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AN INTERNATIONAL EXPLORATION OF BARRIERS AND TACTICS IN THE PUBLIC SECTOR INNOVATION PROCESS

ABSTRACT

This study deepens our knowledge on innovation barriers within public sector innovation (PSI) processes. Our research contributes to the barrier approach to innovation. We develop a conceptual framework, which expands the conventional view of barriers. The exploratory empirical evidence based on 99 cases from Italy, Japan and Turkey identifies the dynamic nature of the barriers within innovation processes. We uncover tactics that are used to overcome these barriers and the mechanisms that can surprisingly contribute to fruitful outcomes.

INTRODUCTION

The purpose of this study is to explore the nature of innovation barriers and the tactics utilised to overcome them. The `barrier approach to innovation` (Hadjimanolis 2003) aims to uncover inhibitors to innovation. Within the private sector innovation literature, D'Este et al. (2011) introduced the concept of `revealed barriers`, which suggests that innovative organisations reported a greater number of barriers, but also were able to overcome them. These barriers were perceived as difficulties within the innovation process and did not negatively influence innovation outcomes.

Recent studies have investigated D'Este et al.'s proposition (2011) in the public sector context and distinguished revealed barriers and deterring barriers. These studies also uncovered that innovation barriers reported by public servants do not negatively affect innovative outputs (Arundel et al. 2015; Torugsa and Arundel 2016; Demircioglu and Audretsch 2017). They speculated innovators might be aware of these difficulties and are able to overcome them. Yet, the PSI literature lacks studies which specifically examine the nature of revealed barriers.

Our study responds to calls for further research into the barriers to PSI and how they can be overcome (see Hadjimanolis 2003; Borins 2014; Meijer 2015; Cinar et al. 2018). Recent empirical research has attempted to measure PSI via extensive surveys such as the Innobarometer within EU, the Australian Public Service Survey (APSS) and MEPIN within Scandinavian countries. A limited number of these studies have attempted to analyse the influence of barriers, as an independent variable, on innovation outcomes (e.g. Bloch and Bugge 2013; Torugsa and Arundel 2015; 2017; Demircioglu 2017). This results in three shortcomings:

Firstly, prior studies have analysed barriers as antecedents of innovation and predictors of outcomes (see Demircioglu and Audretsch 2017). This fails to capture the dynamic nature of barriers across the innovation process (Hadjimanolis 2003; Cinar et al. 2018). Moreover, despite growing recognition of the shift towards a collaborative approach to PSI (Hartley et al. 2013; Torfing 2018), these studies have failed to examine the types of barriers stemming from these interactions. Secondly, existing studies on tactics have either provided limited detail in certain contexts (e.g. Borins 1998, 2000, 2014; Meijer 2015), or focused on specific internal factors, such as empowerment and organisational attributes (e.g. Arundel et al. 2015). This limits a wider appreciation of barriers and their influence. Thirdly, the literature lacks detailed insight into how the barriers can affect the outputs positively (e.g. Torugsa and Arundel 2016). To address these gaps, we conducted an exploratory study. The content of ninety-nine open-questionnaire forms submitted in English to the United Nations Public Service Award (UNPSA) was analysed. Our study consists of the complete population of semi-finalists from Italy, Japan and Turkey between the years of 2009 and 2015. The unit of analysis is the entire innovation process from idea development to implementation. Our study examines the nature of revealed barriers within the PSI process, the tactics utilised to overcome them, as well as their potential positive contribution to the PSI process. Our content analysis allows us to deepen our understanding of the complex nature of `revealed barriers`, which are related to innovation processes that produce positive outcomes (D`este et al. 2011).

This study provides three contributions to the literature. Firstly, in contrast to prior studies which have simply identified and classified barriers, we apply and empirically build on the framework of a recent systematic review by Cinar et al. (2018) in order to uncover the dynamic characteristics of innovation barriers within different stages of the innovation process across a number of innovation types. In so doing, we also uncover the interrelations between the revealed barriers. Secondly, our study is the first of its kind to independently investigate the frequency of interaction specific barriers. This reveals the difficulties that emerge between the parties of the innovation process. Indeed, these are the most frequently reported revealed barriers. Thirdly, our findings from three separate countries, Italy, Japan and Turkey provide an empirical contribution to this stream of literature where the study of international samples is rare (Voorberg et al. 2014, De Vries et al. 2016).

THE NATURE OF BARRIERS

1. The Typology of Barriers

A variety of difficulties hinders organisations' efforts to innovate. Within the literature, these have been labelled as barriers (Hadjimanolis 2003), obstacles (Borins 1998), inhibitors (Osborne and Brown 2011) or problems (Keast and Brown 2006). D'este et al.'s (2011) research differentiated between two types of barriers. Firstly, 'revealed barriers' that slow the innovation activities of organizations during the ongoing innovation process; and secondly, 'detering barriers', which prevent the process itself from being initiated. Their study found that revealed barriers were more common than deterring barriers. This led the researchers to suggest that employees were not deterred by barriers, but were instead aware of and capable of overcoming them within the process.

Prior studies have attempted to classify and analyse these obstacles. Borins (2014) suggested that barriers can be categorised as either external or internal. Yet, this oversimplification fails to capture the critical differences between contextual-external barriers and interaction specific barriers. Contextual barriers are beyond the influence of public sector organisations (PSOs), whereas interaction specific barriers are shaped by the relationships between the different parties within the innovation process (Hadjimanolis 2003). Our study categorises revealed barriers into five separate categories: i. Organisational, ii. insufficient resources, iii. innovation characteristics related, iv. contextual and v. interaction-specific.

i) Organisational obstacles form most common within PSI (Borins 2014). Ineffective administration of process activities is a key issue, with failures or difficulties in administration impeding a number of activities within the process (Gardner et al. 2010; Piening 2011). Other internal difficulties include; a resistance or lack of support from specific actors (Ezzamel et al. 2014), rigid organisational structure or culture (Azad and Faraj 2011), and a lack of skills, knowledge or expertise (Weber et al. 2014). ii) Insufficient financial and human resources can act as a barrier to the innovation process (Borins 2014). iii), innovation characteristics with specific barriers include; incompatibility (Brown 2010), complexity and software problems (Costa et al. 2013). iv) Contextual obstacles include: laws and regulations (Pelkonen and Valovirta 2015), lack of standardisation (Raus et al. 2009) and socioeconomic factors (Kumar et al. 2002; Gardner et al. 2010), which can also surface as barriers to slow the innovation process.

Finally, in contrast to prior studies, we examine interaction-specific obstacles as a fifth type of barrier in PSI. These obstacles have been found to play a crucial role in hampering innovation activities (Cinar et al. 2018). Within the PSI process, a number of parties are commonly involved, including: public organisations, contractors, citizen groups and NGO`s, political entities, and even international organisations (Osborne and Brown 2011; Hartley et al. 2013). Innovations involving multiple parties increase complexity (Hadjimanolis 2003). In addition, the barriers that emerge between them cannot be described as internal or external, because they are formed during the interaction and may be influenced by both parties. Recent survey-based studies have failed to capture an understanding of how PSO`s overcome problems with collaborators in the innovation process (e.g. Demircioglu and Audretsch 2017; Arundel et al. 2015). We argue that interaction specific barriers warrant detailed investigation, under a specific and independent category, according to the different parties involved.

