. In this section, the paper provides a revision based on the typology theory (Table 2) to observe and identify e-Government ideological type.

The author added “E-service level” to the revision and deleted “Role of local elected” character since there are obviously no campaigns or approved democratic elections in China and some other authoritarian countries. The category for e-service level came from the stages of online service development in UN e-Government survey [17],

dividing into four stages: Emerging information/Enhanced information/Transactional/Connected services. This revision of typology theory could be used as a reference to verify the essential of e-Government ideology promoted by the national government.

4. E-ADMINISTRATION CHARACTERS OF CHINESE E-GOVERNMENT

4.1. Previous research on e-Administration

E-Administration has been interpreted diversely by scholars focusing on from its theoretical connection to empirical practice. Wang et al (2010) have regarded e-Administration as one the three main contributions of e-Government, which means improving government processes including cutting process costs; managing process performance; making strategic connections in government and creating empowerment.[18] Some researchers have equated e-Administration as back office system [19], similar to the views of explaining it as an administrative online system[20]. Considering the role of e-Administration on the interaction between citizen and government, Jansen (2005) has introduced e-Administration as electronic information based services for citizens, and also proposed it as one of the three major dimensions in e-Government initiatives as e-Democracy, e-Service, and e-Administration [21]. Garcia et al (2015) have put e-Administration in the position of administration process interacting with the government in use of ICTs [22]; e-Administration has also been explained as using ICT to leverage-Administration in the public sector [23]. In a summary of related research, Bouzidi et al (2015) has concluded e-Administration is a multidisciplinary field that comprises social sciences, law, computer sciences, information, communication science and management sciences as one of the main disciplines, they also have identified e-Administration to the information level of e-Government: the use of platforms for e-Administration promotes better information management and this process is accompanied by a dematerialization of information dedicated to the administrative domain [25].

In choosing the typology of citizenship relationship management using ICTs, this paper places emphasis on e-Administration characters and its similarities to the national development initiatives of China e-Government.

4.2. E-Administration characters of Chinese E-Government

In chapter 2, three basic components of e-Government initiatives in China have been summarized as ICT infrastructure development, BPR (Business Process Re-engineering) and Online Service (including government open information). Next, the paper will discuss the e-Administration character of e-Government in China by observing each sector defined in revision typology theory of citizenship management using ICTs.

4.2.1. Role gave to the citizen

“Service-oriented government” is one of the Government philosophies proposed by former Premier Wen Jiabao at 2004. The concept has been mentioned constantly on many

significant political occasions, especially in 17th Chinese Communist Party National Representatives Congress, in which the leader determined “Building service-oriented government” as a core goal for administration reform. [25] It is not easy to find specific and official explanations of this concept except Wen indicated building service-oriented government is to innovate-Government management into service level and provide better public service for citizen and the whole society. A plenty of research in public administration field have explored the movement of building service-oriented government in theoretical and practical way, and brought out the topic of relationship between service-oriented government and e-Government, which has been presented the first time at “National information development strategy2006~2020” : improve public service via e-Government stretch into community and rural area, to build service-oriented government by improving contents and quality of public service [26]. Thus, e-Government has been considered as ICT tools to promote-Government’s philosophy, in which citizen is classed as “consumer” to receive public service from government.

4.2.2. Citizenship’s component

The concept of “service-oriented government” stipulates government serving citizen as a consumer with better public service, while a citizen has rights to claim and demand their needs of the service. Therefore, citizen entitles to express opinions on administrative affairs which can be considered as goods provided to them directly from the government. E-Government in China also can help a citizen with extensive channels for delivering consumer’s voice on public service improvement.

4.2.3. Underlying logic

As e-Government in China has been designed as a tool for improving productivity and performance of government, citizen/consumer’s satisfaction would be a significant indicator to be weighted in the evaluation. National Development and Reform Commission (NDRC) has published “Information for citizens Plan” (2014) to enlarge citizen’s benefit by informatization [27]. The document has mentioned diverse and personalizes needs from citizen press for better information utilization. Furthermore, policy-making for information utilization should be citizen-centric aim to improve livelihood and satisfaction of people.

