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Environmental antecedents, innovation experience, and officials' innovation willingness: evidence from China

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ABSTRACT

Prompting officials' innovation willingness is a prerequisite for processes of public sector innovation. This article constructs a framework explaining officials' innovation willingness by linking environmental antecedents and path dependence. The empirical analysis, based on an original survey of 403 officials and interviews with 102 officials in China, shows that their innovation willingness is mostly driven by factors within the bureaucratic system, i.e. top-down and horizontal drivers but less so by bottom-up drivers. Moreover, officials with previous innovation experience tend to have more innovation willingness but are less driven by top-down factors. This study advances the theory of innovation willingness generation.

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KEYWORDS Public sector innovation; innovation willingness; local officials; path dependence; innovation drivers

Introduction

Innovations have become an important source for public sector agencies across the globe to respond to increasingly complex challenges. They often allow government officials to overcome problems and are frequently associated with benefits such as economic growth, public service delivery, and improved environmental governance, and are also related to the co-creation of public value (Greenstone and Hanna 2014; Heilmann 2008; Malesky, Nguyen, and Tran 2014; Osborne 2018). Thus, it is imperative to understand what considerations spur actors' decisions to initiate public sector innovations (PSIs). The burgeoning literature on innovation adoption and diffusion has highlighted numerous important associated factors including top-down processes (e.g. Berry and Berry 2014; Hannah and Mallinson 2018; B. Huang and Wiebrecht 2021), horizontal diffusion mechanisms (e.g. Korac, Saliterer, and Walker 2017;

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Mooney 2020; Shipan and Volden 2008) as well as bottom-up drivers (e.g. Bernier, Hafsi, and Deschamps 2015; Moore and Hartley 2008; Trischler et al. 2022).

By treating innovations as monolithic and focusing on organizational-level drivers and outcomes, prior studies have provided rich macro-level explanations for innovations in the public sector. Increasingly, the current theory of PSI is beginning to further differentiate innovation into different stages, that are each affected by different drivers (and barriers) (Cinar, Trott, and Simms 2019; de Vries, Bekkers, and Tummers 2016; B. Huang and Wiebrecht 2021). Yet, among these different stages, especially earlier ones such as the generation of innovation willingness have received relatively little attention (Cinar, Trott, and Simms 2019) leaving us with limited knowledge about why government officials accept and advocate change in the first place.

To fill this research gap, this study adds to the creation of a more nuanced innovation theory by studying the individual level as opposed to the organizational level and specifically, the drivers of government officials' willingness to innovate. Previous research highlighted that individuals with formal decision-making positions play key roles in innovations (Bartlett and Dibben 2002; Considine and Lewis 2007). Their motivation constitutes a prerequisite for the idea generation of innovation (Hartley, Sørensen, and Torfing 2013; Houtgraaf, Kruijen, and van Thiel 2022) and is the first and foremost step for innovation to enter the decision-making agenda (Meijer 2014). This study then seeks to answer what factors drive government officials' willingness to innovate and specifically, how environmental antecedents, innovation experience, and their interaction do so.

To investigate these questions, we primarily analyse unique survey data on local government officials' innovation willingness in China. The country provides a suitable setting for our study since government officials are under pressure to innovate from both, top-down, horizontal, and bottom-up environmental antecedents (Göbel and Heberer 2017; Yi and Liu 2022; Zhu 2014). They often simultaneously influence local governments and officials in China's multilevel and fragmented governance system (Gilli, Li, and Qian 2018; A. J. He 2018). In addition, many government officials in China have gained experience in innovating since the concept of PSI was introduced around the year 2000 (J. Wu, Ma, and Yang 2013; A. M. Wu, Yan, and Vyas 2020). The survey was conducted in 2016 in Zhejiang Province, China, and includes a sample of 403 government officials from different localities and ranks. In addition, we also interviewed 102 Chinese local government officials at different levels to uncover the mechanisms by which the environmental antecedents influence the generation of officials' innovation willingness.

The survey responses show that top-down factors are the most important drivers in motivating government officials to innovate and that horizontal drivers also significantly foster officials' innovation willingness. However, bottom-up drivers such as popular protests have no direct effect on promoting innovation willingness at the individual level. The interviews reveal that this is primarily because factors from within the bureaucratic system, namely the top-down directives and horizontal peer situations, directly spur local officials' considerations of performance, thereby stimulating their willingness to innovate. Bottom-up factors, on the other hand, need to be transformed into performance requirements first in order to prompt officials to consider innovation. Otherwise, they often cannot directly influence officials' personal willingness to innovate.

These findings demonstrate a discrepancy of driving forces on the organizational and individual levels. While, for instance, bottom-up drivers are widely considered influential in facilitating innovation on the organizational level (Bernier, Hafsi, and Deschamps 2015; Shipan and Volden 2008; Trischler et al. 2022), our results suggest that innovation willingness at the individual level is more likely to be shaped by instructions from higher-level governments and peer pressure from other bureaucracies. Although citizens may put some pressure on the organization as a whole, they do not seem to have a significant impact on the formation of officials' willingness to carry out innovations.

In addition, we also find an important factor of path dependence showing that officials' prior innovation experience also inspires their future willingness to innovate and, simultaneously, reduces their willingness to follow top-down directives. The underlying logic behind this is that prior experiences with innovation enable local officials to better grasp the potential risks in innovating. Consequently, compared to those officials without such innovation experiences, they are more willing to promote PSIs. Moreover, this increased capacity to handle risks also reduces their reliance on top-down driving factors, as following top-down guidance for innovation is considered a safer approach.

The contributions of this study are twofold. First, highlighting the necessity of discussing innovation in stages, our study particularly advances the theory of innovation willingness generation. While a number of studies have explored PSIs' environmental antecedents with different methodological approaches (e.g. Bernier, Hafsi, and Deschamps 2015; Berry and Berry 2014; Hannah and Mallinson 2018; R. M. Walker 2006), most do so in regard to innovation adoption and diffusion. Instead, we are exploring officials' innovation willingness generation to examine how a need to innovate is triggered in the first place. The process from innovation willingness generation to innovation behaviour is a complex process; thus, different antecedents may not equally influence both innovation behaviour and innovation willingness. Some organizational factors that promote innovation behaviour at the organizational level may not necessarily spur (individuals') innovation willingness but may skip the willingness generation stage and directly enter the decision-making agenda (such as many innovations mandated top-down). However, innovations that are imposed may be less sustainable and successful in achieving their goals than induced innovations that are supported by an intrinsic willingness to innovate. Therefore, exploring the triggers of innovation willingness is crucial, at least equally important as understanding innovation behaviour. By decoupling innovation behaviour and innovation willingness, our study also underscores the necessity of distinguishing layers of factors that influence innovation, including drivers and barriers of innovation behaviour and triggers and inhibitors of willingness to innovate rather than conflating them (Damanpour 1991; Houtgraaf, Kruijen, and van Thiel 2022).

Second, our analytical framework of government officials' innovation willingness responds to previous statements that our 'understanding of the sources of public innovation is inadequate' (Sørensen and Torfing 2011, 844). We build upon the commonly identified environmental antecedents and add an important element to previous literature, namely prior personal innovation experience. This factor of path dependence may have been underexplored in previous work that primarily focused on the environmental antecedents of innovation adoption. As such, our approach also

advances prior individual-level studies (e.g. Bertelsen, Lindholst, and Hansen 2022; Hasmath, Teets, and Lewis 2019; Jung and Lee 2016; Lewis, Teets, and Hasmath 2022; Meijer 2014; Ronquillo, Popa, and Willems 2021) that have focused on individuals' personal characteristics. Instead, our study analyses the driving motivations behind their innovation willingness more explicitly.

In the following, this paper will discuss its theoretical framework, outline the empirical expectations, and introduce its empirical strategy.