2. Typology of Innovations

Prior studies have noted that barriers to innovation vary depending on the type of innovation being pursued (Osborne 2002; Hadjimanolis 2003; Damanpour and Schneider 2009; Walker et al. 2011). Cinar et al.'s (2018) systematic review also identified differences in barriers depending on the innovation type. They revealed that digital innovations primarily experience organisational and content specific obstacles, whilst non-digital innovations faced interaction specific barriers. Yet, their study failed to capture differences beyond these two innovation types.

For the purposes of this study, we adopt the innovation typology developed by De Vries et al. (2016) from their recent and comprehensive review of the literature. Their paper identified five types; however, we argue that it is also necessary to include social innovations with their unique nature, in accordance with Voorberg et al. (2014), as they aim to solve complex social problems through collaboration and can utilise a combination of new services. This results in a total of six key types. New service innovations form the first type. Second, administrative process innovations refer to the creation of new ways, methods and forms of undertaking tasks within the organisation. Third, technological process innovations involve the application of technology to operational activities and service delivery mechanisms. Fourth, conceptual innovations aim to impose novel concepts and frameworks to solve complex problems. Fifth, governance innovations introduce new participation mechanisms for citizens, new ways to increase transparency and accountability within the public sector. Lastly, social innovations target social needs such as immigration, juvenile crime, homelessness, domestic violence, and

other such acute social problems. It is worth noting that a single innovation may be categorised into more than one innovation type (De Vries et al. 2016).

3. Typology of Tactics Utilised to Overcome Barriers

Successful innovators interpret the barriers as difficulties to be overcome rather than impediments not to innovate (Deste et al. 2011). Hadjimanolis (2003) suggested that in order to fully capture the true picture, research must incorporate the tactics to overcome barriers. Existing insights are limited to a number of creative tactics utilised by innovators:

Borins' (2000) study of PSI in the U.S.A. suggested that the tactics most commonly employed were persuading opposition and accommodating affected groups. Further, Kumar et al. (2002) uncovered that innovators also utilise training, demonstrations of the benefits, and improvements to the innovation as strategies to overcome resistance against digital innovations.

Meijer (2015) identified two groups of strategies utilised to manage barriers. Firstly 'fixing the innovation', which involved providing and modifying the necessary resources, technology, and logistical activities. Secondly, he identified 'framing', which involved overcoming internal resistance and external opposition to the innovation through persuasion. The importance of persuasion is also supported by Martin et al. (2009), who drew together networks and distributed leadership theory to investigate innovations within the UK's NHS. Moreover, McDermott et al.'s (2013) analysis of the tactics of individual change agents highlighted the use of "Entrepreneurial tactics" to overcome difficulties in finding resources and persuading both resistant managers and frontline staff.

Some studies conceptualise tactics to overcome barriers as "strategies to support innovation". Arundel et al. (2015) found that the most common strategies deployed were evaluating innovations and the active role of managers. Finally, Demircioglu (2017) identified employee internal empowerment practices held the potential to overcome organisational barriers in cases of Australian PSI.

4. Beyond the Typology: Dynamic Characteristics

The characteristics of innovation barriers are dynamic rather than static (Hadjimanolis 2003). However, previous empirical literature has focused on typologies and our understanding on their dynamic nature is quite scarce.

The first dynamic dimension of barriers is how they vary within the innovation process (Sandberg and Aarikka-Stenroos 2014). The innovation process is complex, non-linear and iterative in nature, and these stages are not objective realities (Hartley 2013). Yet, prior studies have adopted a phased approach to examining barriers (e.g. Osborne 2002; Meijer 2015; De Vries et al. 2016). Hadjimanolis (2003) argued that *‘the systematic variation according to the stage of innovation’* should be considered to evaluate its precise influence on the innovation. Meijer (2015) explored how barriers vary across the innovation phases. He found that organisational barriers, political resistance, and difficulties stemming from the characteristics of the digital innovation played an important role within development & design stages. Finally, Cinar et al.’s (2018) systematic review investigated the relationships between different types of barriers and key stages in the innovation process. They revealed the dominance of organisational barriers across all phases. However, the influence of organisational barriers decreases from the design & development stage to implementation stage, whilst interaction-specific barriers increased.

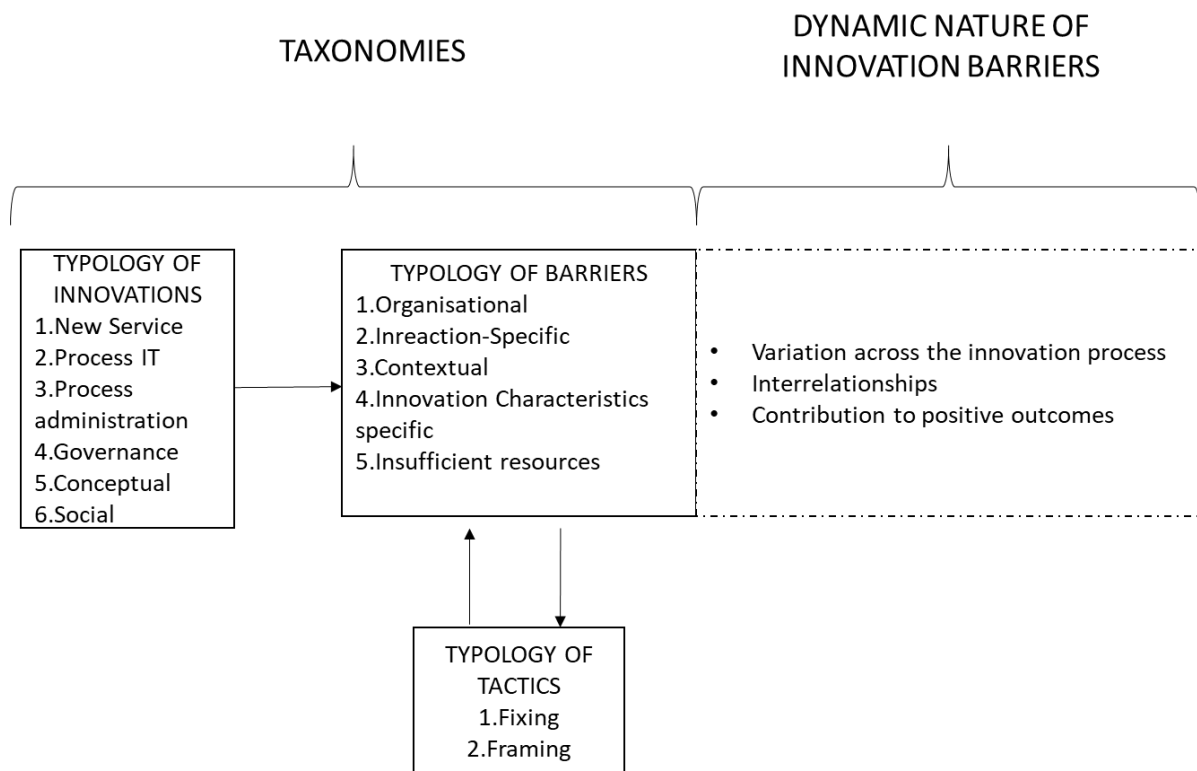
The second important feature of barriers is that each barrier at a particular process stage may result in further barriers at later stages in the process. Hence they are interrelated within a vicious cycle (Hadjimanolis 2003). Barriers may reinforce one another, creating a need to investigate the *‘underlying mechanisms’* (Termeer 2009). Yet, few empirical studies have investigated this particular dimension of innovation barriers. Two are worthy of note: Biesbroek et al. (2014) identified the *‘underlying mechanisms’* for the barriers between citizens and PSOs; and Azad and Faraj (2011) shed light on the roots of managerial resistance against IT innovations. The interrelationships between barriers represent an important gap in the literature (Cinar et al., 2018).