4.2.4. Corresponding ICT’s role

By examining national e-Government initiatives we have asserted government website improvement is a vital issue for e-Government development in China. Delivering online service is a basic need and required to keep improving at every moment. Even the most advanced countries have to innovate their services within ICT evolution incessantly. To the case of China, 3 main indicators for evaluating government portal site which has been published by MIIT can be considered as the target e-services at the present stage. Among them, online administrative service including e-Procedure is the fundamental mission for e-

Administration mode. Besides, government open information which is relevant to transparency concerns the “service-oriented government” philosophy for being responsible and open.

4.2.5. E-service level

According to UN e-Government survey, the “stage1 emerging information services” corresponds to information, document and service provision for public policy, governance, regulations, etc. In China, “Government portal site construction” (2006) has formulated guidelines for online service development [28]. There is explicit clause about information provision differ in each level of government, for instance, national and authoritative announcement by the central website, local information by municipal level. At the same time, online administrative services including documentation downloaded and e-procedure chiefly belong to the local government.

From inspecting relevant policies, we can evolve the e-Administration character in Chinese e-Government promotion. Compared with e-Government/e-governance modes, the key points has been placed in the improvement of productivity and performance of existing government, better public service delivery and efficient administration with ICT utilization. In regard to transactional level by collaborative tools, such as e-vote, e-consultation systems are absent in the map of Chinese e-Government promotion. Especially, the philosophy of e-democracy which e-Government can empower citizen to reach the advanced political realm has rare chance to launch in China so far according to the national initiatives up to now.

These policy preferences could lead to low performance in international e-Government rankings in which e-Democracy is of much importance evaluation factor that reflecting in indicators of online services, e-participation, etc. The alike problem could arise in other authoritarian countries while they consider designing e-Government structure for adapting existing political and economic environment, resulting in receiving a low evaluation from international e-Government surveys.

5. CONCLUSION

This paper provided an overview of e-Government national initiatives in China, followed by the discussion on their strategical contents and revision typology theory of citizenship management using ICTs, then the paper has suggested that e-Government in China draws close to the features of e-Administration type at present according to the national promotions.

Lack of collaborative tools for citizen participation can hamper the progress of e-democracy development, but more importantly, a nation’s e-Government strategy which in the absence of transactional and connected idea would lead to the democracy deterioration with ICT utilization.

Providing a consolidated and justified model can avail against the confusion in e-Government development. Meanwhile, international evaluation standards could help each country formulate reasonable strategy compared with advanced nations. The future research will focus on the

amendment of e-Government model and the creation of benchmark for verifying and assessing e-Government implementation which may differ in nation’s ideology.

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FEDERAL SPENDING DATA ON A DEADLINE: THE DEVELOPMENT OF USASPENDING.GOV

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ABSTRACT

Open Data has become an international buzzword for governments trying to present themselves as transparent and citizen-centered. In the United States, there are now many government-administered sites that offer open data sets, including Data.gov, Census.gov and Recovery.gov. However, USAspending.gov stands as one of the pioneer open data websites in the world, and the story of its development is instructive. This paper tells that story by combining details from the public record with first-hand accounts from individuals who played major roles in the development process.

Keywords— e-Government, procurement, USAspending.gov, CIO, non-profit, IT development, Open Data, transparency, good governance

1. INTRODUCTION

USAspending.gov is a publicly viewable and searchable website that hosts data regarding U.S. Federal contracts and expenditures. Any user can search all Federal contracts for data by state, by congressional district, by company, by date, by award amount, and more. Users can also download datasets in a variety of formats according to their own specifications. The website was mandated by the Federal Funding Accountability and Transparency Act of 2006. This bill was introduced by four Senators, including Barack Obama and John McCain, and signed by President George W. Bush in September 2006. The relevant portion of the law mandated that “not later than January 1, 2008, the Office of Management and Budget shall... ensure the existence and operation of a single searchable website, accessible by the public at no cost to access.” [1]

This left just over a year for the Office of Management and Budget (OMB) to create a website from scratch that fulfilled the legislation’s requirements. They also had to find a way to do this with existing funds, as the Congress had not appropriated any new funding for the project. In the end, the website launched ahead of schedule and cost far less than initial estimates. Even the individuals most closely involved in the development of USAspending.gov acknowledge that it is not without its flaws (some of which persist today). However, what they were able to achieve under the time and budget constraints that existed qualifies the project as a success story worthy of closer examination.