Theoretical framework

PSIs have received an enormous amount of attention in recent years (Korac, Saliterer, and Walker 2017; Trischler et al. 2022; J. Wu and Zhang 2018; P. Zhang and Wu 2020). This is unsurprising given that they can help government officials respond to governance challenges, minimize the risks of new policies by testing them out in smaller jurisdictions, and often directly or indirectly spur economic growth and promote value co-creation (Heilmann 2008; Osborne 2018; Rogers 2003). Hereby we follow Rogers' definition of innovation as 'an idea, practice, or object that is perceived as new by an individual or other unit of adoption' (2003, 12).

The extant literature has provided rich functionalist explanations as to why local governments adopt innovations. Besides characteristics of the governments (Damanpour 1991) and the innovations themselves (Carter and Bélanger 2005; Rogers 2003), environmental antecedents have been shown to play a crucial role. These can generally be divided into top-down, bottom-up, or horizontal factors that drive local governments to innovate (Berry and Berry 2014; Korac, Saliterer, and Walker 2017). For instance, some innovations are mandated by higher-level governments (Berry and Berry 2014; Hannah and Mallinson 2018), while others diffuse horizontally across local governments (Baybeck, Berry, and Siegel 2011; Mooney 2020; Shipan and Volden 2008). Yet others are adopted in response to bottom-up pressures such as protests (Bernier, Hafsi, and Deschamps 2015; Korac, Saliterer, and Walker 2017; Tolbert, Mossberger, and McNeal 2008).

Nevertheless, the focus on organizations' adoption of innovations may overshadow some of the developments that take place prior to that. Innovations are processes of which the adoption is only the ultimate culmination, and although innovations can be 'iterative, complex, [and] multi-directional' (R. Walker, Jeanes, and Rowlands 2001, 19), it is useful to think of them as taking place in different stages. For instance, Hartley, Sørensen, and Torfing (2013) identify five different stages of innovation: problem definition, idea generation, testing, implementation, and diffusion. Others, including Cinar, Trott, and Simms (2019) divide the process into four phases including idea generation and selection, development and design, implementation, and sustainment. While the precise categorization may be debated, the general distinctiveness of different phases is not.

In consequence, the different stages are also important to study independently of each other. First, in different stages of the process, different actors may be involved so that for instance, the initiator of the innovation is not necessarily equal to the innovation adopter (e.g. Meijer 2014). Moreover, a number of studies have identified that different stages are associated with different innovation barriers (e.g. Cinar, Trott, and Simms 2019; Hadjimanolis 2003). Relatedly, and most relevant to the premises of this paper, the drivers of innovations may also be distinct in different phases of the process

(e.g. de Vries, Bekkers, and Tummers 2016; B. Huang and Wiebrecht 2021). Yet, relative to the adoption stage, earlier phases of innovations have been understudied as systematic literature reviews show (Cinar, Trott, and Simms 2019).

In this study, we focus on the initial stage of the innovation process, which is the willingness generation before the idea is born. That is, how a need to innovate is triggered for government officials in the first place. This step is in many ways a prerequisite for the following stages. Although some innovations are mandated, in most/many cases individuals need to have willingness before they can devote themselves to advance innovation and before they inform themselves about potential solutions (Amabile 1996; Hartley, Sørensen, and Torfing 2013; Houtgraaf, Kruijen, and van Thiel 2022). Yet, our understanding of the considerations of individual government officials is less developed. Although prior research has shown that, in addition to environmental factors, the intrinsic motivations of individuals are also important antecedents for innovation adoption (Roberts and King 1991; Zhu and Zhang 2016), it is less clear where individuals get this motivation from.

In order to analyse this question, this study takes local leaders, who are considered key actors in all stages of PSIs (Considine and Lewis 2007; Damanpour and Schneider 2009; Gofen, Meza, and Moreno-Jaimes 2023; Meijer 2014), as the unit of analysis. Primarily due to limited individual-level research, we draw on organizational-level research and seek to analyse to what extent the environmental antecedents highlighted on the organizational level also drive officials' individual willingness to

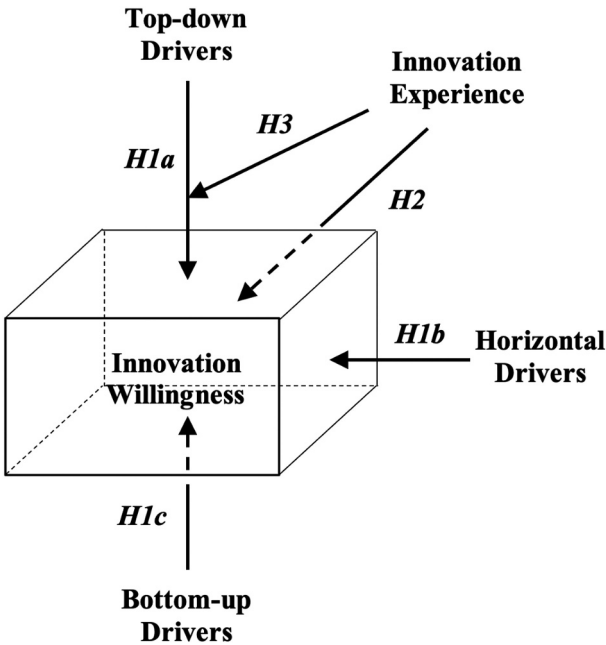


Figure 1. Influence of environmental drivers and innovation experience on innovation willingness. *Notes:* This figure illustrates the theoretical framework of our research. The cross-sectional dimension represents environmental antecedents that may influence officials' innovation willingness, including top-down, horizontal, and bottom-up drivers. The second dimension represents the time dimension, highlighting the potential influence of prior innovation experience on willingness and on the top-down drivers' effect on innovation willingness.

innovate. On the other hand, inspired by arguments of path dependence that characterize causal relationships as self-reinforcing processes (Pierson 2004), we hypothesize that leaders' prior innovation experience also has an impact on their later innovation willingness and moderates the effect of some innovation drivers. Figure 1 below illustrates our theoretical framework which complements factors at the cross-sectional dimension (top-down, horizontal, and bottom-up drivers) with the time dimension (prior innovation experience). In the following, this paper will introduce its specific hypotheses.

First, top-down drivers of innovation have attracted increasing academic attention. Higher-level authorities can shape the behaviour of local governments including the adoption of innovation through mandates, authorization, policy guidance, and financial incentives (Berry and Berry 2014; Hannah and Mallinson 2018; Lou, Sun, and Zhang 2023). Based on evidence from the United States, prior research has shown that national governments and the Supreme Court can force lower-level governments to innovate (e.g. Hinkle 2015; Hoekstra 2009).

Although top-down pressures are often considered to stimulate innovation in a mandated and imposed manner, we expect that for local government officials, top-down pressures are still likely notable drivers of innovation willingness for several reasons. First, in most bureaucratic systems, officials' careers also depend on responding to higher-level pressures (e.g. Berry and Berry 2014; Tullock 1965). Second, often, mandates and instructions to innovate also go hand in hand with financial incentives for officials' municipalities or departments (e.g. Nicholson-Crotty 2009; Welch and Thompson 1980). Third, creativity to innovate in public sector organizations may be limited due to high levels of formalization and centralization (e.g. Damanpour 1991; Houtgraaf, Kruijen, and van Thiel 2022; Y. Ma 2024). Responding to higher-level instructions may therefore be the most straightforward way of innovating. Fourth, government officials and public sector employees generally also tend to be risk-averse and avoid radical innovations (e.g. Damanpour 1991; Houtgraaf, Kruijen, and van Thiel 2022; Kruijen and van Genugten 2017). Following higher-level incentives and instructions can often minimize the risk of innovations for government officials (Lewis, Teets, and Hasmath 2022; Torugsa and Arundel 2016).

