

Toward an Integrative Framework of Dynamic Capabilities in Innovation-based Public Services: Empirical Analysis in Taiwan

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With the growing significance of public services in developed countries, there is an increased interest in the role of service innovation in governments. While most studies provide empirical analysis on how innovation serves as a promising means of improving public services, little attention has been paid to recognizing which assets and dynamic capabilities are at the heart of service innovation and how successful examples can be identified or classified. The view on this subject remains fragmented, reflecting the need to explore how institutional incentives affect public service innovation. Therefore, the focus of this study is to theorize the concept of service innovation in the public sector to achieve a consensus regarding what types of competitive strategy are the main components of innovation-based public services and to what extent their emergence can be set in motion by institutional design or policy interventions. Based on applications of the public service innovation awards launched by the central government in Taiwan, this paper illustrates the trajectory of innovation through the different approaches of public management. The methods of data collection and analyses of the award-winning agencies are outlined, followed by cluster analysis. The results of the analyses and findings are discussed, and finally, implications for theory and practice are provided.

Keywords: public service innovation, dynamic capabilities, innovation-based public service, cluster analysis

INTRODUCTION

As one of the biggest service industries, a major role of governments is to provide services to the public. However, the traditional perspectives of government bureaucracies have been challenged by expectations of a reduced debt burden, complicated policy issues, and the development of information and communication technologies. A growing need for efficiency and effectiveness by governments around the globe is continually leading the search for new control and service delivery strategies. As such, an extensive amount of research confirms that innovation can play a critical role in bringing about change in public services (Morse & Buss, 2008; S. P. Osborne & Brown, 2005). Accordingly, in many countries, innovation is recognized as a key means of meeting the increasing demand for high-quality public service and government effectiveness in environments with shrinking resources. When governments embrace and promote the concept of innovation as a crucial

determinant of competitiveness and national progress (Boyne, Gould-Williams, Law, & Walker, 2005; Light, 1998; D. Osborne & Gaebler, 1992; Rogers, 2003; Walker, 2008), the government bureaucracy should acknowledge the compelling need for service innovation and develop an integrated body of knowledge to support ongoing innovation in the processing, delivery, and improvement of services (Borins, 2000).

While most studies provide empirical evidence on innovation as a promising means to improve public services, little attention has been paid to recognizing which assets and dynamics are at the heart of service innovation and how to identify or classify successful examples. Research on this subject remains fragmented, reflecting the need to explore how institutional incentives affect public service innovation. In particular, the critical task of evaluating the impacts of public service

innovation regarding competitive strategies that can achieve the best results has been largely ignored due to inaccessible data or the intricate procedural complexities involved. Since the concept of service innovation has become so prominent, we need to know more about how to institutionalize innovation as a core value and foster a performance-oriented culture to build the legitimacy of governments.

Therefore, the focus of this article is to theorize on the concept of service innovation in the public sector to achieve a consensus regarding which competitive strategies are the main components of innovation-based public services and to what extent their emergence can be set in motion by institutional design or policy interventions. In contrast to the private sector, the drivers of service innovation in public organizations are the improvement of service performance and widespread improvements, which enable greater individual and collective engagement in achieving desirable social outcomes (Moore, 1995). Indeed, the government takes on the main responsibilities in introducing innovations by means of regulations and resource allocations to sustain the operation of social production systems (Moore & Hartley, 2008). It is necessary to provide empirical evidence in order to understand service innovation that can differentiate the contexts of the public sector from business models.

This paper uses research based on applications of the public service innovation awards launched by the central government in Taiwan to illustrate the trajectory of innovation through the different approaches of public management. As Taiwan and other nascent democratic countries have gone through the process of democratic transition, it is imperative for them to have good governance in order to reinforce the legitimacy of their governments. In particular, faced with the political divisions of ethnicity, national identity, and regional division, “one-size-fits-all services” cannot satisfy the immense needs and expectations of citizen groups and communities. Governments need to have the skills, opportunity, and motivation to innovate effectively and successfully in order to meet these challenges. Consequently, a series of administrative reforms according to the principles of New Public

Management was adopted by the Executive Yuan in 1993. In the transition from authoritarian government to democratic bureaucracy, the election of political leaders had transformed the constitutional body as well as the quality improvement of government services.

Due to restricted natural resources and its geographic disadvantage, there is an urgent need for the Taiwanese Government to come up with a plan to improve its competitiveness by leveraging opportunities using strategic plans and ensuring ongoing improvement. Since the award schemes have become a popular marketing tool to enhance the visibility of award organizers and benchmark quality diffusion (Bovaird & Löffler, 2009; Hartley & Downe, 2007; Holzer, Charbonneau, & Kim, 2009), the Executive Yuan designated the “Government Service Quality Award” (GSQA) as a means to upgrade service improvement into service innovation. According to the results published by Switzerland’s Institute of Management Development (IMD),¹ in 2011 Taiwan was rated sixth amongst 59 countries in terms of overall competitiveness. The key attribute through which the government can make constant progress is innovation.

This study first reviews recent efforts to address the dynamic capabilities-based view of competitive strategy. We draw from the literature on service innovation-based competitive strategy and integrate typologies of public sector innovation into an assessment framework; this then provides the foundation to analyze innovation-based public service. Next, we outline the methods of data collection for the award-winning agencies analyzed, after which we use cluster analysis. The results of the analyses are presented in the following section. Finally, we discuss the implications and limitations of this research and offer some suggestions for future inquiry.