The third and also least studied dynamic dimension of barriers is their potential positive contribution to innovative outputs. Early studies suggested that “messy” barriers deterred organisations from innovating (e.g. Hadjimanolis 1999). However, recent research has called this into question (e.g. Deste et al. 2011; Torugsa and Arundel 2016); it has identified a further dimension of barriers, which is positive. Innovators find solutions to overcome these barriers and learn how to innovate more effectively in the long term (Torugsa and Arundel 2016). These barriers have been found to contribute to forming and situating the innovation in the relevant context. Hence they may act as windows of opportunity rather than impediments (Borins 2014). The current PSI literature does not examine the potential benefits resulting from overcoming barriers.

5. Conceptual Framework

Our review of the literature has revealed that prior research failed to capture the complex and dynamic dimensions of barriers. It is necessary to differentiate between deterring barriers and revealed barriers, and consider the potential positive effect of these barriers (e.g. Demircioglu and Audretsch 2017; Arundel et al. 2015; Torugsa and Arundel 2017). This informs the approach adopted by our study. To help the reader and to conceptualise our approach, Figure 1 presents the framework adopted. Building upon Cinar et al. (2018), the center of our framework captures (i) *the typology of barriers* within the innovation process, and to the left how (ii) *the barriers vary according to innovation types*. Further, we conceptualise (iii) *the typology of tactics* innovators utilised to overcome barriers. Beyond these typologies, the right part of the framework captures (iv) *the dynamic nature* of the barriers: How they vary across the innovation process; how they interrelated in a vicious cycle, and how the barriers can contribute to the innovation process positively.

Figure 1 Framework of the dynamic nature of innovation barriers



METHODOLOGY

DATA DESCRIPTION

Our research analyses the content of ninety-nine open-questionnaire forms submitted in English to the UNPSA. Based on the Economic and Social Council decision 2003/277, the UN designated the 23rd of June as ‘Public Service Day’ to reward and disseminate novel public sector achievements worldwide since 2003. The number of submissions has increased over years and several hundreds initiatives worldwide have been submitted to UNPSA each year (United Nations, 2015). The UNPSA evaluated the innovativeness of the initiative; however, it does not accept pure scientific innovations and innovations by a non-public institution. The open-questionnaire’s required a set of qualitative responses on the innovation process elements: Problem, innovative solution, implementation strategies, stakeholders, outputs, resources, barriers and utilised tactics, outputs, transferability, sustainability and lessons learned (See [UN Database](#)). Since 2007, UN published openly all semi-finalist applications selected after two rounds of panel review process and evidence document submission. At the third round, the *Committee of Experts on Public Administration* decides the award winners. The organisation responsible for implementing receives the award.

We studied all semi-finalists from Italy (34), Japan (26) and Turkey (39) between the years of 2009 and 2015, when the semi-finalist initiatives reached significant numbers worldwide and in selected countries. The unit of analysis is one single innovation as a complete process rather than total organisational innovative activity, which is suggested by Arundel et al. (2019).

Award applications are a widely utilised data source in the domains of PSI (e.g. Borins 1998, 2000, 2014; Wu et al. 2013). We are aware of the limitations of such an approach (see Limitations section). However, as it is the purpose of our study to examine ‘revealed barriers’, which innovators are able to overcome, we believe this design is well suited to the present study. Indeed, as revealed barriers are more common in the case of positive innovation outcomes (Demircioglu and Audretsch 2017), the use of innovation awards with positive outcomes is well suited to our study. Semi-finalists applications submitted and then selected in an international award by the UN can also represent genuine innovations with most beneficial outputs rather than fashionable initiatives. Our approach is informed by Torugsa and Arundel (2016):

‘Instead of measuring impediments that entirely prevent or deter innovation, the questions on barriers measure the awareness of public employees of problems that must be solved in order

to innovate, or what D'Este et al. (2011) describe as the 'revealed' effect of barriers. The evidence presented in this study that barrier breadth does not reduce the variety of beneficial outcomes from complex innovations further suggests that employees are able to control, manage and overcome these barriers.

The open and transparent database provides us the opportunity to conduct a rare cross-country study with distant countries. Prior studies have also utilised award applications as a representative sampling proxy for relevant contexts, (e.g. Borins 1998, 2001, 2014; van Acker and Bouckaert 2017). The semi-finalists from UNPSA can be considered as representative based on five reasons. Firstly, the awards call for all levels of government to apply. Secondly, the UN has announced the award applications through various channels, increasing awareness and the number of applications from different types of organisations. Third, all three countries are well-established members and the UN has had local offices in the countries for many years. Fourth, national governments announce the UN competition via official channels to make every organisation aware. Indeed, the media coverage and news on PSO's websites also indicate that there is a general awareness of the award (see TRT News 2015; Formez PA News, 2013; Ministry of Foreign Affairs of Japan, 2010). Fifth, the application uses a simple online procedure. This increases the number and diversity of applications. However, we are also aware of the limitations of this opportunistic design, which is not appropriate for statistical tests requiring random sampling and does not allow for generalisations (Bornstein et al., 2013). Thus, we aim to produce descriptive quantitative statistics and qualitative analysis through content analysis and do not claim any generalisability of our results.

CONTEXT OF THE STUDY: ITALY, JAPAN AND TURKEY

In order to investigate and develop the conceptual framework by Cinar et al. (2018), we utilised applications from three different countries: Italy, Japan and Turkey. Recent reviews (Voorberg, 2014; DeVries et, al 2015) revealed that the majority of PSI studies were conducted in USA and EU and the cross-country data collection was also very scarce. Thus, we selected three different settings in Europe, Eurasia and East Asia.

There were also many contextual reasons for selecting these countries. Firstly, each country is a well-established member of the OECD (Organisation for Economic Co-operation and Development) with large economies, as well as with a relatively large population. Secondly, each country has introduced significant public administration reforms in recent decades (Furukawa 1999; Mele 2008; Sezen 2011; Natalini and Stolfi 2012; Cucciniello et al. 2015;

Kim 2017), which holds the potential to produce PSI's (Pollitt and Hupe 2011). Finally, despite the common setting, each country is sufficiently different in terms of GDP per capita, governance structures & traditions and IT infrastructure (see Table 1). Italy is an EU member, it characterises Southern European public administration and has attempted to decentralise its unitary government for a long while (Oliveira and Breda-Vázquez 2012). In the case of Japan, it is a developed and technologically advanced economy, with highly decentralised local governments (Kim 2017). Finally, Turkey is an EU candidate with a strong central government tradition (Ertugal 2011), that has introduced a significant amount of reforms since the 2000's (Sezen 2011). Moreover, each country differs concerning their e-government advancement (World Bank 2017), which is significant for digital innovations. Whilst these different contexts allowed us constructing a diversified cross-country dataset, this study does not have any comparative ambitions. A meaningful comparison would extend its length beyond that for a single journal paper. Thus, our main aim is to evaluate empirically the barrier framework, rather than a comparative institutional analysis.