Thus, our first hypothesis on the importance of innovation drivers is as follows:

H1a: Top-down drivers are positively associated with local officials' willingness to innovate.

Besides vertical mechanisms, horizontal drivers have been discussed in great detail in the existing literature. Studies on innovation diffusion distinguish between learning, competition, and emulation processes that drive decision-makers to adopt innovations already introduced elsewhere (Berry and Berry 1990; Mooney 2020; Shipan and Volden 2008). Therefore, innovations in other places could promote local governments' innovative activities (Korac, Saliterer, and Walker 2017), even transnationally. In addition, local governments compete with each other in most political systems, either for political rewards or for resources such as fiscal transfers (J. L. Walker 1969; R. M. Walker 2006). Thus, innovations in other localities also create peer pressure for local governments in the same jurisdiction to innovate, especially when innovativeness

is a key performance indicator (Damanpour, Walker, and Avellaneda 2009; L. Ma 2016).

These considerations are likely also reflected within the willingness generation stage on the individual level. If their counterparts in other places adopt an innovation, local officials are likely to feel left behind. This motivates them to try to bridge such gaps and surpass their peers through innovation (Arnold and Long 2019; Butler et al. 2017). Furthermore, if an innovation has shown to be successful elsewhere, local officials are also expected to be more inclined to adopt the innovation and reap the same benefits and reduce the risk of imitating innovations (DiMaggio and Powell 1983; Korac, Saliterer, and Walker 2017; Scott 2001). Thus, horizontal innovation drivers allow local government officials to substantially reduce the cost of adopting innovations, while at the same time almost guaranteeing positive consequences for the local governments. Thus, our second hypothesis is as follows:

H1b: Horizontal drivers are positively associated with local officials' willingness to innovate.

Third, PSIs are also understood as demand-induced (J. L. Walker 1969). A large number of innovations are not merely aiming at improving internal organizational procedures but are oriented towards citizens (e.g. de Vries, Bekkers, and Tummers 2016; Moore and Hartley 2008). This is the case, particularly for local governments that need to provide public services to residents and respond to the demands of citizens (Korac, Saliterer, and Walker 2017; Moore and Hartley 2008).

Studies have found that local challenges such as rising social unrest, increasing demand for public participation, and economic downturns stimulate local governments to develop new policies to adapt to these environmental changes (Bernier, Hafsi, and Deschamps 2015; B. Huang, Ye, and Wu 2023; Tolbert, Mossberger, and McNeal 2008). Public officials can experience public pressure from their own citizens to adopt policies. Therefore, local officials can also be expected to have an interest in adopting innovations addressing bottom-up pressures. Thus, our third hypothesis is as follows:

H1c: Bottom-up drivers are positively associated with local officials' willingness to innovate.

In addition, we expect path dependence to be a crucial factor in shaping officials' willingness to innovate. Path dependence has attracted increasing attention in public administration and policy studies and refers to the fact that previous actions affect the choice of subsequent actions (Kay 2005; Pierson 2000; Vergne and Durand 2010). Some recent studies have highlighted the factor of path dependence in explaining innovation adoption and found that those who previously initiated innovations tend to continue on this trajectory. For instance, in explaining New York municipalities' adoption of anti-fracking policies, Arnold and Long (2019) discover that localities that historically introduced more of them are more active in the most recent wave of innovation adoption. Furthermore, based on an investigation of four innovative cities in Norway, Gullmark (2021) finds that the governments' past innovative behaviour led to a series of innovation-stimulating routines, processes, tools, and structures, which constitute an important source of their innovativeness.

Past experiences with innovation adoption likely help organizations in renewed efforts to innovate (Boyne et al. 2005; Catarina et al. 2022). For one, due to prior experiences, a local government may have already created an institutional environment and arrangement more conducive to innovative behaviour (Boehmke and Witmer 2004). In consequence, a self-reinforcing process of policy innovations is set in motion (Gullmark 2021; Kay 2005). This path-dependent effect is basically transmitted by innovators, as the previous innovations could influence subsequent ones by shaping the motivations, capacities, and opportunity structures of government officials (Arnold and Long 2019; Moynihan and Soss 2014). Examples from psychology highlight that prior experiences help individuals to cope with difficult and unpredictable situations (e.g. Benabou and Tirole 2011). For local officials, prior experience may also help alleviate uncertainty surrounding innovations. Thus, the hypothesis on path dependence is raised as follows:

H2: Officials' prior experience in innovating is positively associated with their willingness to innovate at present.

Furthermore, prior experience in innovation is likely not only to exert a direct impact on officials' innovation willingness but also to moderate the effect of top-down drivers on innovation willingness. For local officials, accepting top-down signals to adopt innovations is a relatively risk-free undertaking. While indicating their loyalty to the government, they simultaneously minimize the risk of policy failures. On the other hand, following top-down instructions reduces organizational autonomy due to the lacking freedom in designing policy goals and choosing policy instruments (Demircioglu 2021; Howlett and Ramesh 1993; Wang 2012). Likewise, the benefits for the local government are limited in that they are only seen as 'followers' rather than true 'innovators' (Wang 2012).

Those officials with innovation experience have been through the process of innovation adoption and have gained a better understanding of the risks involved (Boyne et al. 2005). Officials with prior experience may, therefore, feel emboldened to turn towards more autonomous innovations. This allows them, for instance, to develop existing innovations further and integrate new components under their name into the innovation programme. This is beneficial for them as it can make them stand out in the horizontal competition and attract attention and rewards from their superiors (Shipan and Volden 2008; J. L. Walker 1969; R. M. Walker 2006). Therefore, we expect officials with innovation experience to be less likely to follow top-down drivers, compared to those without innovation experience.

Yet, we do not expect the same effect on horizontal and bottom-up drivers. For these, the previous experience is not expected to change officials' risk assessment and/or incentive structure. For instance, when an innovation has proven to be successful in another locality, government officials may feel the same pressure to adopt this innovation as well irrespective of whether they have previously innovated or not. Their willingness to innovate thus would stay consistent. The same applies to bottom-up drivers. Officials with previous experience of innovating, when faced with the same bottom-up pressure, may not have a higher willingness to innovate. This is because their higher willingness to innovate does not necessarily generate more rewards but may require additional costs, even though their innovation experience may enable

them to better cope with challenges during the innovation process. Thus, prior innovation experience is not expected to moderate these two pathways. The hypothesis on the moderating effect of innovation experience is raised as follows:

H3: Officials' experience in policy innovation negatively moderates the positive effect of top-down drivers on their innovation willingness.

Data and methods

Data collection and context

China is chosen as our research context to identify how the cross-sectional environmental drivers and prior innovation experience shape the innovation willingness of local officials. There are several reasons for choosing China. First, China's multilevel and fragmented governance system hosts a rich array of public sector innovation practices (J. Wu and Walker 2020; A. M. Wu, Yan, and Vyas 2020). For local officials under the Chinese governance system, environmental drivers from multiple directions, i.e. top-down, horizontal, and bottom-up, coexist. Chinese local officials are subject to top-down directives as well as competition from their peers, and they also have to respond to local governance issues that otherwise hold back their political careers (Hou et al. 2018; J. Wu, Ma, and Yang 2013; P. Zhang and Wu 2020; Zhong and Zeng 2024; Zhu 2014). This offers an appropriate condition to test the impact of multiple environmental drivers on officials' willingness to innovate.

Second, sufficient variation in officials' innovation experience can be obtained. Since the introduction of the Local Government Innovation Award in China in 2000, PSIs have been encouraged by the Chinese government and society over the past two decades. As a result, PSIs have surged in local China (Yu and Huang 2019). A significant proportion of local officials have carried out innovations but there are still many who have not initiated innovation programmes yet. Thus, the interaction between environmental drivers, officials' innovation experience, and their willingness to innovate can be examined systematically.