SERVICE INNOVATION IN THE PUBLIC SECTOR

Service innovation refers to new or significantly improved service concepts that create additional

¹ http://www.vi.is/files/IMD%202011%20-%20listar_831280280.pdf

value for organizations and their customers (den Hertog, 2000). Different from private companies, commercial competition is replaced by pressure from the public for more transparency, efficiency, and higher service quality. The driving imperative for service innovation in the public sector is the need to respond effectively to the public in an increasingly complex environment. In general, two fundamental rationales for service innovation can be identified. First, the economic rationale focuses on budgetary pressure and restricted resources that have forced governments to improve service systems. There is constant pressure to do more with less; as a result, governments contemplate following a business-like model that emphasizes market orientation, efficiency drive, downsizing, and decentralization (Box, 1999; Boyne, Farrell, Law, Powell, & Walker, 2003; Pollitt & Bouckaert, 2000). These reinventing governments introduce entrepreneurship into the reform process, which highlights the risk taker and rule breaker who can adopt innovative ideas and implement astute initiatives to reform governments (Berry, 1994; Doig & Hargrove, 1987; Osborne & Gaebler, 1992).

The second aspect is the strategic rationale, which has a holistic focus on the broader view, looking beyond traditional boundaries and mental models of governments (Moore & Hartley, 2008). The pressures from different stakeholders push public organizations to transcend traditional boundaries to deal with new challenges and substantial issues. The economic rationale is insufficient to explicate innovation dynamics in the public sector. There is more than one request for continuous improvement and growing thoughts about interactions among the formal operations of each institution and the surrounding network forces in the service system. Instead of focusing on economic needs and expectations, service innovation requires open-minded and creative exploration of the realm of possibilities in order to achieve long-term results. In other words, the strategic rationale emphasizes the transformative power of service innovation and takes public value into account to ensure responsiveness to changing public needs.

Based on these two rationales, there are some

commonalities and synergies between public and private sector innovation. Some aspects of service innovation in the public sector are comparable with the private sector (such as process improvements and applying information and communication technologies). Service requires myriad activities to function effectively, including onstage and backstage activities. Onstage refers to provider-customer interactions; both the public and private sector are concerned about how service quality and customer/citizen satisfaction can be improved. On the other hand, backstage refers to invisible activities involving operational efficiency, technology-enabled processes, as well as other activities to prepare employees to deliver better service. Service excellence for governments and businesses also requires the development of good operations and enhancement of higher productivity through the use of information and communication technologies. As a result, successful service innovation should consider both the visible action of frontline employees and nonvisible operational processes.

In spite of the similarities, there are some important differences in how service innovation reflects public and private values (Hartley, 2005). Public organizations need to consider the democratic value of the whole society, which means that a wide variety of stakeholders are involved. Moreover, the focus of service innovation is on satisfying the needs of citizens to enhance the legitimacy of governments. For some types of service provision, governments must bear responsibilities that greatly outweigh those borne by the private sector (Rosenblatt, 2011). Accordingly, the goal of service innovation in the public sector is to achieve widespread improvements in governance in order to pursue public value (Hartley, 2005; Moore, 1995; Moore & Hartley, 2008).

Dynamic capability and conceptualization of the service innovation construct

The concept of dynamic capabilities has been introduced in the private sector, suggesting that firms need organizational and strategic processes to manipulate resources into value-creating strategies (Eisenhardt & Martin, 2000). When external resources are limited,

organizations are forced to look internally for potential areas of talent and competencies. Recent research has identified internal resources of dynamic capabilities as an important strategic approach (Eisenhardt & Martin, 2000). Dynamic capabilities refer to a firm's ability to integrate, build, and reconfigure internal and external competencies to address a rapidly changing environment (Teece, Pisano, & Shuen, 1997, p. 516). Competitive advantage, therefore, depends on distinctive processes that are shaped by the organizational asset positions and the evolutionary paths followed. Since the primary focus is on using internal resources to improve performance, dynamic capabilities can apply to either private or public organizations by providing coordinative benefits through internal processes, irrespective of the price system (Teece et al., 1997).

Different dynamic capabilities transform the resource base in different ways (e.g. acquiring, shedding, integrating, or recombining resources) (Eisenhardt & Martin, 2000). They are perceived as a higher-order level of capability than operational capabilities that can change the product, the production process, the scale, or the customers (markets) served (Wang & Ahmed, 2007; Winter, 2003; Zahra, Sapienza, & Davidsson, 2006). Teece (2007) proposed three categories of dynamic capabilities that are the essential elements for sustaining evolutionary and entrepreneurial fitness. These include the capacity to sense and shape opportunities and threats, and the ability to seize opportunities to maintain competitiveness through enhancing, combining, protecting and, when necessary, reconfiguring the business enterprise's intangible and tangible assets (Teece, 2007, p. 1319). However, this provides little to explain how some organizations are able to innovate repeatedly, while others are not. Researchers find that the only capability an organization can maintain for innovation is the ability to learn and improvise (Schreyogg & Kliesch-Eberl, 2007). We need to understand not only how to launch a successful service innovation but also to understand how to introduce and employ service innovations repeatedly.