Table 1 Context characteristics of selected countries

	ITALY	JAPAN	TURKEY
Region	Southern Europe	Asia	Eurasia
GDP per capita, PPP\$	30,165.50	34,362.10	14,615.50
Population	59,43 million	127,8 million	73,41 million
Government's online service	48th out of 141	9th	78th
ICT use	26th out of 141	5th	53rd
Government effectiveness	47th out of 141	21th	49th
State structure	Centralised=>Decentralised	Centralised=>Decentralised	Centralised
Major public sector reforms	Reform from the 1990s	Reform from the 1990s	Reforms from the 2000s

Sources: *Worldwide Governance Indicators from year 2011 and Literature*

Table 2 Central-Local Composition of the entire cases and Central-Local Figures

	ITALY		JAPAN		TURKEY		TOTAL	
	Central	Local	Central	Local	Central	Local	Central	Local
Central-Local combination of the semi-finalists	56% (N=19)	44% (N=15)	27% (N=7)	73% (N=19)	77% (N=30)	23% (N=9)	56% (N=56)	44% (N=43)
Public employment by level of government	52%	48%	34%	56%	87%	13%	58%	43%
Public expenditure by level of government	56%	44%	14%	86%	91%	9%	54%	46%

Source: <http://stats.oecd.org>, 2018

To further check the extent of the country specific representativeness of our cases, we examined the composition of applications from each country against the nature of their respective administrative system, with respect to the levels of government. This is captured in Table 2, which compares the composition of the semi-finalists used within this study to the two indicators used by the OECD for the nature of the administrative system with respect to the levels of government (Pollitt and Bouckert, 2017 : 52): (i) Public employment by level of government and (ii) Public expenditure by level of government. The table indicates that the central-local government composition of the semi-finalists represents that of each country.

CONTENT ANALYSIS & CODING PROCEDURE

The open-questionnaires include rich qualitative data on the innovation process. Following the approach adopted by the public administration literature (see Herbane, 2011; Mazzara et al. 2010; Lee et al. 2017), we analysed the open-questionnaires using content analysis (Krippendorf, 2004). The initial qualitative stage of the content analysis began with the aim of understanding the data, and then progressed to the pilot coding phase (Neuendorf, 2016). This process was conducted following Weber (1990) and can be described as both deductive and inductive. Firstly, a coding book was constructed from prior literature. The coding categories generated were not fixed. The thirty-nine cases from Turkey were analysed and coded by the leading author manually. This was repeated three times, with the aim of training for coding (Krippendorf, 2004). Meetings were held with the other members of the research team to discuss the results, identify potential alternative codes, and improve the coding book. To test the reliability of the coding four cases were randomly selected from each country, providing a total of twelve cases, which were independently coded by two other members of the research team. The Holsti co-efficient of agreement (Neuendorf, 2002: 149) was utilised to calculate the inter-coder agreement. This coefficient was calculated at 0.9 which is an accepted measure of reliability by Neuendorf (2002: 143). In the following stages, the leading author coded the remainder of the cases through NVivo qualitative data analysis software, Version 11. Throughout this process, the researchers were dealing with qualitative data. However, we chose a descriptive quantitative analysis due to the large size (N=99) of the cases. Our approach develops that adopted by Borins (1998, 2014) further: In order to capture the qualitative nature of the data and to ensure the transparency of coding, exemplary coded quotes are included to each quantitative table with high total responses (See Table, 3, 4, 5, 6 and 7). At the same time, the nature of the analysis of interrelations and positive contribution is more qualitative, as the literature on them are limited and we constructed the codes inductively from the data (Table

8,9). Whilst this approach is a new way to transcend the qualitative and quantitative border and poses a conflict, content analysis is appropriate for both qualitative and quantitative enquiries (Hamad et al., 2018). Our approach is informed by Krippendorff (2004): 'Ultimately, all reading of texts is qualitative, even when certain characteristics of a text are later converted into numbers'.

FINDINGS

1. Typology of Barriers

Table 3 presents the results of the coding for each category of the barrier, as well as the individual result for each country. Overall interaction specific barriers are the most frequently reported. This is significant. This contributes to the debate on collaborative PSI. It illustrates the type difficulties encountered such as: lack of shared understanding, inadequate involvement by citizens, public doubt & opposition, lack of commitment by other PSOs, inadequate information and knowledge sharing between PSOs, different organisational cultures and failures by enterprises as suppliers.

Differences are evident in the results for each country, which can be related to a variety of factors. Firstly, between each country there was diversity in the types of innovations pursued. The cases from Japan were predominantly governance and social innovations, which required citizen-centred interactions. By contrast the semi-finalists from Turkey consisted largely of IT innovations, where organisational problems emerged. The second reason for the differences can be attributed to the national context. The higher Hofstede's 'uncertainty avoidance index' score within Japanese society (Hofstede Insights, 2019) may result in challenges to interactions. On the other hand Turkey has a low IT readiness, combined with dense path dependency in a highly centralised bureaucracy, which holds the potential to result in organisational barriers. This underlying factor may also lead to the highest contextual barrier rates evident in Turkey. The relatively highest frequency of innovation characteristic related problems may indicate that Italy continues to struggle to establish an institutional framework for digital innovations despite longitudinal e-government reforms (Mele 2008).