2. FEDERAL FUNDING ACCOUNTABILITY AND TRANSPARENCY ACT

Preparations for what was to become the Federal Funding Accountability and Transparency Act (FFATA) began in early 2006. At the time, Gary Bass, founder and executive director of the non-profit group OMB Watch, had been meeting sporadically with Mark Tabscott of the Heritage Foundation, a conservative think-tank. While the two groups were ideologically opposed, they found common cause on the issue of bringing transparency to the process by which the federal government spends taxpayer dollars. The impetus was the effort to rebuild New Orleans after Hurricane Katrina in 2005. Federal money began pouring in to assist with relief efforts, but nobody could track exactly where this money was going, and who was receiving the assistance. This led to widespread criticism and distrust from both the left and the right and began to forge a rare alliance in the name of transparency in government spending. As Mr. Bass characterized it, “the right wanted to use spending data to make the argument for shrinking government; the left wanted to use the data to improve the way government operates.” [2] Looking back in 2008, Mr. Tabscott recognized the push for the FFATA as the beginning of the “transparency movement,” a cause that joined both liberal and conservatives and constituted “the first genuinely transpartisan political development of the Internet age.” [3]

Though their initial meetings proved unproductive, Mr. Tabscott invited Mr. Bass back after Oklahoma Senator Tom Coburn expressed interest in developing a bill to increase government transparency in spending. Before long, freshman Illinois Senator Barack Obama was also attached. The Heritage Foundation quickly produced a draft version of the bill and gave it to Mr. Bass for review. He was unimpressed at first, but provided edits and additions to the draft on a short timeline of just a few weeks. Mr. Bass noted that this was an unusually rushed process. “It [normally] takes about five or six months to really develop a bill,” he said. “If you do it properly it takes a while because you shop it, you... refine it, you have experts review it.” [2] In this case, there was no time for such considerations. Despite his reservations, Mr. Bass and his staff at OMB Watch made some revisions to the bill and returned the draft to Heritage.

With a draft of the bill in hand and bipartisan cadre of high-profile senators supporting it, the bill began to look like it stood some chance of passage. The White House, while remaining non-committal, seemed more willing to sign than to veto should the bill reach President Bush’s desk. Encouraged, the bill was finalized and preparations were made to bring it to the floor.

All of a sudden, this progress was halted. An anonymous senator had placed a 'hold' on the bill, meaning that it could not proceed until the hold was withdrawn. Supporters of the bill were outraged, and activists within the blogosphere (mostly on conservative sites like Porkbusters) were immediately activated. One website posted pictures of all one hundred senators and placed an X on their face only after they had issued a clear denial of having placed the hold. After a few days, it was confirmed that the initial hold had been placed by Alaska Republican Ted Stevens. [4] Shortly afterwards, it was determined that West Virginia Democrat Robert Byrd had also placed a hold. Both senators had long reputations for using their seniority and influence to secure federal dollars for their respective states, and they were accused of holding the bill for related reasons. They both quickly withdrew their holds after being targeted with concentrated bipartisan outrage and lobbying efforts. [5] With these holds withdrawn, the bill passed the Senate easily. It passed the House less than a week later and was signed into law by President Bush on September 26th, 2006.

3. FEDSPENDING.ORG

In all, the bill took nearly six months between its introduction in the spring and its passage into law. At the outset, some critics contended that the bill was unrealistic or overly costly. Senator Coburn had insisted that the bill be extremely inexpensive or even cost-free in order to maintain his support. This led many observers to question the feasibility or even the desirability of developing an open government spending site on the cheap.

Rather than waiting around for the wrangling lawmakers to pass the bill, OMB Watch decided to go forward independently by designing a website that approximated the FFATA's requirements. This site eventually became FedSpending.org, and it was developed from scratch and launched within six months of its conception [6]. This was no easy feat, however.

The first consideration was funding. Without a law in place, no federal dollars were available, and funding had to be acquired independently. OMB Watch applied for a grant from the Sunlight Foundation and received one in the amount of \$334,272 over three years. They raised the remainder of the necessary funds independently.