Despite the fact that public sector organizations

do not normally compete for customers, they are required to deliver valuable services to citizens. Governments can employ dynamic capabilities to make ongoing adjustments in resource allocation and build new thinking. These specific capabilities are partly idiosyncratic to the public sector, the public value system or the specific groups served by public organizations. However, the public sector is less likely to advocate inimitability, since governments are constrained by external accountabilities. New public service experiences, new public service concepts, and new ways of delivering must be aligned with the formal regulations and rules. Moreover, these capabilities also contain some generic elements that can be used in other settings and most likely will need some customization. This implies that some best practices can be identified and that there is scope for learning. Consequently, the dynamic capabilities perspective can provide a useful theoretical lens to examine the practices for public service innovation at the organizational level.

Drawing from previous research on various resources and capabilities, scholars have offered a conceptual framework to identify a set of dynamic capabilities and reflect on how they can be used to manage service innovation (den Hertog, Wietze van der, & de Jong, 2010). These authors propose a new service experience or service solution, which should consist of one or several of the following six dimensions: new service concept, new customer interaction, new value system/business partners, new revenue model, new organizational or technological service delivery system. This theoretical framework identifies six dynamic service innovation capabilities: signaling user needs and technological options, conceptualizing, (un)bundling, co-producing and orchestrating, scaling and stretching, and learning and adapting. It is hypothesized that successful firms can outperform their competitors by developing at least some of these capabilities. Thus, the application of the dynamic capabilities perspective to innovation management practices offers promise in advancing our understanding of how public organizations can innovate.

While governments have more restricted rules and take account of democratic values, some dimensions need to be reframed and redefined. We then drop the dimension of new revenue and combine the dimension of “new technological delivery system” with the dimension of the “new organizational delivery system.” In order to discuss and analyze innovation-based public services in greater detail and in a structured way, this study maintains six dynamic capabilities and utilizes the revised four-dimensional model of service innovation. Additionally, the multidimensional facets of service innovation can consider innovation types to delineate a more holistic examination (Hartley, 2006; Walker, 2006, 2008; Wu, Ma, & Yang, 2011). Following this, we then provide an integrated assessment framework in the public sector comprising four dimensions (new service concept, new client interface, new service delivery system, and new value system/ancillary innovation) and 12 types of innovation (channel, procedure, technique/technology, administrative/organizational, citizen/community group, private entity, non-government organization, government agency, target population, marketing strategy, goal/purpose, and concept). Table 1 illustrates the integrated assessment framework of service innovation.

The first dimension of service innovation is the new service concept, which involves more intangible characteristics of existing and competing services. New concept innovation suggests that changes in the underlying mental models direct the actions of the organization in question (Bessant & Tidd, 2007) and involves a significant shift in perceptions or markets (Rowley, Baregheh, & Sambrook, 2011). In other words, new concept innovation occurs when the way of looking at things is reframed. It can also provide the conceptual architecture for organizations to attain and support competitive advantage. In this dimension, it contains two types of innovation: new goals and a reframed concept of service innovation. Two important capabilities included under this dimension are signaling citizens’ needs and conceptualizing. The first entails relating to citizens and understanding their potential needs well in advance by employing different approaches, such as collecting survey data

or interacting with citizen groups. The second may involve the ability to intelligently combine new and existing public service elements into an integrated service configuration that is experienced as new by the society. It may also involve deciding how the new public service provision relates to an organizational strategy, target population, intensity, and collaboration with different partners needed to bring about the public service.

The second dimension of service innovation is a new client interface between governments and their citizens. A variety of service provisions in the public sector are increasingly being marketed, with more focus on building a good connection in a client-specific manner. The new service interface emphasizes the adaptation and development of a product/service for another market or new target group; it primarily manages potential customers and the market segments selected as targets that reveal two types of innovation, including marketing innovation and target population. Scaling and expanding service innovation may be the key to dynamic capabilities under this dimension. Scaling up successful service experience can be expected to increase the efficiency of the service innovation process and to help in creating a consistent set of service experiences or service solutions and expanding target groups. The expansion capability, on the other hand, requires serious investments and a consistent strategy to enhance a service brand. Once established, such new services can be really valuable for clients and expand core service provision.

The third element is a new service delivery system, indicating an appropriate organizational structure and management to help service employees perform their new jobs well. This system comprises four types of innovation: channel, procedure, organization, and technology innovation. Three capabilities can be recognized as the essential parts under this dimension. The first capability is (un)bundling, which means many new public services are newly bundled, enriched—or the opposite, newly unbundled, in which services are broken down into their essential elements. The second capability is signaling technological options, which provides opportunities to adapt and

Table 1. The Operational Definition of Innovation-based Public Service Innovation

