Transplanting good practices in Smart City development

A step-wise approach

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ABSTRACT

In the quest for Smart City (SC) development, numerous examples of 'good practices' have circulated in national and international policy arenas. Learning from good practices elsewhere is a common approach for cities to initiate and develop SC policies of their own. Nevertheless, because of political, legal and cultural differences across countries and cities, policies will always be context dependent, and prosper under specific conditions. There is a vast literature on policy transfer and policy mobility, but much of it utilizes different concepts (i.e., policy translation, policy learning, and policy diffusion). Nonetheless, a critical omission they all share is limited concern for context-dependence and lack of prescriptive clues. Addressing both omissions would lead to a framework in which learning from good SC policy practices, formulating lessons, transferring them, and then adjusting them to fit the recipient's needs is taken up systematically in a stepwise manner. To develop a theoretical framework for Smart City adoption, this study brings together variegated existing literature under the heading 'policy transplantation' and synthesizes existing insights into a prescriptive procedure policymakers can follow. A systematic literature review is conducted to identify all key elements and sub-elements associated with SC policy transplantation, leading to a theoretical framework. This (prescriptive) theoretical framework is subsequently validated using an expert group and illustrated through a real-life case. The framework can be used as an analytical lens by researchers, but also constitutes a practical tool to guide policymakers aiming to use insights from good practices and implement them in line with their own contextual setting. Conducting contextual assessment before transplanting a SC policy is essential.

1. Background

Smart Cities (SC) can be seen as a hype inspiring public officials and policymakers of cities across the world. In the quest for SC development, numerous examples of 'good practices' have been created and circulated in national and international policy arenas. Nevertheless, because of political, legal and cultural differences, SC policies when implemented need to be context specific (Braun & Gilardi, 2006; True & Mintrom, 2001). Many cities, and not only large cities but also medium and small-sized ones are keen to adopt Smart City concepts and practices, and hope to be able to quickly transfer SC innovations, projects and policies to their own localities to acquire the assumed economic benefits (Rose, 1991). But local governments are also aware of contextual differences and fear ending up with failed transfers.[1] This raises the question how policy makers (at the receiving end) can find ways to 'borrow' and acquire inspiring 'good practices', while tailoring them to their own local context to ensure that adoption will go smoothly.

In the policy studies literature learning from good practice is associated with theory on policy transfer and policy mobility (Benson & Jordan, 2011; Berry & Berry, 1990; Dolowitz & Marsh, 2000; Hettne, 2002; Sausman, Oborn, & Barrett, 2016). There is a vast literature on this topic, but the terminology in use is far from consistent (i.e., policy transfer, policy learning, policy diffusion, policy mobility, policy translation, or policy adoption) with different approaches and attitudes (Bulkeley, 2006; Dolowitz & Marsh, 2000; Peck & Theodore, 2010; Rose, 1991; Wolman, 1992).

Wathne and Haarstad (2020) state that the SC policy discourse has a special emphasis on concepts of good practices, learning from lessons, and SC policy mobility. They believe that SC policies are 'glocal' (globally pervasive and highly local context-related) and 'mobile' in nature (Wathne & Haarstad, 2020). Baker and Temenos (2015) hold that the knowledge regarding transferring policy not only deals with the practices and processes of mobilizing policy but also with territorializing policy (Baker & Temenos, 2015; Mora et al., 2021). Robinson (2015), focusing on the movement of SC policy, draws attention to policy arriving in local contexts and reception among local actors (Robinson, 2015). According to Crivello (2015) the SC policy mobility process can be seen as a combination of reception, mutation, and adoption that involves actors, networks, processes, and mechanisms of its implementation (Crivello, 2015). Baker and Temenos (2015) identify three theoretical orientations to urban policy mobility. These pertain to redevelopment of cities through global relational connections, reproduction of political-institutional settlements, and the role of materials (e.g., policy documents, press releases, websites, and manuals) and techniques (e.g., performance indicators and audit regimes) in policy mobility processes. They argue that both redevelopment of cities and

[1] Insights from a brainstorming meeting with a senior process manager in the department of urban development in the municipality of Rotterdam, director for the Erasmus Centre for Data Analytics works with city of Rotterdam on smart city projects, and a member of the Advisory Boards of Smart City Lighthouse project Smarter Together and EU Project ComeEasy in January 2022.