Relative to its ambitions, this was a small-scale project. There was only one full-time coder and one designer. Two other OMB Watch employees managed the day-to-day development and oversaw the project's budget. However, the team managed to put together a functional site by October 2006, shortly after the FFATA's passage, and more than a year before the January 2008 deadline mandated in the law [2].

One of the most significant challenges facing the team was the lack of uniformity of data and records throughout the federal government. A few agencies maintained detailed and digitized records, and some even made these available to the public. Such cases, however, were rare exceptions rather than the rule. In many cases, there were large gaps in spending records, discrepancies in data collection and

reporting methods, a lack of digitization, and a lack of publicly available data. These limitations made it clear from the outset that there would be no way to create a perfectly accurate site within the projected timeframe without significant reforms from inside the government.

However, FedSpending.org did capture the public's interest and attention immediately upon its launch. The response was mostly positive and uncommonly bipartisan. Conservative bloggers, like the popular site Porkbusters, used it to highlight instances of wasteful government spending [7]. Liberal bloggers used it to point out excessive payments to large, well-connected contracting companies. Despite its acknowledged limitations, the site was working as intended.

4. AN UNLIKELY PARTNERSHIP

As mentioned, the FFATA mandated that a searchable spending database be available to the public by the beginning of 2008. The Office of Management and Budget (OMB) was responsible for making this happen, and the timeline of the bill left them with about fifteen months to develop and launch the site.

In the fall of 2006, amidst the passage of the FFATA and the launch of FedSpending.org, OMB Watch approached officials from the OMB offering to adapt FedSpending.org rather than starting from scratch with their own government website. "We didn't really expect to hear back," said Mr. Bass. "Shockingly, within a couple weeks, I would say by mid-December, I got a call from Robert [Shea]." [2]

At the time, Robert Shea was a deputy director of the OMB. When the bill that became the FFATA first started gaining steam among lawmakers, Mr. Shea was tasked by the White House with killing it. The White House's argument—and the argument that Mr. Shea was selected to present—was that the FFATA was unnecessary and redundant. One of the explicit stipulations of the draft bill was that no new data be collected. Senator Coburn and his staff had inserted this language in order to avoid any new, potentially costly burdens on federal departments and agencies. But, the White House argued, if no new data is being collected or released by agencies, then the entire bill is a waste of time and resources.

Mr. Shea, along with subject matter experts from within the administration, began to make this argument to lawmakers and staffers on Capitol Hill, but he soon became convinced that the bill was, in fact, necessary. While the data was already being released by individual departments and agencies, "it wasn't very good, and it wasn't very accessible. It wasn't like Google for Government. You had to have a password, or you had to know Access database technology to get it." As he puts it, "the experts did the opposite of what their goal was." The more members of Congress learned about the manner in which data was being released to the public, the more they realized that the reform in question was necessary [8].

Having been convinced of the worthiness of the project himself, Mr. Shea lobbied internally to gain responsibility for it. He did not have a tech background, but he had prior experience developing OMB's ExpectMore.gov

accountability website and thought his participation in the shaping of the FFATA gave him insight into what Congress was looking for [9].

Mr. Shea's role within OMB had been to improve internal performance and accountability. In this role, he was often at odds with OMB Watch, but he worked closely with the organization and saw the project through in the end.

5. LESSONS AND CONCLUSIONS

5.1. Lack of Tech Expertise

One of the most important lessons to be taken from this episode is that legislation—even when it is deeply involved with questions of what is or is not technologically possible—is not usually written with an informed understanding of the relevant technology. Most legislators and their staffs come from a legal background, and very few have any experience with creating an online database or managing a tech project on any scale. Thus, they generally have a hazy understanding of how long a project will take, and how much it will cost.

As Gary Bass pointed out, many in the government were originally estimating that USASpending.gov, as outlined in the FFATA, would cost up to \$55 million and take five years to develop. In the end, the site cost about \$600,000 and was developed in less than a year. This type of climate, in which legislators and bureaucrats have little understanding of the costs or timelines of large projects and often receive estimates and advice from specialists with vested interests in potential contract bidders, can lead to confusion, distrust, and waste of taxpayer money. As Robert Shea put it when discussing his early efforts to find a contractor to develop USASpending.gov, “I got a lot of advice from a lot of people who, I think, wanted to make a lot of money implementing the legislation.”