Dimension	Capability	Type	Operational definition	Examples
New delivery system	(Un)bundling Signaling technological option Learning and adaptation	Channel	Channel innovation adopts specific service delivery and is carried out by the original agency	Home delivery, at-home service, online application, etc
		Procedure	Procedural innovation brings about change (either altering the old procedures or providing brand new ones) in the standard operating procedure and institutions	Simplified procedures or one-stop services
		Technique/ technology	Technical innovation employs the new technologies or facilities	Information and communication technologies (ICTs), application of mobile devices, etc
		Administrative/ organizational	Administrative/organizational innovation involves internal communication systems and management systems. It can develop a new organizational structure and provide related education and training courses for organizational members	Updating management systems, adopting flexible customer time, and employee training
New value system/ partnership	Co-producing and orchestrating	Citizen groups	These involve citizen engagement such as with volunteers, communities, or social groups	Local schools or community colleges
		Private entities	These collaborate with private sectors	IT firms, private companies
		Non-government organizations	These collaborate with NGOs such as schools and hospitals	Schools and hospitals
		Government agencies	These collaborate with other government agencies	Upper, parallel or lower level government authorities
New client interface	Scaling and expanding	Target service population	Target innovation targets specific groups or populations (either expanding original service groups or developing new ones)	Immigrant residents, native Taiwanese, those discharged from prison, and those in remote mountain areas
		Marketing strategy	Marketing innovation utilizes new marketing strategies	Using new media to promote or organizing large events
		Goal/ purpose	Goal/purpose innovation involves new goal setting or organizational goal change to deliver public services	From children's hospitals to children's playgrounds
		Concept (fundamental logic change)	Concept innovation occurs when the way of looking at things is reframed. It involves a significant shift in perceptions or markets	From passively to actively providing public services

innovate the service portfolio, including new ways of interacting with citizens, enriching service dialogue or providing opportunities for customized services. This can be part of the function of public agencies or an Information and Communication Technologies (ICTs) department that can create a group of people in charge of searching for promising technologies. The third capability is learning and adaptation, which allows tasks to be performed more effectively and efficiently. It is defined as the capability to specifically learn from the way service innovation is managed currently and subsequently adapt the overall service innovation process (den Hertog et al., 2010: 504).

The final dimension is a new value system, which involves new actors co-producing a service innovation as well as an ancillary innovation (Damanpour, 1987). New services require a combination of service functions provided by a coalition of providers (Teece, 2007) such as other government agencies, non-government organizations, community groups, and private enterprises. Service innovators must be able to manage and orchestrate with different sets of partners. This would indicate an ability to co-produce and co-design with clients that usually benefit from citizen interaction and community groups. Stakeholders and other partners who configured the new service concepts can then orchestrate these temporary partnerships or alliances.

A new service should innovate by using a combination of the dimensions outlined here and consider the complementary relationships between different types of innovation. Since public organizations are embedded in society, they not only deliver a public service for individuals but also provide public goods, establish common rules, and create collective efficiency for the society as a whole (Hartley, 2005). Consequently, the analysis of service innovation needs to consider not just the immediate improvements in service quality and fitness for purpose, but wider issues of public value (Moore, 2005; Moore & Hartley, 2008). Successful innovation requires its practical impact on partnering with other societal sectors to co-create innovative strategies and new concepts. Thus, this paper examines the best innovation application

recognized by the Government Service Quality Awards in Taiwan to explain service innovation and examine whether institutionalized award schemes can attain wider achievements to encourage public values. In the next section, this study analyzes service innovation by using this integrated assessment framework.

THE CASE BACKGROUND

Public service quality awards are employed to assess and recognize organizational capacities for innovation and improvement (Holzer et al., 2009). The Executive Yuan designated the “Total Service Quality Enhancement Plan” (TSQEP) to stress the enhancement of public service quality and the dissemination of good practices. As approved by the Government Service Quality Awards in 1996, the Executive Yuan encouraged public organizations to adopt business-like strategies and introduce customer-oriented services to improve service quality.

To further promote the image of good governance to global communities, the Executive Yuan revised the TSQEP to the Government Service Advanced Plan (GSAP), particularly specifying the idea of innovation in 2007.² Based upon the development of ICTs and innovative integration services, this plan incorporated three key categories: (1) continuously improving citizen satisfaction; (2) ensuring the public have the right to know about and the right to use information; and (3) providing innovative integration services. To achieve the core ideas of the GSAP, the Research Development and Evaluation Committee developed the “Government Service Quality Award” (GSQA) to encourage quality improvement and innovation of public services among government agencies. Two types of public agencies were identified within the GSQA: those that provided direct public services and those that developed service planning and design.

Awards are given to service units, whole organizations, and for special service innovations. Before

² The website of the Research, Development and Evaluation Commission of the Executive Yuan. <http://www.rdec.gov.tw/mp160.htm>. 2016/01/12.

participating in the award selection process, the supervisory organization has to complete an internal screening process to select the best practice agency to compete with the others. Then, the award selection process contains two stages that are evaluated by the award review board. In the first stage, the award review board, which comprises a mix of experts, scholars, and government officials, reviews proposals from applications. In the second stage, those award applicants with better proposals are selected for on-the-spot checks and inspections, which are carried out by the award review board.

The data source for the analysis is the GSQA in Taiwan from 2008 to 2011. The body of evidence comprises samples of successful award-winning agencies from among frontline public service-delivery agencies from different levels of government between 2008 and 2011. Qualitative analysis methods were used to assess the proposals from 2008 to 2011 in terms of the integrated framework of service innovation.