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reproduction of institutions require change (Baker & Temenos, 2015). Without these adjustments, cities cannot be expected to easily transform into Smart Cities. Therefore, it is crucial that preparations are made to accommodate change processes.

Despite providing and showcasing useful insights that policy mobility and related concepts have to offer there is a critical omission in this body of literature: it neglects the importance of the context and the complexity of the context in policy mobility processes. Nonetheless, there is a promising approach that does include the importance of context, and covers multiple theoretical perspectives to policy mobility, and this pertains to the concept is that of policy transplantation (De Jong & Stoter, 2009). Transplanting, as a metaphor, means moving something – like an innovation or policy - from one locality to another. Like transplanting an organ from one body to another, policy transplantation begins from a certain context (with certain modal conditions, i.e. as a metaphor to the role of blood groups in transplantation of organs) and ends with the acceptance, adoption and (successful) implementation of a 'foreign' action, practice or policy in a receiving political jurisdiction, like a city. By using the concept 'policy transplantation' this paper aims to convey the message that the importance of context and its complexity are essential and have to be addressed seriously by policymakers of the receiving administrative body (e.g., a city) before certain practices, actions or policies can be observed, 'shared', 'borrowed', or even 'copy-pasted' from one locality and 'transplanted' into another.

Accordingly, in this paper it is assumed that successful transplantation of a certain policy is not possible without thoroughly taking into account contextual factors and conditions that influence its implementation, and particular those that are at play at the receiving end (Tan, Taeihagh, & Sha, 2021). Just as with anatomic transplantation institutional transplantation fails when the contextual setting of the destination does not align well with (certain key characteristics of the) adopted SC policy (which was originally developed in another unique contextual setting). To ensure successful transplantation of the Smart City policies, the recipient is expected to prepare for proper transplantation (unless the conditions of the recipient context differ so much that transplantation is simply not possible). Being aware that lessons learned from good practices are not isolated or separated from the context where they were drawn from, there is a need for policymakers of the recipient administration to check the context.

Although studies have been conducted that address (aspects) of policy transplantation (De Jong & Stoter, 2009; Dolowitz & Marsh, 2000; Dussauge-Laguna, 2012; Peck & Theodore, 2010), there is currently no integrated (or 'holistic') theoretical framework for transferring SC policy from one political setting to another taking the importance of context into account. Studies that are relevant to SC policy seem to focus on certain aspects of the transplantation process but so far have done so in isolation, without adopting an integrated approach, or only focusing on conceptualizations that largely overlook the importance of context. To address this knowledge gap, this study seeks to identify key phases, steps, and activities contributing to developing a theoretical framework that can provide more holistic insights into the process of transplanting a given policy from one city to another.

In this paper the central questions are: How can Smart City policies, practices, or projects be fruitfully transplanted from a city of origin to an aspiring recipient city? What theoretical framework can offer a prescriptive stepwise approach for this process in which learning, transfer and context-specific adoption are successfully completed? To answer these questions this paper undertakes four steps pertaining to (i) systematic literature review, (ii) developing a theoretical framework, (iii) validating the framework, and (iv) illustrating the framework. First, a systematic literature review is conducted to identify key elements, steps and actions associated with the SC policy transplantation process. Through interpretation, integration and synthesis of these insights a process of SC policy transplantation is conceived, and a theoretical framework developed. Then, the framework is validated and illustrated. Validation takes place via an expert workshop with a panel discussion, with the aim to validate and elaborate the SC policy transplantation framework. Subsequently, the framework is illustrated by presenting a real-world example: the case of Helmond (in the Netherlands).