Third, prior research shows that partisanship may also influence innovation processes (e.g. Volden 2006). By focusing on China, however, we can hold political factors such as officials' ideology and partisanship constant to focus explicitly on how environmental drivers shape their willingness to innovate.

We carried out a survey among government officials in Zhejiang, a coastal province with rapid socio-economic growth and one of the provinces at the forefront of PSI in China (B. Huang and Yu 2019; Yang, Sun, and Li 2023). Given its substantial practices in PSI, Zhejiang serves as a compelling case study, in which government officials may possess a more accurate and nuanced understanding of innovation, and there may be rich variations in environmental drivers, officials' innovation experiences, and innovation willingness (J. Wu, Ma, and Yang 2013; Zhu and Zhang 2016). Therefore, while Zhejiang may not be representative of China overall, it helps us advance general knowledge on PSI. The survey was conducted from August 2016 to September 2016 in conjunction with a provincial-level government official who had working connections with officials in the general offices of all municipal governments in Zhejiang Province. The official first sent the questionnaire to municipal governments in

Table 1. Measurement of control variables.

Variable	Measurement
Gender	Respondents' gender. (0 = Female, 1 = Male)
Age	Respondents' age. (1 = 18–25, 2 = 26–35, 3 = 36–45, 4 = 46–55, 5 = 56 and above)
Education	Respondents' educational background (1 = High School, 2 = Higher Vocational School, 3 = Bachelor, 4 = Master, 5 = Doctoral)
Administrative level	Respondents' administrative level. (1 = Clerk, 2 = Vice-Township, 3 = Township, 4 = Vice-County, 5 = County)
Leadership Experience	Respondents' experience as a government leader previously. (1 = Yes, 0 = No)

Zhejiang and then asked them to forward it to county leaders and township leaders via WeChat Groups.¹ The questionnaire was anonymous and voluntary, and ultimately, a total of 403 valid responses were received. Though it is not a random sampling, this method carries a certain degree of obligatoriness, thus ensuring diversity in regional backgrounds, educational and administrative levels as well as the age of the officials, providing unique data for analysing innovation willingness at the individual level (see Table 1). Following previous studies (Demircioglu and Audretsch 2017), our survey data also passed Harman's one-factor test, suggesting that the data does not suffer from serious common source bias.

For the purpose of this study to contribute to the general knowledge of PSI, we consider it advantageous to use survey data collected in 2016. This was in the earlier stages of the Chinese government's emphasis on top-level design, and local officials had not incorporated too many factors associated with this in their decision to innovate, such as the political risks of failure or being seen as a 'jumping the gun' by central leaders (Lewis, Teets, and Hasmath 2022; Teets and Hasmath 2020). Thus, PSIs during that time are likely to have had more general features like their counterparts in other countries, compared to context-specific ones. Practically speaking, the data from 2016 also captures a unique window in time when China's top-level design had not yet been significantly strengthened, suggesting that also horizontal and bottom-up factors were plausible driving forces for officials' decision to innovate. Thus, it holds the potential to provide a basis for formulating practical implications applicable in a broader international context. This could also be supported by the fact that many studies that contribute to the theory of PSI taking China as a case have also used data from that period (X. Huang and Kim 2020; Lewis, Teets, and Hasmath 2022; Liu and Yi 2023).

It is crucial to acknowledge that with the increasing emphasis by the Chinese government on top-level design, there may have been significant changes in the context described above for China. Therefore, this study has limitations in understanding the current state of PSI in China. Nevertheless, the academic debate surrounding these changes is still ongoing and scholars have proposed different views, including some that suggest that basic aspects of China's institutions and policy process remain unchanged (Ahlers and Schubert 2022; Heffer and Schubert 2023).

Survey

Dependent variable

This study focuses on the innovation willingness of local officials. Inspired by the extant studies (Demircioglu and Audretsch 2017; Demircioglu and van der Wal 2022),

the survey measures innovation willingness by asking respondents, ‘How is your current willingness to innovate?’. Government officials could indicate their innovation willingness on a five-point Likert scale ranging from ‘1 = very weak’ to ‘5 = very strong’.

Independent variables

Our study contains two groups of independent variables: environmental drivers of PSI from multiple directions (including top-down, horizontal, and bottom-up) and prior innovation experience.

The environmental drivers were measured by asking: ‘Please evaluate the importance of the following factors in promoting PSI’, and a seven-point Likert scale ranging from ‘1 = not important at all’ to ‘7 = very important’ was employed. Based on existing literature (Berry and Berry 2014; R. M. Walker 2006; R. M. Walker, Avellaneda, and Berry 2011; Y. Zhang and Zhu 2020), we included three top-down factors. They were: 1) Strategic planning of superior governments; 2) Reform and innovation work mentioned in top-down directives; 3) Reform and innovation work emphasized by superior leaders. For horizontal driving force, we also designed three factors based on previous studies (Korac, Saliterer, and Walker 2017; R. M. Walker, Avellaneda, and Berry 2011; Y. Zhang and Zhu 2020). They were: 1) Innovation of other local governments in China; 2) Innovation of other local governments being commended by superior governments; 3) Innovations of foreign local governments. Also deriving from the extant literature (Korac, Saliterer, and Walker 2017; R. M. Walker 2006; R. M. Walker, Avellaneda, and Berry 2011), we chose four bottom-up factors, which were: 1) Social unrest; 2) Public emergencies; 3) Trust crisis towards the government; 4) Economic downturn. The overall importance of top-down, horizontal, and bottom-up environmental drivers is obtained by averaging the officials’ judgement on the importance of the individual factors accordingly.

The prior experience in innovation was measured by asking the respondents ‘Have you ever initiated the adoption of a PSI before?’ (1= Yes, 0= No).

Control variables

Previous literature has pointed out that personal characteristics of key actors could affect innovation adoption (Damanpour and Schneider 2006). Accordingly, we controlled for the gender, age, and education of the local officials (Demircioglu and Audretsch 2017; Kiefer et al. 2015). In addition, considering that officials’ administrative level and leadership experience may also affect their judgement (Lewis, Teets, and Hasmath 2022), we also control for those. The measurements of the control variables are shown in Table 1.

Estimation

Since our dependent variable is ordinal, we adopted an ordered logit regression model. In order to account for potential heteroscedasticity, all the estimates were clustered based on the administrative level of the officials.

Interviews

In addition to the questionnaire, we conducted semi-structured interviews with 102 local officials from six provinces in China between 2012 and 2022. These interviews provide important insights for us to understand local officials’ innovation willingness

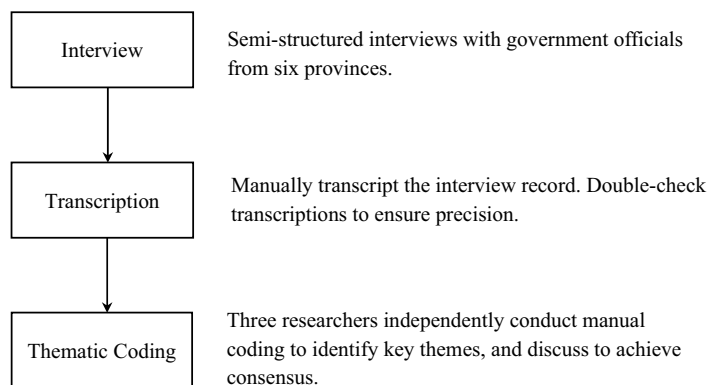


Figure 2. Qualitative research process.

and explain the quantitative results. These provinces include developed coastal provinces in China – Zhejiang, Jiangsu, Shanghai, and Guangdong, as well as western provinces – Gansu and Shaanxi. Their administrative levels covered range from the lowest level of clerks to deputy provincial-level officials. More than half of the respondents hold positions at the township and county government.