RESEARCH METHOD

In order to explore the characteristics of service innovation, the analysis process consisted of the following primary steps. First, two trained assessors discussed and determined the number of innovation-based public services in each award-winning agency based on the individual proposals.³ On the basis of the literature, in Table 1 we developed 12 distinct essential types of service innovation in the codebook structure. After defining these innovation-based public services, we analyzed their content according to the 12 types of service innovation. The unit of analysis was the innovation-based public service. Accordingly, the phi correlation matrix was used to assess the correlation between the two variables.

Moreover, cluster analysis was applied to investigate these characteristics in the data. This analytic method aimed to create groups that have maximum cohesion internally and maximum separation externally. The cluster analysis of binary variables with Ward's linkage was employed to generate a classification hierarchy to minimize the variance within each group.

This analysis also enabled us to build a binary tree that successively merges similar types of innovation, which allowed us to rank clusters based on similarities. By comparing the connections among the different elements of service innovation, it was possible to capture the route of these innovation-based public services in the process of democratization in Taiwan.

FINDINGS

The findings in Table 2 show that the total number of agency participants that took part in the GSQA was 431 and the total number of finalists was 143. The average percentage of award-winning agencies was 20%. From 2008 to 2011, an increasing number of frontline agencies participated in the GSQA contest, which made it much more competitive.

The results of the analysis of the type of the award-winning agencies are shown in Table 3. The award-winning agencies in 2008 were mainly (17%) from household management, nature conservation and research, and medical institution and local public health centers. In 2009, the vast majority of the award-winning agencies belonged to industry and commerce service, customs, and labor affairs (18%). The other four types of award-winning agencies account for a large proportion (14%), including taxation, nature conservation and research, land administration and city or township office, and medical institutions and local public health centers. In 2010, each type of the award-winning agencies showed regular trends compared to 2008 and 2009. In other words, each agency that participated in the GSQA had an equal chance of winning the award. However, in 2011, one type of award-winning agency (namely, police affairs, fire service, coast guard public affairs, and correction services) accounted for the largest proportion (21%). Overall, three types of award-winning agencies were in the majority, including police affairs, fire service, coast guard public affairs, and correction services; land administration and city or township office; and

³ If a disagreement occurred, we first discussed it and then found a third party to make a decision. There were 35 differences of opinion concerning innovation-based public services. Therefore, the mutual agreement rate was 94%.

Table 2. The Statistics of Frontline Public Service-Delivery Agencies Participants and the Award-winning Agencies

Year	No. of agency participants (A)	No. of agencies for the finalists	No. of award-winning agencies (B)	The percentage of award-winning agencies (B/A)
2008	98	34	18	18%
2009	97	33	22	23%
2010	117	37	21	18%
2011	119	39	24	20%
Total	431	143	85	20%

Table 3. The Analysis of the Type for the Award-winning Agencies

Type of Agency	No. in 2008 (N1/N6)	No. in 2009 (N2/N6)	No. in 2010 (N3/N6)	No. in 2011 (N4/N6)	Total (N5/N6)
Industry and commerce service, customs, and labor affairs	2 (11%)	4 (18%)	1 (5%)	3 (12%)	10 (12%)
Police affairs, fire service, coast guard public affairs, and correctional services	1 (5%)	2 (9%)	3 (14%)	5 (21%)	11 (13%)
Household management	3 (17%)	2 (9%)	3 (14%)	2 (8%)	10 (12%)
Cultural affairs, and social education	2 (11%)	1 (5%)	3 (14%)	3 (12%)	9 (10%)
Traffic, and meteorological service	1 (5%)	1 (5%)	1 (5%)	1 (4%)	4 (5%)
Taxation	1 (5%)	3 (14%)	2 (10%)	3 (12%)	9 (10%)
Nature conservation, and research	3 (17%)	3 (14%)	2 (10%)	2 (8%)	10 (12%)
Land administration, city or township office	2 (11%)	3 (14%)	3 (14%)	3 (12%)	11 (13%)
Medical institutions, and local public health center	3 (17%)	3 (14%)	3 (14%)	2 (8%)	11 (13%)
Total (N6)	18	22	21	24	85

medical institutions and local public health center. Apparently, people contact these three types of award-winning agencies frequently, which have more room to enhance organizational performance and provide more innovative services.

As shown in Table 4, the number of service innovations in each agency from 2008 to 2011 has been identified. The number of innovation-based public services increased during this period of time. Obviously, more service innovations were recorded in 2011 than in 2008. There were 84 award-winning agencies⁴ providing 590 innovation-based public services. These public services became our sample and represented

the creation of new public services.

Each innovation-based public service has been analyzed according to the 12 types of service innovation. The results are shown in Table 5. Each innovation-based public service contains at least one type of service innovation. In general, with the exception of 2009, most innovation-based public services took into account three types of service innovation as the major creative strategies: channel, technique, and administrative innovation. In 2009, two types of service innovation (technique and administrative innovation), were most frequently adopted. The three types of service innovation are in the dimension of a new delivery system, suggesting that instrumental innovation dominated. The two types of service innovation least considered in 2008 were

⁴ We excluded one award-winning agency in 2008 since its proposal could not be found.