Table 3: Types of Barriers as Percentage of Total Barriers					
TYPE OF BARRIERS	IT (N=34)	JP (N=26)	TR (N=39)	TOT (N=99)	
INTERACTION SPECIFIC	29 (28.4%)	30 (46.9%)	28 (29.8%)	87 (33.5%)	
CITIZENS & NGO	12 (11.8%)	18 (28.1%)	15 (16.0%)	45 (17.3%)	<i>But sometimes people were not convinced. Views like “I’m too busy to help” and “Education is something that should be left entirely to the government” were common. (JP18)</i>
PUBLIC ORGANISATIONS	10 (9.8%)	7 (10.9%)	11 (11.7%)	28 (10.8%)	<i>While the two different establishments had two different way of working and this could have contaminated the working process, causing a disadvantage.. (TR27)</i>
BUSINESSES	6 (5.9%)	3 (4.7%)	1 (1.1%)	10 (3.8%)	<i>... difficulties with companies have been encountered, as has hostility on the part of lawyers and certain clerk of the court’s offices, who are sometimes accomplices of the organisers of the frauds against... (IT21)</i>
OTHER	1 (1.0%)	2 (3.1%)	1 (1.1%)	4 (1.5%)	<i>...the legislation process was challenging. However, this obstacle was overcome after explaining the benefits of the system in detail and its uses in solving several problems in the enforcement and bankruptcy system; a consensus was reached ultimately.(TR17)</i>
ORGANISATIONAL	28 (27.5%)	12 (18.8%)	35 (37.2%)	75 (28.8%)	
INTERNAL RESISTANCE OR LACK OF SUPPORT	10 (9.8%)	7 (10.9%)	13 (13.8%)	30 (11.5%)	<i>His action to bring a mobile PC and a smartphone into an ambulance was fiercely opposed by ambulance attendants.(JP05)</i>
ADMINISTRATING PROCESS ACTIVITIES	8 (7.8%)	2 (3.1%)	12 (12.8%)	22 (8.5%)	<i>the absence of a monitoring and assessment activity, as well as of a rewarding system for PAs and managers making use of these tools(IT34)</i>
LACK OF CAPABILITIES	4 (3.9%)	2 (3.1%)	4 (4.3%)	10 (3.8%)	<i>the lack of the proper capacity to fully utilize the tools that are available today through technology and in particular by Internet.(IT28)</i>
RIGID ORGANISATIONAL STRUCTURE AND CULTURE	6 (5.9%)	1 (1.6%)	6 (6.4%)	13 (5.0%)	<i>There has been a strong inclination to maintain status quo. There has been a common belief that innovation in public sector was impossible(TR38)</i>

INNOVATION CHARACTERISTICS	24 (23.5%)	10 (15.6%)	10 (10.6%)	44 (16.9%)	
COMPLEXITY	7 (6.9%)	4 (6.3%)	7 (7.4%)	18 (6.9%)	<i>Another obstacle was represented by the complexity of the topics, which made it necessary to increase the number of workshops. (IT01)</i>
DESIGN OF SOFTWARE	12 (11.8%)	3 (4.7%)	1 (1.1%)	16 (6.2%)	<i>The biggest challenge was creating an information technology database for a system which, for a century, had been organized to work "on paper". (IT07)</i>
INCOMPATABILITY	5 (4.9%)	3 (4.7%)	2 (2.1%)	10 (3.8%)	<i>.. the training provided and the possibility of re-employment often did not correspond to the profile of the experiences and expectations of potential beneficiaries, (IT08)</i>
CONTEXTUAL	13 (11.8%)	9 (12.5%)	16 (16.0%)	36 (13.5%)	
LAWS, REGULATIONS	4 (3.9%)	3 (4.7%)	8 (8.5%)	15 (5.8%)	<i>...., fixing the MCA mobile station and using it as a radio station for a disaster prevention communication system by municipalities was prohibited by law.(JP24)</i>
SOCIOECONOMIC	3 (2.9%)	4 (6.3%)	3 (3.2%)	10 (3.8%)	<i>.. the threats received by INPS lawyers and managers, who have sometimes been obliged to travel under escort. (IT21)</i>
LACK OF MODEL INNOVATION/STANDARDS	5 (4.9%)	1 (1.6%)	4 (4.3%)	10 (3.8%)	<i>.. the absence of concrete methods on how to forecast the deterioration of urban infrastructures (JP12)</i>
INSUFFICIENT RESOURCES	9 (8.8%)	4 (6.3%)	6 (6.4%)	19 (7.3%)	
TOTAL NUMBER OF BARRIERS OBSERVED	102 (100%)	64 (100%)	94 (100%)	260 (100%)	

2. Barriers and Innovation Types

This section explores the extent to which the characteristics of the innovation barriers differ depending on the type of innovation being developed. Our analysis revealed that interaction specific barriers have emerged more frequently in the cases of social, governance, conceptual and new service innovation types. This results from the higher level of interactions involved in each of these innovation types:

‘During the preparation phase, an important difficulty emerged in the recruitment of citizens, casually chosen. In fact, they often refused to collaborate because of different reasons’ (IT15)

Similarly, a conceptual innovation in Japan revealed this difficulty:

‘..challenge was obtaining the agreement and cooperation of local residents, without which the Comprehensive Bicycle Program would have made no headway’ (JP19)

Governance innovations, on the other hand, reported a similar number for both organisational and interaction specific barriers. This is because governance innovations tend to attempt to increase citizen participation, transparency and accountability all of which lead to organisational resistance. For example:

‘Some staff members were resistant to the new reforms, especially in the wake of many other reforms implemented since in 2003. ..not all of the staff were able to fully understand the significance of the Collaboration Testing at the time of its implementation. Many were hesitant to fully disclose the details of their duties, as they had never been required to perform such a task before’ (JP23)

Table 4: The Variation of Barriers according to Innovation Types

	Process IT (N=55)		Governance (N=13)		Social (N=18)		New Service (N=13)		Conceptual (N=12)		Process Adm (N=11)	
	Occurrences	Per cent	Occurrences	Per cent	Occurrences	Per cent	Occurrences	Per cent	Occurrences	Per cent	Occurrences	Per cent
Interaction Specific	35	24.3%	16	33.3%	16	39.0%	12	36.4%	9	32.1%	4	15.4%
Organisational	47	32.6%	15	31.3%	8	19.5%	8	24.2%	6	21.4%	11	42.3%
Contextual	20	13.9%	5	10.4%	8	19.5%	7	21.2%	5	17.9%	5	19.2%
Characteristics	28	19.4%	9	18.8%	8	19.5%	5	15.2%	6	21.4%	2	7.7%
Insufficient Resources	14	9.7%	3	6.3%	1	2.4%	1	3.0%	2	7.1%	4	15.4%
TOTAL	144	100%	48	100%	41	100%	33	100%	28	100%	26	100%

By contrast, organisational barriers are more frequent in the case of administrative and IT innovations. This is because the innovation process is relatively closed rather than open. Finally, the frequency of insufficient resources was highest for administrative process innovations. Initiatives for citizen-centred innovations can more easily access financial resources, whereas organisational change and reform is no longer a popular area of change for many governments following the worldwide 2008 financial crisis:

.. there was no budget and the re-organization task should have been made with no extra cost.`(IT25)

3. Tactics to Overcome Barriers

PSOs use a variety of tactics to overcome innovation barriers with complex dimensions (Table 5). Our content analysis utilised codes initially developed from the literature (e.g. Borins 2014; Meijer 2015; Demircioglu 2017). However, the coding process revealed a number of additional tactics, including modifying the innovation and finding support from a collaborator. Following discussions amongst the authors and sample coding, we decided to categorise these tactics under the second order codes of `fixing` and `framing`. These codes follow the suggestion made by Meijer (2015) in his single case study of e-governance innovation in the Netherlands. Our data provides further empirical support for these two tactics. The framing of an innovation to overcome internal and interaction related resistance was evident in a larger number of cases than `fixing` the content and logistical process administration of innovations.

Analysis of cross-country data showed that framing innovations was similar within Japan and Turkey, this resulted from the intensity of interaction specific and organisational barriers within each of these countries respectively. Hence framing was employed to persuade resistant and unmotivated stakeholders. Within Italy the high frequency of innovation characteristics and organisational resistance as barriers may explain why the fixing of an innovation was the most common tactic.