Interviews with government officials were mostly conducted in one-on-one settings but also included group interviews. Each interview lasted approximately 60–90 minutes and focused on a particular innovation they were conducting. For example, on August 4–5, 2015, we investigated the participatory budgeting innovation in Wenling City, Zhejiang Province, which is a PSI that attracted great academic attention (B. He 2019; Y. Wu and Wang 2012). We interviewed four leaders of three townships in Wenling, who were the direct initiators and executors of Wenling’s participatory budgeting, as well as two leaders at the departments of Wenling Government (including leaders from the local People’s Congress and the local propaganda department), who were co-initiators of the innovation. During the interviews, we primarily inquired about the factors that triggered their will to carry out this innovation, whether they had conducted innovations before this, and why this innovation was put on the government’s agenda at this specific point in time.

The subsequent qualitative data analysis was coded manually by three researchers independently. The coding decisions were discussed collaboratively among the researchers to achieve consensus. This process allowed us to identify recurring themes, concepts, or patterns in the participants’ responses, and ensure consistency and reliability of the coding framework through consensus discussions. Key insights and patterns were extracted from the interviews to further support and explain the results of our quantitative research. The process of qualitative research is shown in [Figure 2](#).

Findings

Descriptive statistics

[Table 2](#) reports the results of the descriptive statistics. It shows that officials generally attach more importance to top-down innovation pressure (Mean = 5.41) than horizontal (Mean = 4.22) and bottom-up pressures (Mean = 4.47). In terms of innovation

Table 2. Descriptive statistics.

Variables			N	Mean	SD	Scale
Dependent variable	Innovation willingness		401	3.80	0.71	1–5
Independent variables	Perceived drivers of innovation	Top-down drivers	403	5.41	0.65	1–7
		Horizontal drivers	403	4.22	0.95	1–7
		Bottom-up drivers	403	4.47	1.03	1–7
Control variables	Innovation experience	Prior innovation experience	400	0.59	0.49	0 or 1
	Demographic context	Gender	400	0.78	0.41	0 or 1
		Age	403	3.02	0.75	1–5
		Education	403	3.30	0.61	1–5
		Administrative level	399	3.39	1.21	1–5
		Leadership experience	400	0.40	0.49	0 or 1

experience, 59% of the surveyed officials had initiated PSIs before. This provides sufficient variance among the sampled officials.

Results from quantitative and qualitative methods

Table 3 presents the regression results of the ordered logit model that is used to test our hypotheses. In Models 1–4, we test the effects of top-down, horizontal, and bottom-up drivers as well as prior innovation experience on innovation willingness separately, while Model 5 includes all three drivers and prior innovation experience. Model 6 measures the moderating effect of prior innovation experience on the influence of top-down drivers on officials’ innovation willingness.

The results of Models 1, 2, and 5 suggest that top-down drivers, as well as horizontal drivers, have a strong and highly significant impact on the innovation willingness of officials. This supports H1a and H1b, that is, the stronger top-down and horizontal drivers are, the higher officials’ innovation willingness will be. Yet, the coefficient for bottom-up drivers is not significant in any of the models, which is inconsistent with H1c. This suggests that officials’ innovation willingness is not affected by bottom-up drivers.

Although our survey sample is limited to respondents from Zhejiang Province, our interviews confirm these findings and suggest that they also apply across other provinces in China. On the one hand, almost all respondents said that they thought of innovations because of the triggers of top-down policy requirements and saw them as a way of creatively implementing tasks assigned by superiors which would reflect positively on their performance. On the other hand, the active innovation efforts of other local governments are also crucial for generating innovation willingness among local officials. In the bureaucratic system, performance can be demonstrated both by comparing one’s innovative work with one’s past work and by comparing it with one’s peers. A considerable number of interviewees acknowledged that bottom-up demands also drive their adoption of innovation. Yet, when carefully inquiring whether these bottom-up demands triggered their thoughts of using innovations to solve problems or to comply with innovation directives within their institutions (which is led by bottom-up demands), the latter was a shared understanding among the respondents. In other words, most respondents believed that bottom-up demands drive innovation adoption at the organizational level, but they are not a direct factor that triggers officials’ willingness to innovate at the individual level.

Table 3. Baseline results.

Dependent Variable: Innovation Willingness		(1)	(2)	(3)	(4)	(5)	(6)
Perceived drivers of innovation	Top-down drivers	0.403*** (0.0448)				0.382*** (0.0717)	0.918*** (0.203)
	Horizontal drivers		0.211*** (0.0463)			0.153** (0.0594)	0.147*** (0.0562)
	Bottom-up drivers			0.0809 (0.0922)		0.0117 (0.112)	0.0102 (0.111)
Innovation experience	Prior innovation experience				0.851** (0.419)	0.915** (0.425)	0.917** (0.425)
	Top-down drivers* Innovation experience						−0.797*** (0.298)
Interaction of Perceived drivers & Innovation experience Control variables	Gender	0.546*** (0.166)	0.555*** (0.172)	0.563*** (0.168)	0.460** (0.190)	0.452*** (0.159)	0.443*** (0.169)
	Age	0.103 (0.194)	0.106 (0.184)	0.111 (0.172)	0.114 (0.200)	0.0877 (0.217)	0.0751 (0.210)
	Education	0.550*** (0.193)	0.554*** (0.178)	0.550*** (0.199)	0.494** (0.243)	0.516** (0.256)	0.548** (0.254)
	Administrative level	−0.00354 (0.0603)	0.0104 (0.0586)	−0.000683 (0.0567)	−0.110 (0.0791)	−0.0947 (0.0803)	−0.0987 (0.0720)
	Leadership experience	0.881*** (0.323)	0.902** (0.356)	0.932*** (0.314)	0.810*** (0.264)	0.750*** (0.272)	0.804*** (0.260)

Notes: This table presents the effect of top-down, horizontal, bottom-up drivers and prior innovation experience on officials' innovation willingness, where Models 1–4 test the effects of the factors separately, Model 5 includes all three drivers and prior innovation experience, and Model 6 measures the moderating effect of prior innovation experience on the influence of top-down drivers on innovation willingness. $N = 390$. Standard errors in parentheses and clustered on administrative level, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Therefore, for individual officials, the direct factors that induce their innovation willingness are the elements within the bureaucratic system. This is because those factors which include top-down requirements and horizontal peer pressures are based on institutional arrangements that can directly influence officials' personal behavioural choices, and the primary intermediary is officials' concern towards performance. In other words, the top-down and horizontal factors stimulate officials' willingness to innovate by evoking their need for performance.

Models 4, 5, and 6 show that the coefficient of innovation experience is strongly positive and significant at the 5% level, supporting H2. This implies that there is a path-dependent effect on officials' innovation willingness. Officials who have initiated innovation programmes in the past also had stronger subsequent innovation willingness.

In our interviews, we also found that most of the respondents who had previously led innovation displayed a stronger impulse for innovation. This is largely attributed to their prior innovation experiences, even those marked by failure, which heightened their awareness of the risks associated. For instance, one official who had previously led an innovation stated, 'Past experiences with innovation make me more willing to execute tasks through innovation because I have done it before, and it boosts my confidence in engaging in innovation'. Another official, who had led innovation in the past but faced failure, expressed, 'Although the innovation was not very successful, it taught me a lesson about the obstacles of innovation ... Now, I am even more willing and confident to innovate a good programme'.