Table 4. The Number of Innovation-based Public Services (IBPS) in Each Award-winning Agency from 2008 to 2011

2008 Agency ID	No. of IBPS	2009 Agency ID	No. of IBPS	2010 Agency ID	No. of IBPS	2011 Agency ID	No. of IBPS
101	1	201	8	301	4	401	11
102	1	202	2	302	12	402	12
103	1	203	21	303	6	403	4
104	14	204	2	304	4	404	3
105	7	205	12	305	2	405	3
106	2	206	3	306	3	406	3
107	5	207	7	307	12	407	4
108	8	208	7	308	6	408	11
109	2	209	8	309	3	409	9
110	6	210	1	310	5	410	10
111	1	211	9	311	4	411	11
112	11	212	10	312	5	412	14
113	1	213	4	313	9	413	3
114	1	214	12	314	9	414	17
115	2	215	4	315	7	415	6
116	2	216	3	316	28	416	6
117	1	217	7	317	12	417	13
		218	14	318	8	418	8
		219	7	319	18	419	2
		220	2	320	7	420	3
		221	5	321	5	421	10
		222	1			422	19
						423	16
						424	8
Total	66		149		169		206

new concepts and working with private enterprises. The results imply that instead of adopting intangible new concepts, most agencies employ a simple tangible way to develop new services. Alternatively, they would cooperate with a private counterpart.

The findings also show that more partnerships were initiated between 2008 and 2011. In particular, in 2011 innovation-based public services engaged in more collaboration with NGOs and other government agencies. Moreover, in that year, other types of service innovation were more readily employed. For example, in 2011, marketing strategies increased by the biggest proportion compared to 2008. The proportion of new concept innovation increased by 6% between 2008 and 2011, and there was a similar increase in collaboration

with NGOs and the private sector.

Cluster analysis

Among the large number of service innovations, six clusters emerged when relatively small levels of dissimilarity were found among types of service innovation. Table 6 presents the results of the cluster analysis. Since we had no preconceived notion of how many clusters would emerge, we sought to reduce the number of clusters as much as possible without risking significant loss of either homogeneity within clusters or differentiation across them.

Cluster 1 (Digital database exchange) includes channel, technique, and administrative innovation.

Table 5. The Types of Service Innovation from 2008 to 2011

Type of service innovation	No. in 2008 (No./66)	No. in 2009 (No./149)	No. in 2010	No. of IBPS
A Channel	31(47.0%)	49(29.0%)	76(45%)	114(55.3%)
B Procedure	9(13.6%)	36(24.2%)	42(25%)	50(24.3%)
C Technique	30(45.5%)	69(46.3)	86(51%)	86(41.7%)
D Administrative	29(43.9%)	76(51.0%)	81(48%)	101(49.0%)
E Citizen	8(12.1%)	15(10.1%)	19(11%)	27(13.1%)
F Private	5(7.6%)	14(9.4%)	24(14%)	38(18.4%)
G NGO	11(16.7%)	28(18.8%)	29(17%)	55(26.7%)
H Other government	19(28.8%)	28(18.8%)	27(16%)	69(33.5%)
I Target	18(27.3%)	36(24.2%)	27(18%)	61(29.6%)
J Marketing	13(19.7%)	41(27.5%)	44(26%)	70(34.0%)
K Goal	16(24.2%)	28(18.8%)	19(11%)	55(26.7%)
L Concept	3(4.5%)	13(8.7%)	39(23%)	22(10.7%)

Table 6. The Results of the Cluster Analysis

CL	A	B	C	D	E	F	G	H	I	J	K	L	No. of IBPS	% of IBPS
1	0.93	0.38	0.85	0.98	0.25	0.20	0.40	0.46	0.20	0.46	0.22	0.10	81	13.73%
2	0.57	0.15	0.29	0.36	0.14	0.17	0.23	0.41	0.54	0.41	0.86	0.19	96	16.27%
3	0.96	0.17	0.82	0.08	0.04	0.13	0.13	0.16	0.09	0.38	0.03	0.13	119	20.17%
4	0.19	0.22	0.10	0.43	0.16	0.14	0.45	0.33	0.55	0.14	0.11	0.25	114	19.32%
5	0.01	0.01	0.38	0.68	0.10	0.12	0.01	0.01	0.00	0.24	0.01	0.05	135	22.88%
6	0.00	1.00	0.31	0.53	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	45	7.63%

Note 1: The dark gray cells represent the higher percentage of specific innovative type of public service (from 0.7 to 1); the light gray cells represent the middle percentage of specific innovative type of public service (from 0.4 to 0.69).

Note 2: CL = Cluster; IBPS = innovation-based public services.

Characteristically, this cluster emphasizes modification and reconfiguration of the internal organizational arrangements that have to be managed to allow public service employees to perform their jobs well. This cluster highlights the digital database exchange and transmittance to break the original limitation in order to provide a higher quality of public service. Public sector organizations are encouraged to use organizational competencies and make sure they understand the latest options that technologies offer in their work and related public services. Examples include the bus information system on the national freeways and highways of the Taipei City Motor

Vehicle Office, and the E-housekeeper system at the Local Tax Bureau of Taichung City Government.