Examination of the results for each tactic in detail reveals that the modification of innovations is the most frequently deployed tactic for each country. These modifications were commonly reported in cases of technological innovations and include the integration of new tools, standardisation procedures or safety measurements to an ICT (e.g. in cases TR 05, IT31) as well as removing some parts of the proposed solution (e.g. in case TR17). These changes indicate the revealed barriers help the innovation in situating its content and design to the relevant context as TR 05 case reported:

Local practices that bound us did not make much sense for the users in some cases. For example, some users did not want to enter their parents` names in the related fields, as some of them claimed that they did not have this information. We had difficult time explaining this situation to our customs authorities. Yet we finally did and information about parents became optional to fill up.

Non-technological innovations also undergo some modification in activities of the novel programme such as representative citizen selection process (IT15, JP14) or additional modules to reach the target group efficiently (JP09). Once again these changes reveal the importance of the modification to fit the innovation content to the context

`the possibility of re-employment often did not correspond to the profile of the experiences and expectations of potential beneficiaries, and sometimes this has delayed the start of training courses, which were adapted from time to time to make more appropriate and responsive to the internal and external reference context. `

The second and third commonly utilised tactics `showing the benefits of innovation by meetings` and `co-optation of resistant groups to the governance of innovation` also reveal how the interaction specific barriers result in necessary adaptation:

Another challenge was the resistance of practitioners, i.e. enforcement and bankruptcy personnel. ... awareness-raising meetings were organized to address these concerns. ... and the system was constantly refined based on their recommendations (TR17).

To identify the conditions in which fixing and framing were deployed, we coded the tactics most commonly used for each type of barrier and their frequency following Borins (2014). Table 6 displays the four most commonly used tactics for each category of barrier. This reveals different types of tactics can be employed for certain barrier types. Whilst innovators utilised framing dominant tactics against interaction-specific and organisational challenges, fixing tactics such as modifying innovation and finding resources were favoured in other barrier types. Further, the specific type of framing tactics utilised against interaction-specific barriers were different from those used against organisational barriers. For example, in the cases of organisational barriers PSOs reported the use of `provide training` and `showing benefits` rather than `co-optation i.e. including the staff to governance of innovation`. This appears as a result of existing top-down bureaucratic rigidity in all three countries both at central and local level. Finally, the most frequent fixing tactic, “modifying innovation” was the only tactic reported for all barrier types. This analysis indicates that the use of tactics can vary in accordance with the features of the barriers.

Table 5 Tactics to overcome Barriers as percentage of Total Utilised Tactics					
TACTICS	IT (N=34)	JP (N=26)	TR (N=39)	Total (N=99)	Exemplary quote
FIXING					
Modify innovation	21 (24.4%)	12 (18.8%)	15 (13.9%)	48 (18.6%)	<i>This situation forced us to repeated re-sampling and even to the redefinition of some selection criteria. (IT15)</i>
Be persistent	11 (12.8%)	7 (10.9%)	5 (4.6%)	23 (8.9%)	<i>.. day after day and with small but continuous footsteps, through an activity that, even with few resources (but determined and especially organized), is bringing to the gradual and progressive involvement of Organizations .. (IT31)</i>
Support from collaborator	4 (4.7%)	4 (6.3%)	12 (11.1%)	20 (7.8%)	<i>This problem was overcome by the technical support of the Ministry of Finance. (TR14)</i>
Provide necessary logistics	10 (11.6%)	0 (0.0%)	9 (8.3%)	19 (7.4%)	<i>To solve this problem, one of the rooms at the Centre was converted into a nursery and childcare services were provided to young children while their mothers were in training. (TR12)</i>
Find resources	5 (5.8%)	3 (4.7%)	2 (1.9%)	10 (3.9%)	<i>.., it became possible to enlist resources that could not be secured by conventional mechanisms, by efficiently matching projects of the government and the contributions to society by companies, while meeting the desires and challenges of the companies. (JP21)</i>
FRAMING					
Show benefits by meetings	10 (11.6%)	14 (21.9%)	13 (12.0%)	37 (14.3%)	<i>The first was gaining the understanding of parents, guardians, and local residents opposed to the idea. ... To that end briefing sessions were held repeatedly at which the program was carefully explained.(JP18)</i>
Co-optation (Include the resistant group to innovation governance)	9 (10.5%)	9 (14.1%)	11 (10.2%)	29 (11.2%)	<i>To solve this problem the Administration decided to involve the whole staff in the development of the initiative since “day one”, sharing project objectives with all the personnel, through a continuous flow of internal communication on the activities progress. (IT10)</i>
Provide training	6 (7.0%)	3 (4.7%)	16 (14.8%)	25 (9.7%)	<i>.. the operators of the call centers to be assigned to the Access to Justice by Direct Enquiries System were trained in legal terms and concepts by experts. (TR29)</i>
Social Marketing (Promotion of innovation through media)	3 (3.5%)	6 (9.4%)	10 (9.3%)	19 (7.4%)	<i>.. raising public awareness of this program and its PR activities were the first priority for .. Prefecture made PR leaflets about the program and distributed them to the citizens, and also advertised it on TV, radio, newspapers and other media. (JP02)</i>

Top management power	6 (7.0%)	1 (1.6%)	5 (4.6%)	12 (4.7%)	<i>Our officers in the facilities were warned in order to increase the utilization of the cards and eliminate such problems. (TR25)</i>
Change Laws & Build political support	0 (0.0%)	3 (4.7%)	7 (6.5%)	10 (3.9%)	<i>the Division persistently negotiated with the national government. And finally, the Division succeeded in convincing the national government to admit the system's effectiveness and to change the law. (JP24)</i>
Consultation	1 (1.2%)	2 (3.1%)	3 (2.8%)	6 (2.3%)	<i>In response to this criticism, we collected detailed opinions and demands from counseling staffs to persuade them. (JP06)</i>
Total	86 (100%)	64 (100%)	108 (100%)	258 (100%)	

Table 6 Four Tactics Used Most Frequently

		Number of occurrences and percentage of total utilised barriers		Number of occurrences and percentage of total utilised barriers		Number of occurrences and percentage of total utilised barriers		Number of occurrences and percentage of total utilised barriers
INTERACTION SPECIFIC	Show benefits	28 (23.0%)	Co-optation	24 (19.7%)	Modify innovation	20 (16.4%)	Social Marketing	14 (11.5%)
ORGANISATIONAL	Provide training	26 (20.6%)	Show benefits	19 (15.1%)	Modify innovation	14 (11.1%)	Be persistent	14 (11.1%)
CHARACTERISTICS	Modify innovation	29 (59.2%)	Be persistent	6 (12.2%)	Provide necessary logistics	5 (10.2%)	Provide training	3 (6.1%)
CONTEXTUAL	Modify innovation	12 (36.4%)	Change Laws & Build political support	7 (21.2%)	Social Marketing	3 (9.1%)	Show benefits	3 (9.1%)
INSUFFICIENT RESOURCES	Find additional resources	8 (47.1%)	Support from collaborator	6 (35.3%)	Be persistent	2 (11.8%)	Modify innovation	1 (5.9%)

4. Process Stages and Barriers

Innovation has been regarded as a process rather than outcome (Trott 2017) and consequently barriers differ between the key stages of the innovation process (Cinar et al. 2018). We explore these dynamic differences, acknowledging that the innovation process is `iterative, complex and multidirectional` (Hartley 2013).