In this case, an excessive contract award was avoided because the winning bidder was affiliated with a nonprofit organization that had already done much of the development work at a low cost. However, elected representatives, their constituents, government auditors, and watchdog groups must be careful not to be misled into wasting money on tech projects that could be completed faster and for less money. A lack of tech expertise among appropriators bears the risk of misallocating funds or applying ineffective oversight.

5.2. Public-Nonprofit Partnership

One of the most unique aspects of USASpending.gov's development was the partnership of a progressive watchdog nonprofit with a conservative administration. As Robert Shea describes it, his relationship with OMB Watch prior to this project was one of distrust and antagonism. “OMB Watch was an extremely partisan organization,” he said. “They were extremely critical of my efforts which were basically to assess and report and improve program performance. I promise you there was no hidden agenda. But they would get stories printed about how terrible what I was doing was.”

Then-OMB Watch President Gary Bass does not disagree. “Every day we were out there beating him up!” Despite

this, the two ended up forging “an unnatural partnership” that successfully developed USASpending.gov on time and under budget. This would not have been possible without the cooperation and proactivity of both sides. OMB Watch developed FedSpending.org as proof of the feasibility of such a website. When the FFATA passed, they tweaked the design to fulfill the law's requirements as completely as possible. In doing so, they made it nearly impossible for FFATA opponents to attack the law as impractical and expensive. And they provided the government with a clear benchmark by which to measure competitors' cost estimates and timetables. As discussed in 5.1, this is especially important when dealing with tech projects that are not always readily understood by appropriators.

On the government side, OMB should be commended for working with OMB Watch despite their previously frosty relationship. In order to do this, OMB had to jump through several bureaucratic hoops in the procurement process to justify their decision not to open up the contract to outside bidders. After months of delays and a Request for Proposal (RfP) issued by the General Services Administration against OMB's will, they had to procure FedSpending.org by adding it on to an existing IT contract. The whole process took eight to nine months. OMB likely would not have gone to these lengths if they had not been presented with a quality product that met their requirements.

This type of public-nonprofit cooperation is all too rare, especially between watchdog groups and the government agencies that they are monitoring. Often, relationships are too hostile and suspicious to produce any fruitful collaboration. In this case, too, the relationships were strained and antagonistic, but both parties stayed focused on the goal at hand. This case is a reminder of the importance of a strong civil society. If OMB Watch did not have the funding, expertise, and will to create FedSpending.org, it is likely that the initial launch of USASpending.gov would have been rushed and over-budget. The launch of Healthcare.gov in late 2013 showed that even established private contracting companies with experience on major government projects can release a deeply flawed product without the government receiving a prior warning. This has led to skepticism about whether the federal government can manage large-scale tech projects overall. The USASpending.gov case shows that an engaged civil society and a receptive, proactive government can form a close working relationship and overcome many of these difficulties.

5.3. Shortcomings

USASpending has not fulfilled all of the hopes of its developers. The site provides tools to users who want access to information about federal contracts and grants. It supplies researchers and bloggers alike with a quick way of searching which companies or congressional districts receive the most federal funding. However, many argue that the site still does not do enough to promote a more participatory and informed electorate. The site still falls short of its original vision of creating, as Senator Tom Coburn put it, Google for Government.

Specifically, Gary Bass (now executive director of the Bauman Foundation) believes that the site could do more to connect spending data to the things that people care about. For instance, companies could be listed not only by how many federal dollars they received in a given year but on their compliance record with federal labor or environmental regulations. Without this data included on the website, it is difficult for citizens and nonprofits to determine whether federal dollars are being awarded appropriately.

Another challenge is that, while the site was modified to include secondary contractors in 2010, it still does not trace each dollar to its eventual destination. The current data collection process only includes the prime contractor and a subcontractor, but the actual flow of federal dollars is much more complex. This makes it difficult to determine exactly where the money is going. It is also difficult to determine who is benefiting. Award money is reported in terms of legal corporate entities, but these relationships are complex and ever-changing. Many separate legal entities can fall under the umbrella of one parent company, and new entities can be created at any time. For example, L-3 Insight Technology Inc. and L-3 Communications Holdings Inc. are tracked separately despite belonging to the same parent company. USASpending does not account for these complexities, and the result is that some of the data can be misleading.

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