In cluster 2 (Beyond existing objectives), there are three types of service innovation: channel, target population, and new goal innovation. Evidently, the focus of this cluster is on the extension and creation of an innovation-based public service. Such a service moves from passive to active to transcend traditional ideas and is an answer to a perceived unmet need of the actual or potential population. The combination capability of service innovation is looking for or interpreting signals in the real world and translates

a specific service delivery option into a new service configuration. Examples for this cluster include the foreigners' consultant and call center at the National Immigration Agency and home delivery in the Big Disaster and Public Safety Department at the Bureau of Labor Insurance, Ministry of Labor, Taipei office.

Cluster 3 (ICT application) comprises two types of service innovation including channel and technique innovation. This cluster accounts for 20.32% and shows that in practice innovation-based public services give shape to delivery systems and technology development. All three types of service innovation play a role in facilitating or enabling factors to something much closer to technology-driven innovation. The capabilities of public organizations mainly focus on introducing ICTs into public service delivery. Examples include Taipei Zoo's Facebook fan groups and blogs and the smart traffic control system at the Police Bureau of Taidong County Government.

There are three types of service innovation in cluster 4 (Caring for specific groups): service target population, NGO, and administrative innovation (19.32%). The aim of this cluster is the strategic focus, indicating the management capabilities of service innovation across the boundaries of individual agencies to expand or develop a service target population. This cluster involves caring for minorities such as the elderly, women, low-income families, and specific groups such as prisoners, victims, or those with special diseases. This corresponds with one of the key characteristics of service innovation – its highly combinatory nature. This implies that service providers have the capabilities to invest in a set of potential NGOs to create new service experiences and solutions. This type of innovation raises the alarm for public organizations to pay more attention to people in need and those with a scarcity of care and resources. Examples include the extension sites at the Household Registration in the Wanhua District of Taipei City, and Victims' Care and Protection at the Taiwan Chiayi District Court.

Cluster 5 (Updating organizational hardware and software) represents only one type of service innovation, namely administrative innovation. There

are 135 innovation-based public services in this cluster (22.88%). This cluster requires both hardware and software innovation. While these innovation-based public services may require new organizational forms and personal skills, innovations and non-conventional solutions can be effective methods in designing a proper organizational structure and providing training programs for public employees. Examples include the establishment of a high-risk family database at the Police Bureau in Taoyun County and the tourist center at the Sun Moon Lake.

In cluster 6 (Re-engineering process), two types of service innovation are found: procedure and administrative innovation. The major task of this cluster is to modify traditional public service procedures or provide new configurations of existing elements used in a new context. This indicates that in practice many new services are bundled, nourished, mixed-service offerings. Examples include the one-stop service and extending service sites at the Xinzhuang Household Registration, New Taipei City, and the GIS Map for the community at the Zhongzheng Land Office in Taichung City.

Overall, the cluster analysis demonstrates the practical trend of innovation-based public services. The results reveal that some innovation types usually combine with other specific ones. These types of combinations rarely function alone and also require a set of dynamic capabilities. Some clusters look alike in terms of their innovation types; in essence, however, they are quite different and are equipped with different capabilities. For example, both cluster 1 (Digital database exchange) and cluster 3 (ICT application) contain high levels of channel and technique innovation (over 8), demonstrating that both clusters possess similar innovation types. However, the differences between cluster 1 and cluster 3 lie in their collaboration with other agencies. The main purpose of cluster 1 is to exchange databases across agencies to interact with other agencies through information systems. By contrast, cluster 3 (ICT application) stresses the introduction of ICTs into the agency instead of collaborating across sectors or agencies. Additionally, cluster 2 (Beyond existing objectives) and cluster 4

Table 7. Chi-square Test of the Four Years in the Six Clusters

Cluster	Year		2008	2009	2010	2011	Total		
	2008	2009							
Cluster 1 Digital database exchange	22.7%	1	29.5%	1	27.2%	1	14.6%	5	135
Cluster 2 Beyond existing objectives	19.7%	2	16.1%	3	21.9%	3	21.8%	2	119
Cluster 3 ICT application	19.7%	2	17.4%	2	24.3%	2	16.5%	3	114
Cluster 4 Caring for specific groups	18.2%	4	16.1%	3	8.3%	5	22.3%	1	96
Cluster 5 Updating organizational hardware and software	12.1%	5	11.4%	5	12.4%	4	17.0%	4	81
Cluster 6 Re-engineering process	7.6%	6	9.4%	6	5.9%	6	7.8%	5	45
Total		66		149		169		206	590

(Caring for specific groups) both have a middle level of target population types of innovation (over 5). In cluster 2 (Beyond existing objectives), this type of service innovation targets some minority groups which have never been noticed before, identifying their needs during the service delivery process. These agencies are active in terms of strengthening service delivery methods and showing humanistic care for the target groups. On the other hand, cluster 4 (Caring for specific groups) engages in caring for minority groups but does not expand service delivery methods.

Chi-square test

The Chi-square test has been used to analyze the differences among the innovation-based public service in different years and the proportion in the six clusters of the types of public service innovation (Hair et al., 2006; Vuik, Mayer & Darzi, 2016). In Table 7, the results show the significant differences between the different years in the six clusters. For example, the innovation types in 2008 and 2009 are very similar in terms of the proportion of public service innovation types and the order of precedence. Although the order of precedence in 2010 looks stable, the proportion of public service innovation in the six clusters appears to have changed significantly. In 2011, both the proportion of public service innovation in the six clusters and the order of

precedence takes on a new look. In general, comparing the results between 2008 and 2011, we discover that the types of public service innovation move from digital database exchange (22.7%→14.6%) and ICT applications (19.7%→16.5%) to beyond the existing objectives (19.7%→21.8%) and caring for specific groups (18.2%→22.3%).