For this analysis, the barriers were mapped in two stages which reflect the differences between pre- and post-launch activities or between design & development and implementation (Rogers 2003; Piening 2011; Roberts and Longley 2013). Significantly, the comparison between these phases in terms of barriers can demonstrate whether overcoming barriers and gaining awareness of them within the design & development stage lead to a less burdensome implementation.

Table 7 summarises the relative importance of each category of barriers as reported across the two phases. Within the design and development phase, *interaction specific*, *organisational* and *innovation characteristics related* barriers all show similar frequencies. *Contextual* and *innovation characteristic related* barriers also had a higher influence in this early phase. By contrast, the relative influence of *interaction specific* and *organisational* barriers grew after the launch of innovation. The influence of *innovation characteristics related*, *contextual* and *financial barriers* decreased in the implementation phase.

The results also identified 56% of all revealed barriers were reported within the design & development stage, whilst 44 % surfaced during implementation. This preliminary finding shows that PSOs experienced more challenges while they are developing the initial idea and designing the innovation. Yet, by finding the necessary resources, forming the content and facing the contextual problems, they were able to progress it to implementation. This also contributes to the innovation process, which we analyse in the final section. Those barriers faced within the implementation phase were different in nature, due to the higher level of interactions with citizens and other organisations. Within this latter part of the process, as the innovation became more tangible to members of PSO it resulted also in greater resistance.

Table 7: The Variation of Barriers across Innovation Stages

TYPE OF BARRIERS	Development & design (N=99)	n	%	Implementation (N=99)	n	%
INTERACTION SPECIFIC	<i>The main challenge prior to the implementation was the reluctance of call center companies due to revenue concerns because the service had not been tried before. (TR 29)</i>	40	27.3%	<i>The low level of legal awareness among the public at large and particularly parents of the students is a challenge for the implementation of the course. (TR13)</i>	49	42.7%
ORGANISATIONAL	<i>Hence it was difficult for the Directorate of General Insurance personnel to convey their will to the IT personnel who were devoid of the necessary insurance knowledge. (TR15)</i>	38	25.9%	<i>On the other hand, during the implementation, the obligation for giving technical support to hardware materials occurred from time to time.(TR14)</i>	37	32.5%
CONTEXTUAL	<i>The first obstacle faced was the need to fill a gap not only in services provided by MEF, but also in those provided nationally. This made it necessary to develop a new business model for a service that did not exist before in Italy. (IT22)</i>	24	16.1%	<i>Proliferation of the system has revealed that some facilities cannot now provide a sufficient number of parking spaces for the disabled due to a greater number of people with user certificates. (JP15)</i>	11	9.4%
CHARACTERISTICS	<i>The major obstacles were encountered in the development of the technology suitable to carry out the service delivery ... (IT24)</i>	31	21.0%	<i>..the training provided and the possibility of re-employment often did not correspond to the profile of the experiences and expectations of potential beneficiaries, and sometimes this has delayed the start of training courses (IT08)</i>	14	12.0%
INSUFFICIENT RESOURCES	<i>The first obstacle was the budget deficit. Facing financial difficulties, .. Prefecture had no budget to purchase iPads in the middle of a fiscal year. (JP05)</i>	14	9.8%	<i>During application phase of the Project: budget, qualified personnel, time. (TR33)</i>	4	3.4%
TOTAL OBSERVATIONS OF BARRIERS		146	100.0%		114	100.0%

5. Interrelationships between Barriers

This section analyses the interrelationships between barriers within the innovation process, which were reported within thirty-seven cases. Our content analysis revealed a range of generic problems innovators face from the interrelations between barriers:

“The main obstacles we encountered concerned circumstances where eliminating one barrier created a new barrier.... Different groups identified conflicting problems, and the elimination of existing barriers served to create new barriers and problems.” (JP08)

A case in Italy illustrates such interrelations, in this case it relates to the mafia & safety, and a lack of commitment by public sector workers and contractors:

“... the scepticism with which many of the local authorities involved in the project, have expressed about it. In areas of high-intensity mafia the idea of participating in a training course called ". . . to fight corruption and infiltration of organized crime in public procurement", was seen by public institutions experts and companies as something that could create problems in their work, or even to their own safety.” (IT001).

Table 8 Interrelationships between Innovation Barriers

Interrelation Type	Number of occurrences (N=99)	Exemplary quote
Organisational - Organisational	11	<i>.. obstacle was the change of the mentality of the people involved in the process. The new system was based on a philosophy of “sharing” in terms of information and outcomes. This approach is not common in operating rooms because the predominant historical model was hierarchical and the surgeon was the main actor. (IT23)</i>
Contextual - Interaction	10	<i>although private organizations provide support for welfare recipients, issues relating to the protection of personal information prevented government and private organizations from working together to offer support. (JP07)</i>
Interaction - Interaction	5	<i>.. the insufficient motivation of government staff and residents to care for urban infrastructures .. since they had strong notion that maintenance of urban infrastructures belongs to “public works.” (JP12)</i>
Characteristics - Interaction	4	<i>.. it was shown difficulty from individual citizens to participate with an active role in the discussion about the issues presented. This is probably due to the complexity of the topic discussed, (IT15)</i>
Contextual - Organisational	4	<i>There is a strongly rooted resistance towards letting in outsiders in from out of safety concerns amongst the staff at facilities which are charged with the safety of children such as day care centers and nursery schools.(JP17)</i>
Other variations	3	<i>.. problems was of technical nature. Although this can be directly linked to the above-mentioned lack of resources, some issues had to be addressed by the team working on the site.</i>
TOTAL	37	

Table 8 captures the relationships we identified between different barriers. For simplicity, the bold words within the qualitative quotes indicate these interrelations. As Hadjimanolis (2003) suggested in his theoretical paper, the most frequent interrelationship is between organisational barriers, where rigid organisational culture and structure, a lack of capabilities, and insufficient resources, which lead to organisational resistance against the innovation. Second, contextual barriers such as restricted laws, socioeconomic conditions, political polarisation in a society and security concerns prevent organisations and citizens from collaborating.

6. The Contribution of the Barriers to PSI Process

In this section, we explore how revealed barriers can contribute to the PSI process. The UNPSA survey asked the applicants about the “lessons learned” across the innovation process. Like many of the other questions, this is open-ended and innovators reported a wide variety of factors. Fourteen applicants reported on a total of sixteen occasions that barriers contributed to their success and that they perceive these barriers to be beneficial to their initiatives. Following the suggestions of Torugsa and Arundel (2016); Demircioglu and Audretsch (2017), these responses serve as a proxy to illustrate how innovation barriers can enhance the innovation process in a positive way, rather than presenting them as negative. Through content analysis of the data, we identified three different frames all of which show how innovation barriers contribute to success. Table 9 displays these frames, explanation and exemplary quotes: i) learning from difficulties enables PSO’s to better manage innovative projects in the future through learning from the experience; ii) barriers serve as opportunities to modify the innovation in order to improve its characteristics to effectively situate it within the relevant context; iii) awareness of how significant the barriers were led to increased determination to make the innovation happen.