In addition, Models 1, 2, and 5 show that when the models contain both top-down and horizontal drivers, the coefficients of both are smaller compared to models with only one motivating factor. One possible explanation is that officials have limited attention, time, and resources to deal with pressure from multiple directions. Therefore, the effects of the two drivers on officials' innovation willingness may not total in a straightforward manner (Y. Zhang and Zhu 2020). Inspired by Zhang and Zhu (2020), we also analysed whether there is an interaction between top-down and horizontal drivers, with the former negatively moderating the positive effect of the latter. Yet, on the individual level, our data does not provide evidence for this relationship. This is likely because we are discussing individuals' innovation willingness, while Zhang and Zhu (2020) are discussing actual innovation adoption. Regarding innovation willingness, individuals may consider both top-down and horizontal factors as important, and these factors can independently influence the generation of individuals' willingness. When it comes to innovation adoption which is an actual behaviour, it requires the government to consider multiple factors simultaneously. Consequently, in actual behaviour, top-down driving factors may weaken the push of horizontal factors on innovation adoption. With regards to the control variables, gender, education, and leadership experience show significant influence on officials' innovation willingness, while officials' age and administrative ranks do not. Officials who are male, better educated, and have leadership experience are more willing to initiate innovations.

Concerning our hypothesis H3, we find that the interaction term between top-down drivers and innovation experience is strongly negative and highly significant. This indicates that officials' innovation experience moderates the impact of top-down drivers on their innovation willingness. When officials have experience with innovation, the same level of top-down driving forces translates into less innovation willingness.

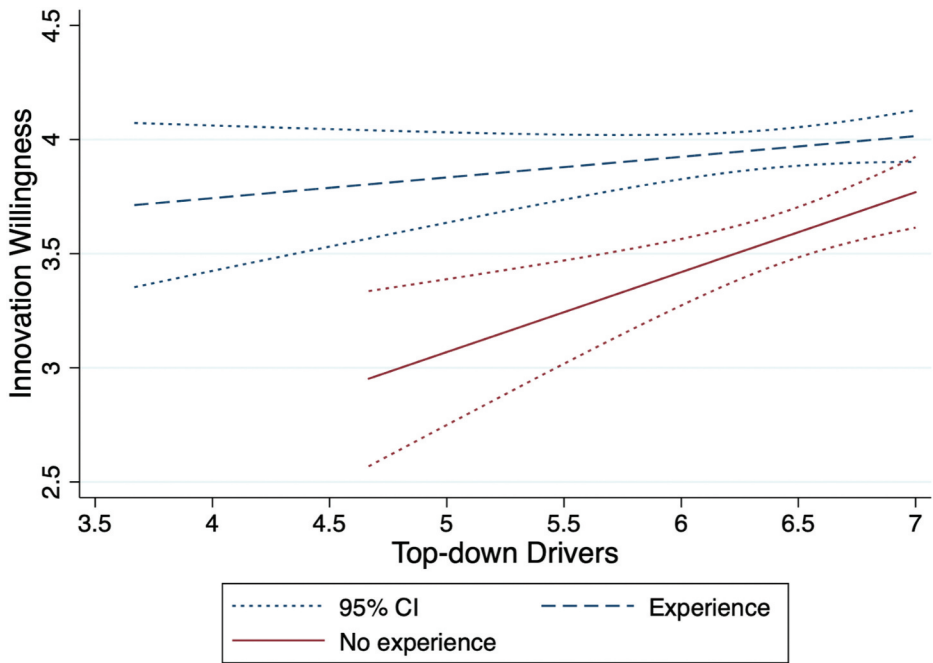


Figure 3. Effect of innovation experience on top-down drivers' influence on innovation willingness.

Our interviews also resonate with this finding. Those respondents with innovation experience, when asked about the triggers of their current innovation willingness, tended to highlight the top-down drivers less frequently. On the other hand, however, interviewees without innovation experience, when asked the same questions, usually emphasized the significant role of top-down policy requirements in stimulating their willingness to innovate. For example, one official who designed participatory budgeting in 2005 in Wenling, Zhejiang Province, was also the first to introduce elements of deliberative democracy in 1999. He highlighted how he used the idea of deliberative democracy to develop participatory budgeting in our interview with him in 2015. In contrast, another official in Wenling who did not have innovation experience before adopting participatory budgeting continuously emphasized how he followed higher-level governments' instructions throughout the innovation process.

This result offers support for our hypothesis H3. On the other hand, as expected, we find no significant results for the interaction between prior innovation experience and horizontal or bottom-up drivers.

To further illustrate the moderating role of prior innovation experience, we plotted the marginal effect of top-down drivers on innovation willingness for officials with prior innovation experience and without (see Figure 3). The graph shows that the innovation willingness of officials with innovation experience is generally stronger than that of officials without innovation experience. Meanwhile, top-down drivers have a smaller positive effect on officials' innovation willingness when they have prior innovation experience.

Finally, we conducted a number of robustness checks to test the validity of our results. First, since the values of the dependent variable can be regarded as

ordinal or continuous, we replicated our models with OLS estimations. The results remain robust to this model specification. While the coefficients decreased slightly in magnitude, they retained their statistical significance (see [Table A1](#)). Second, we modified our sample by excluding the respondents whose administrative level is ‘clerk’ since their capacity and autonomy to initiate innovations may be limited. The results also remain robust for this subsample (see [Table A2](#)).

Third, we also analysed different compositions of our top-down and horizontal pressure indicators. Specifically, we first only retained the indicator ‘Reform and innovation work mentioned in top-down policy directives’ to measure top-down drivers and the indicator ‘Innovation of other local governments in China’ to measure horizontal drivers. The regression results (see [Table A3](#)) were consistent with those in [Table 3](#). Subsequently, we used ‘Strategic planning of superior governments’ and ‘Reform and innovation work mentioned in top-down policy directives’ to measure top-down drivers (excluding ‘Reform and innovation work emphasized by superior leaders’), and ‘Innovation of other local governments in China’ and ‘Innovation of other local governments being commended by superior governments’ to measure horizontal drivers (excluding ‘Innovations of foreign local governments’). The results show that the coefficients for top-down drivers, innovation experience, and the interaction term remained significant (see [Table A4](#)). However, the coefficient for horizontal drivers became insignificant after eliminating ‘Innovations of foreign local governments’ in Models 5 and 6 in [Table A4](#). This may be the case since Zhejiang is one of China’s most innovative provinces (B. Huang and Wiebrecht 2021; Zhu and Zhang 2016). Therefore, for local governments in Zhejiang, a considerable part of the horizontal driving force of innovation adoption likely comes from innovations outside of China. Future research may therefore compare survey results from other provinces in China with those presented here.

Discussion and conclusion

PSIs are important sources for local governments to improve the quality of public services as well as to cope with increasingly complex governance challenges (Damanpour and Schneider 2009; Hartley, Sørensen, and Torfing 2013; R. M. Walker 2014). Existing literature has revealed the influence of various antecedents on the adoption and diffusion of innovation in the public sector, both from macro and meso perspectives (de Vries, Bekkers, and Tummers 2016; de Vries, Tummers, and Bekkers 2018). Building on this research, this study advances innovation theory from a micro-process perspective (e.g. Hasmath, Teets, and Lewis 2019; Jung and Lee 2016; Lewis, Teets, and Hasmath 2022; Ronquillo, Popa, and Willems 2021) by focusing on a key step in idea generation of PSI: the generation of officials’ innovation willingness. The study explores how environmental antecedents trigger officials’ willingness to innovate while taking into account the impact of their prior innovation experience.

Our research finds that at the stage of the generation of officials’ innovation willingness in China, the incentives within the system (top-down and horizontal pressure) are most likely to foster officials’ innovation willingness, while bottom-up social demands do not directly affect their willingness. This is because for government

officials, innovation drivers from outside the bureaucratic system, particularly bottom-up pressure, need to be translated into performance requirements within the system first, in line with the arguments of extant literature (Damanpour, Walker, and Avellaneda 2009; L. Ma 2016). This can take place, for instance, through public resistance that makes problems known to superiors who transform bottom-up social demands into top-down forces. This would ultimately motivate local officials, who care about their performance, to think about dealing with new social demands through innovation. In other words, bottom-up pressure does not directly shape officials' willingness to innovate despite the fact that bottom-up pressure is believed to promote innovation adoption from the organizational-level perspective (X. Huang and Kim 2020; Korac, Saliterer, and Walker 2017).