DISCUSSION

On the basis of the GSQA as an example, this paper provides an integrated assessment framework to evaluate essential factors in service innovation and acknowledge their connections; based on an analysis of innovation-based public services, the GSQA provides a common platform for each frontline service agency to participate in the service innovation competition. From 2008 to 2011, the results shown in Table 2 demonstrate an increasing number of public organizations engaging in the GSQA that are able to apply more innovative thinking to new service development or service improvement. The types of award-winning agencies shown in Table 3 are from those which are in frequent contact with citizens, such as police affairs, land administration, and local public health centers. Those public agencies can gain an awareness of people’s potential needs and improve

their performance and quality of public service through innovative methods. Best practices provide public managers with a better overview of all aspects of the service innovation so they can gain insights into how their roles fit into the integrated whole. This benefit of a clearer organizational vision is recognized by virtually every award-winning agency.

According to the results relating to the types of service innovation, in 2008 they were adopted in a straightforward and simple way. From 2009 to 2011, more complex types of service innovation were employed at the strategic level of innovation, which required public organizations to incur higher costs and take greater risks in practice. These public agencies in Taiwan would like to take the opportunity to engage in a higher strategic level of innovation to look at both quality improvements and innovation (Hartley, 2005; Moore & Hartley, 2008). Contrary to the conventional bureaucratic systems of the past, the organizational structures, institutional designs, and interaction with environments that exist today have changed extensively. By analyzing the proposals of award-winning agencies, we find that public organizations adopt business-like strategies to improve government innovation (Borins 2001). The results confirm that public organizations and private sector actors share similar means and ideas, particularly with regard to the application of total quality management, which contributes to the innovative environments in public organizations.

Clearly, an economic approach is the priority for most public service organizations to manifest their service innovation by modifying their service delivery systems, reconfiguring organizational resources and arrangements, or adopting new technological options. However, more promising is the extension or creation of a new service concept. Although the conceptual nature of new services is riskier and costlier, and the fact that it is sometimes difficult for stakeholders to assess beforehand what will be experienced and delivered, a successful new service concept can involve the ability to intelligently combine new and existing service elements into an integrated service configuration. The conceptualization process can

capture the idea of a strategic approach to improve public values and accommodate shared interests. It can also involve decisions on how the new service provision relates to the organization's strategy, the target service population (for example, minority groups or those in need), forms of interaction among citizens, and service partners. This study provides the empirical evidence to delineate the overall picture of how public organizations in Taiwan can apply new value systems with dynamic capabilities to assist in the creation of public values.

In addition, the findings reveal that public organizations are rich in service innovation. From the correlation analysis of the 12 types of service innovation, numerous significant connections have been found, indicating the complementary relationship between them. Faced with complex and diverse environments, a single type of service innovation cannot respond to rapid changes and achieve organizational goals (Borins, 2000; Walker, 2008; Wu et al., 2011). Public organizations need to propose an integrated innovation framework to provide a better quality of public services. Furthermore, such organizations need to interact with external environments in order to learn from others and gain insights and energies from outsiders. By expanding and collaborating with other organizations and groups, the quality of public services can be enhanced effectively and the diversity of service channels can be enriched.

CONCLUSIONS

The bureaucratic structure of public organizations traditionally has set up rules and regulations to avoid risk rather than rewarding innovation. This study reveals that government can innovate and that top-down innovation awards can make a difference by encouraging the dissemination of best practices in the public sector. The best practices in service innovation have discovered that frontline public agencies in Taiwan have the capabilities not only to improve service quality but also to stimulate a higher level of achievement in service innovation. For a practical perspective, the most frequent innovations in the award-winning agencies analyzed are those that have

technical capabilities and involve investment in ICTs. Those agencies come from similar types of public services. Although there are perennial pressures on public organizations for efficiency and improved performance, these public organizations are looking for innovative ways to provide services that can respond to the needs and aspirations of both individuals and communities. As well as reducing costs, these public service innovations can treat citizens with respect and dignity. The results confirm that the use of innovation awards can change production systems, which enables greater individual and collective engagement across the boundaries of organizations. Consequently, rather than following the single loop of the economic approach, this study identifies that public service innovation in Taiwan steps into a broad domain of governance and builds harmonious relationships in society.

Our study has several limitations that should be considered in interpreting its results. Firstly, using this integrated dynamic capability framework allows us to recognize the trajectory of public service innovation from 2008 to 2011 in frontline public agencies in Taiwan; however, this study needs to look into these award-winning agencies and understand how they can stay competitive by adapting to changing environments. These successful cases require further qualitative study. Secondly, one potential limitation of the study is that the results are applicable only in the Taiwanese context. Therefore, caution should be applied in generalizing our results to other countries. For future research, the suitability of an integrated assessment framework can be examined to assess its applicability to a particular context. Lastly, the use of successful examples has intrinsic limitations and future studies should consider multiple sources (e.g. citizen satisfaction or in-depth interviews with public officers) to serve as a complementary method to validate their success.

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