Table 9 Positive Contribution of Innovation Barriers

Frame	Contribution	Explanation	Number of occurrences (N=99)	Exemplary quote
i	Barriers resulted in gaining skills and understanding on innovation	Innovators advised future innovators the way to overcome the barriers	7	<i>“Lessons have been derived from difficulties experienced during analysis and development processes and these lessons gained the institution ground in subsequent studies constituting a roadmap.”</i>
ii	Barriers turned opportunities	Innovators clearly stated barriers were opportunities for improving the innovation	6	<i>“Turn a problem into an opportunity: not to see challenges that arise necessarily as insurmountable, but rather to be mentally flexible in one’s way of dealing with the situation and to try to see, first and foremost, the “problem as an opportunity”; this motivates, improves and helps the institution in which one works and the staff who comprise it to grow.”</i>
iii	The awareness of barriers as a source of determination	Innovators explained they were aware of the seriousness of barriers and showed determined efforts to eliminate barriers	3	<i>“.. involved a host of challenges in terms of space and scheduling.... But X was determined to make the impossible happen. Discussion of the initiative, instead of being entrusted exclusively to the departments directly responsible, was systematically conducted on a government-wide basis, with the whole of X City Office involved; that meant eliminating the sectionalism characteristic of the typical Japanese government office.”</i>

DISCUSSION AND CONCLUSION

The purpose of this study was to examine the complex and dynamic nature of revealed barriers within the PSI process, and the tactics used to overcome them. Moreover, our study aimed to understand how these barriers can contribute to successful innovation outputs. Our international cases of PSIs with positive outcomes from Italy, Japan and Turkey served as a proxy to understand the proposed concept of `revealed barriers` (e.g. D`este et al. 2011; Torugsa and Arundel 2016). Our research has applied and extended Cinar et al.'s (2018) framework of barriers. Our findings also serve as a comparison to the results of Borins (1998, 2001, 2014) in the context of three different countries. In doing so, we put forward a holistic and dynamic picture of barriers with their associated dimensions.

Our findings on the typology of barriers revealed that interaction-specific ones were the most frequently reported. This is significant for research on `Collaborative PSI` (Torfing 2017; Wegrich 2017) and reveals that whilst collaborative interactions hold many potential benefits the inclusion of many partners also presents additional challenges within the innovation process. We have also contributed to the stream of research on cross-country studies of PSI. Our exploratory findings revealed differences between the three countries. Within the Japanese cases, the emphasis on citizen centered innovations resulted in a greater number of interaction specific barriers. Turkey, with its heavily centralised public administration, developed a greater number digital innovations and suffered more frequently from organisational and contextual problems. Finally, the evidence from Italy presented a balance of digital innovations and governance, and social innovations. Similarly the results reflected a greater distribution of barriers in Italy. In comparison to Borins (2014), our results suggest a higher number of obstacles than in the USA.

Second, our findings revealed different characteristics to the barriers between innovation types (Cinar et al. 2018). Interaction specific barriers are more common in social, governance and conceptual innovations, whilst process innovations hold more organisational barriers. It is worth noting that governance innovations aiming for citizen participation and transparency face both internal resistance and interaction problems.

Third, PSOs overcome barriers through the deployment of a variety of tactics. Modifying innovation to situate it to the relevant context is the most frequent tactic. Also, in common with the results of the Borins (2014) study, we found that to overcome revealed barriers PSOs commonly employed soft instruments to `win hearts and minds`, instead of hard management

power. Our findings provide further empirical support, in three different contexts, to Meijer (2015)'s conceptualisation of 'fixing' and 'framing'.

Fourth, our research provides some preliminary findings of dynamic nature of barriers beyond the typologies above. With regards to process stages, the development & design phase is more challenging than the implementation phase. This demonstrates that innovators are aware that they need to craft the innovation and undertake intensive preparation activity before the launch. Thus, the nature of barriers changed across the process. Our findings also support the proposition of the interrelationships between barriers (Hadjimanolis 2003, Termeer 2009) since many cases reported underlying mechanisms rather than isolated factors. We identified also patterns explaining how innovators recognise the contribution of barriers to their success: i) innovators revealed that they benefited from these barriers through learning to manage the innovation process. ii) they regarded the barriers as opportunities to develop the innovation further. iii) the awareness of barriers enhanced their determination to succeed. Our research provides an in-depth analysis of dynamic mechanisms between barriers and successful innovation outputs. This finding builds upon recent survey based literature (Torugsa and Arundel 2016, Demircioglu and Audretsch 2017), which identified a positive relationship between barriers and fruitful innovation outputs.

In particular, our study reveals three specific areas for future research. Firstly, we have identified a number of differences between three countries. The discussion of underlying reasons requires an institutional comparison, which is beyond the limited space of a journal article studying various nature of innovation barriers. However, this instructive finding opens a new research avenue to explore the influence of context on barriers. Second, quantitative survey studies need to include interaction-specific barriers in their response options, which we have found they are the most frequent 'revealed barriers' particularly in the most popular innovation types such as social and governance innovations. Third, whilst we identified the relationship between the feature of the barriers and tactics, future studies should also examine the characteristics of the tactics further to identify conditions, which favour fixing or framing tactics. Finally, further understanding of the contributions of 'revealed barriers' to better innovation outcomes should be explored. Qualitative and quantitative studies should examine their contribution in greater detail.

LIMITATIONS

Our study is not without limitations. First, it is important to recognise the limitation of best practice research. These limitations are shared by all prior studies utilising PSI awards (Borins, 1998, 2001, 2014, Farah and Spink, 2008; van Acker and Bouckaert 2017). The main criticism of this type of research by Overman and Boyd (1994) is that it attempts to propose a recipe for success. However, we aim to uncover the nature of `revealed barriers` with all dimensions rather than imposing success principles, which is well suited to successful cases, due to the relation between success and barrier frequency (Torugsa and Arundel 2016). Second, our data was drawn from the written applications submitted for UNPSA. This opportunistic design restricted the domain of our understanding to the content of the award application forms. Third, the findings on dynamic relations, in particular the interrelations between barriers and the contributions of barriers to the success, are preliminary due to the lower number of responses that provided detail on the interactions and contributions. However, this instructive finding represent a meaningful contribution to the previous scarce empirical literature on the dynamic nature of barriers. Finally, we suggest that the findings of our study should be considered context dependent. Hence further research is required to establish differences in the results across a wider number of country contexts. Despite these research limitations, this study provides a comprehensive and international picture of revealed barriers.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

APPENDIX

APPLICATION QUESTIONNAIRE FORM TO UNPSA

1. What was the problem before the implementation of the initiative?
2. Who proposed the solution and how did the initiative solve the problem?
3. In which ways is the initiative creative and innovative?
4. How was the strategy implemented?
5. Who were the stakeholders involved in the implementation?
6. What resources were used for the initiative and how were they mobilized?
7. What were the most successful outputs?

8. What systems were put in place to monitor progress and to evaluate the activities?
9. What were the main obstacles encountered and how were they overcome?
10. What were the key benefits resulting from this initiative?
11. Is the initiative sustainable and transferable?

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