This suggests that the innovation we observe in public organizations is, from an individual perspective, a response to performance requirements rather than an embrace of social demands (for organizations, this may be the case). This may to some extent explain why a certain number of innovation programmes cannot be sustained (Borins 2014) since officials may not be willing to respond to demands through innovation but hope to pursue performance through innovation. Our interviews also support this judgement. Although the local officials usually highlight how an innovation responds to public needs, when asked about the origins of the innovation, they mainly emphasize that the innovation was, first and foremost, an innovative implementation of a top-down policy directive. As one official we interviewed in Shenzhen, Guangdong Province, in 2017 stated, 'Individually, we make the effort to implement innovatively the top-down instructions ... sometimes, the innovation is not closely linked with local demands which later makes it difficult to sustain'.

Nonetheless, as Cinar et al. (2024) pointed out, the impact of different drivers on innovation varies depending on the political, social, and temporal context. Therefore, our research findings may also be closely tied to the context of China. While we made efforts to collect data from the earlier stages of the Chinese government's emphasis on top-level design, it is important to acknowledge that compared to their counterparts in Western democracies, local officials in China may particularly exhibit characteristics of upward accountability (A. M. Wu 2012) under strict top-down performance evaluations (Gao 2009; Han and Wang 2023; Xue and Zhong 2012). Besides, as a country with lower levels of individualism, there tends to be a greater reliance on top-down innovation for more benefits (Demircioglu 2023). Consequently, the empowerment and coordination of grassroots officials in innovation may also be relatively insufficient in such environments (Saari, Lehtonen, and Toivonen 2015). Therefore, the impact of bottom-up demands on officials' innovation willingness may be underestimated, while the impact of top-down and horizontal drivers may be overestimated due to the context from which our data originates. Exploring whether external bottom-up demands directly motivate local officials to innovate constitutes one of the crucial agendas for future research.

Our results also speak to previous research on the interaction effect between different environmental drivers of PSI. While Zhang and Zhu (2020) suggest that top-down pressures can negatively moderate the effect of horizontal drivers, we do not find support for this regarding the willingness generation phase of innovation. This may be because when faced with environmental antecedents, individual officials can more independently judge the impact of different drivers on their willingness to innovate than organizations with more institutional constraints.

Our research responds to the efforts of deepening the analysis of different innovation stages (e.g. Cinar, Trott, and Simms 2019; Hartley, Sørensen, and Torfing 2013) and pinpoints individuals' innovation willingness generation specifically. Once PSIs are disaggregated to discuss the factors that influence them at different stages (such as Houtgraaf, Kruijen, and van Thiel (2022)'s analysis of civil servants' creativity as the 'front-end' of the innovation process), the drivers that explain innovation adoption at the macro and meso levels are not entirely applicable to specific phases. While various factors affecting innovation have been discussed, their mechanisms of influence and influencing stages in the innovation process may differ. Our research implies the need to further differentiate between the factors that influence innovation, and those that drive innovation behaviour may not be triggers of the willingness to innovate, and vice versa. These factors have often been conflated in previous research. In order to refine the theory of PSI and generate targeted policy implications for advancing innovation at different stages, efforts to distinguish the stages of innovation and the layers of influencing factors are indispensable.

Furthermore, we highlight the importance of path dependence (prior innovation experience in particular) to explain the innovation willingness of local officials, responding to the need to explain political phenomena from the perspective of time (Pierson 2004). Our results show that officials' innovation willingness is significantly reinforced by their past innovation experience. This finding encourages subsequent research to examine this path-dependent effect in other stages of PSI both at the individual and organizational levels. At the same time, this experience will negatively moderate the influence of top-down pressures on officials' innovation willingness. This may be because officials with innovation experience have gained a better understanding of the risks involved and more capacity to handle them when innovating. Therefore, they are more likely to use their experience to gain more autonomy in innovation processes, rather than fully conforming to top-down requirements. Nevertheless, one of the limitations of this study is that it cannot empirically illustrate whether the prior innovation experience itself changes officials' attitudes or whether more risk-taking personalities self-select into the subsample of officials with experience. Future research should more explicitly tackle this question.

Our research also provides important implications for practitioners. The findings show that the top-down approach is still the most effective way to incentivize local officials to think about innovation, while bottom-up forces only play a limited role in triggering innovations as part of a problem-solving approach. This may lead to situations in which innovations thrive but fail to respond well to public demands, and local officials' innovation adoptions merely become demonstrations of loyalty to their superiors. Therefore, an appropriate way to promote innovation is to integrate top-down requirements for innovation with responses to public needs. Besides, it is important to note that different antecedents of innovation operate at distinct stages and mechanisms within the innovation process. Therefore, tailored incentives should be provided at different stages of innovation to promote effective innovation. Higher-level governments should also provide innovation principles, value foundations, and behaviour boundaries, especially for local officials with innovation experience so that these reformers can innovate to create public value without imposing too much top-down pressure.

While our paper makes contributions to the literature, it is not without limitations. First, according to most extant studies, we assume that innovation is largely driven by the government while citizens are only the source of innovation demand. However, the creation of value in public services and PSI should be promoted by co-production, which means the voluntary or involuntary involvement of public service users (Osborne 2018; Osborne, Radnor, and Strokosch 2016), suggesting that citizens can also be the contributors of PSIs. Therefore, future research should also expand to understand the role of different actors in the process of PSI, including and especially that of citizens.

Second, it is essential to recognize that we primarily focus on the generation of innovation willingness. The transition from willingness to actual behaviour and innovation performance, which may involve complex pathways including potential intermediary steps and influencing factors, has not been thoroughly explored. Therefore, to enhance our understanding of staged discussions on innovation, subsequent research needs to build upon this foundation and conduct further analysis on the specific process of transforming willingness into behaviour. Regarding willingness itself, we used one item to measure it by following the established practices of previous research on PSI. However, broader literature has provided more ways to measure willingness, which we believe could advance a more refined measurement of innovation willingness. Exploring innovation willingness measurement in more depth is a crucial aspect for future research.

Additionally, we acknowledge that our data exclusively originates from the context of China. Although China's multi-level governance structure and diverse innovation experiences among government officials provide us with a typical case to discuss officials' innovation willingness at the micro-level, the contextual features of China may also make some of the empirical findings context-specific. Therefore, cases and data from other contexts are needed to better promote refined theories of PSI as a process.

Note

1. WeChat is the most popular social media platform in China. Since the questionnaire was posted in the WeChat Groups, we are unable to know the share of the target audience that read the message and completed the questionnaire.

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Appendix

Operationalization

Dependent Variable

Innovation willingness: 'How is your current willingness to innovate?' (1 = very weak through 5 = very strong)

Independent Variables

The innovation drivers are measured by the question: 'Please evaluate the importance of the following factors in promoting policy innovation'. (1 = not important at all through 7 = very important)

Top-down drivers

- (1) Strategic planning of superior governments
- (2) Reform and innovation work mentioned in top-down policy directives
- (3) Reform and innovation work emphasized by superior leaders

Horizontal drivers

- (1) Innovation of other local governments in China
- (2) Innovation of other local governments being commended by superior governments
- (3) Innovation of foreign local governments

Bottom-up drivers

- (1) Social unrest
- (2) Public emergencies.
- (3) Trust crisis towards the government.
- (4) Economic downturn.

Prior innovation experience: 'Have you ever initiated the adoption of a policy innovation before?'

(1 = Yes, 0 = No)

Robustness Check

Table A1. Regression results of OLS models.

<i>Dependent Variable: Innovation Willingness</i>		(1)	(2)	(3)	(4)	(5)	(6)
Perceived drivers of innovation	Top-down drivers	0.135*** (0.0205)				0.124*** (0.0230)	0.324** (0.0845)
	Horizontal drivers		0.0737** (0.0233)			0.0513** (0.0178)	0.0465** (0.0140)
	Bottom-up drivers			0.0229 (0.0351)		0.00454 (0.0377)	0.00355 (0.0355)
Innovation experience	Prior innovation experience				0.297* (0.125)	0.315* (0.122)	0.316* (0.123)
Interaction of Perceived drivers & Innovation experience	Top-down drivers * Innovation experience						−0.290* (0.123)
Control variables	Gender	0.167** (0.0418)	0.171** (0.0456)	0.173** (0.0460)	0.137* (0.0573)	0.134** (0.0438)	0.128** (0.0447)
	Age	0.0217 (0.0648)	0.0203 (0.0584)	0.0211 (0.0554)	0.0255 (0.0655)	0.0219 (0.0684)	0.0158 (0.0654)
	Education	0.199* (0.0767)	0.199* (0.0726)	0.204* (0.0832)	0.175 (0.0933)	0.175 (0.0962)	0.181 (0.0941)
	Administrative level	0.00461 (0.0176)	0.0110 (0.0155)	0.00588 (0.0163)	−0.0347 (0.0253)	−0.0303 (0.0251)	−0.0301 (0.0231)
	Leadership experience	0.295** (0.0990)	0.301* (0.111)	0.313** (0.0981)	0.264** (0.0818)	0.241* (0.0876)	0.255** (0.0830)
	Constant	1.954** (0.506)	2.414*** (0.463)	2.668*** (0.577)	2.881*** (0.425)	1.793** (0.628)	0.528 (0.955)
R ²		0.099	0.095	0.087	0.121	0.143	0.156

Note: N = 390. Standard errors in parentheses and clustered on administrative level; ****p* < 0.01, ***p* < 0.05, **p* < 0.1.

Table A2. Subsample analysis (clerks excluded).

<i>Dependent Variable: Innovation Willingness</i>		(1)	(2)	(3)	(4)	(5)	(6)
Perceived drivers of innovation	Top-down drivers	0.367*** (0.0239)				0.366*** (0.0895)	0.941*** (0.236)
	Horizontal drivers		0.196*** (0.0456)			0.124** (0.0607)	0.116** (0.0568)
	Bottom-up drivers			0.0891 (0.0977)		0.0297 (0.124)	0.0236 (0.123)
Innovation experience	Prior innovation experience				0.895** (0.440)	0.958** (0.445)	0.955** (0.449)
Interaction of Perceived drivers & Innovation experience	Top-down drivers * Innovation experience						−0.819** (0.343)
Control variables	Gender	0.466*** (0.178)	0.465*** (0.179)	0.471*** (0.172)	0.352* (0.188)	0.354** (0.160)	0.349** (0.175)
	Age	0.102 (0.242)	0.0991 (0.231)	0.118 (0.216)	0.142 (0.242)	0.0980 (0.269)	0.0738 (0.262)
	Education	0.554** (0.216)	0.557*** (0.200)	0.563** (0.221)	0.514* (0.272)	0.523* (0.292)	0.544* (0.288)
	Administrative level	−0.0298 (0.0477)	−0.0129 (0.0491)	−0.0199 (0.0596)	−0.134* (0.0786)	−0.126 (0.0772)	−0.118 (0.0789)
	Leadership experience	0.890*** (0.316)	0.913*** (0.351)	0.948*** (0.309)	0.822*** (0.264)	0.757*** (0.264)	0.811*** (0.253)
	Constant						

Note: N = 358. Standard errors in parentheses and clustered on administrative level; ****p* < 0.01, ***p* < 0.05, **p* < 0.1.

Table A3. Independent variables with adjusted measurement I.

<i>Dependent Variable: Innovation Willingness</i>		(1)	(2)	(3)	(4)	(5)	(6)
Perceived drivers of innovation	Top-down drivers	0.240*** (0.0688)				0.253*** (0.0905)	0.565*** (0.0802)
	Horizontal drivers		0.198** (0.0811)			0.186** (0.0780)	0.180** (0.0798)
	Bottom-up drivers			0.0809 (0.0922)		0.00707 (0.118)	0.00968 (0.116)
Innovation experience	Prior innovation experience				0.851** (0.419)	0.931** (0.422)	0.950** (0.423)
Interaction of Perceived drivers & Innovation experience	Top-down drivers *						−0.433** (0.174)
Control variables	Gender	0.570*** (0.180)	0.582*** (0.188)	0.563*** (0.168)	0.460** (0.190)	0.500*** (0.189)	0.482** (0.191)
	Age	0.113 (0.186)	0.120 (0.178)	0.111 (0.172)	0.114 (0.200)	0.106 (0.205)	0.0957 (0.202)
	Education	0.584*** (0.184)	0.544*** (0.171)	0.550*** (0.199)	0.494** (0.243)	0.544** (0.236)	0.551** (0.231)
	Administrative level	−0.00985 (0.0552)	−0.00182 (0.0528)	−0.000683 (0.0567)	−0.110 (0.0791)	−0.109 (0.0724)	−0.108 (0.0723)
	Leadership experience	0.890*** (0.307)	0.927*** (0.354)	0.932*** (0.314)	0.810*** (0.264)	0.772*** (0.257)	0.785*** (0.256)

Note: $N = 390$. Top-down drivers = Reform and innovation work mentioned in top-down policy directives; Horizontal drivers = Innovation of other local governments in China. Standard errors in parentheses and clustered on administrative level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A4. Independent variables with adjusted measurement II.

<i>Dependent Variable: Innovation Willingness</i>		(1)	(2)	(3)	(4)	(5)	(6)
Perceived drivers of innovation	Top-down drivers	0.356*** (0.0794)				0.417*** (0.0523)	1.101*** (0.288)
	Horizontal drivers		0.130** (0.0538)			0.0891 (0.0968)	0.0869 (0.0980)
	Bottom-up drivers			0.0809 (0.0922)		0.0190 (0.125)	0.0282 (0.132)
Innovation experience	Prior innovation experience				0.851** (0.419)	0.946** (0.424)	0.993** (0.425)
Interaction of Perceived drivers & Innovation experience	Top-down drivers *						−0.983** (0.392)
Control variables	Gender	0.547*** (0.167)	0.541*** (0.166)	0.563*** (0.168)	0.460** (0.190)	0.439*** (0.150)	0.421*** (0.154)
	Age	0.0933 (0.190)	0.113 (0.185)	0.111 (0.172)	0.114 (0.200)	0.0785 (0.217)	0.0540 (0.212)
	Education	0.568*** (0.184)	0.546*** (0.177)	0.550*** (0.199)	0.494** (0.243)	0.533** (0.250)	0.568** (0.267)
	Administrative level	−0.0114 (0.0580)	0.00278 (0.0613)	−0.000683 (0.0567)	−0.110 (0.0791)	−0.112 (0.0805)	−0.122 (0.0748)
	Leadership experience	0.890*** (0.330)	0.916*** (0.338)	0.932*** (0.314)	0.810*** (0.264)	0.761*** (0.261)	0.809*** (0.237)

Note: $N = 390$. Top-down drivers = Strategic planning of superior governments + Reform and innovation work mentioned in top-down policy directives; Horizontal drivers = Innovation of other local governments in China + Innovation of other local governments being commended by superior governments. Standard errors in parentheses and clustered on administrative level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.