This paper is structured as follows. Section 2 presents the methodology used in the systematic literature review, the development of the proposed theoretical framework and its validation. Section 3 presents the results of the literature review. Section 4 introduces the framework on SC policy transplantation and in Section 5, its validation is addressed. In addition, an illustration using a real-world case is presented in section 6. In Section 7, the theoretical reflection and intellectual contribution of this paper are discussed. Finally, the main conclusions as well as suggestions for future research are presented in Section 8.

2. Methods used

The research is designed as a conceptual study using a four-step approach, with each step building on the previous one. First, a systematic literature review is conducted (Van Wee & Banister, 2016). Second, a theoretical framework for SC transplantation is synthesized. Third, the framework is validated using an expert panel with panel discussion set-up. Fourth, the framework is illustrated using a real-world case.

2.1. Systematic literature review

A systematic literature review is conducted to identify the various steps and actions associated with the process of SC policy transplantation through synthesising the existing literature on 'policy learning, policy transfer and policy adoption' in policy studies and 'context preparation' (examination and localization) in SC policy studies. The systematic literature review consists of the steps (Brunton, Oliver, & Thomas, 2020; Gough, Thomas, & Oliver, 2012):

- Identifying the key relevant concepts;
- Selecting an a priori framework;
- Coding the extracted data;
- Interpreting the coded data.

The first step is conducting a preliminary literature review to identify relevant key concepts to SC policy transplantation. Based on the results, an a priori framework (of policy transplantation consisting of preparation, policy learning, policy transfer, and policy adoption) is used to derive the compartmentalising codes for the third step. Eventually, the coded data are interpreted as the key steps and activities of the SC policy transplantation process and an integrated framework is developed.

During the first step the three key concepts 'policy learning', 'policy transfer', and 'policy adoption', in policy studies and two key concepts of 'Smart City examination' and 'Smart City localization' in SC policy studies, and their relevant search terms are identified. The search terms related to SC and the complexity of context (Table 1) are added to adapt the framework to an SC policy perspective. These five key concepts are used as an a priori framework (Table 1) to design the systematic review protocol. The search terms reflect the relevant concepts commonly used to study the five key concepts and take into account the different terms and synonyms used for the same concept. The systematic literature review is designed based on Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines using explicit inclusion and exclusion criteria (Moher et al., 2009). To formulate the search queries, search terms are combined using the AND/OR Boolean operators. This results in the creation of the five search queries (Table 1).

Next, a systematic database search using 'Scopus' is performed. The search includes title, abstract, and keywords. The search queries are used to screen titles, abstracts, and eventually the full text of relevant peer-reviewed journal articles in English. First, all scientific articles published in any peer-reviewed journal in English between the years 1990–2022 are included to screen by title using the inclusion criteria

Table 1
Conceptualization of the SC policy transplantation through relevant theoretical concepts in the academic literature.

	Key concepts	Search terms	Search query
Policy Studies	Policy learning	Lesson-drawing, policy learning, policy-oriented learning, learning from good practices, political learning, instrumental policy learning, social policy learning (Search query1:)	**Query1:** TITLE-ABS-KEY((‘lesson-drawing’ OR ‘drawing lesson’) OR (‘policy learning’ OR ‘policy-oriented learning’ OR ‘political learning’ OR ‘instrumental policy learning’ OR ‘social policy learning’) OR (‘learning from good practices’)) AND DOCTYPE(ar) AND PUBYEAR >1990 AND PUBYEAR <2022
	Policy transfer	Transferring policy, moving policy, policy mobility, policy borrowing, policy diffusion	**Query2:** TITLE-ABS-KEY(((‘policy transfer’ OR ‘transferring policy’) AND (‘policy moving’ OR ‘policy mobility’) OR (‘policy borrowing’) OR (‘policy diffusion’))) AND DOCTYPE(ar) AND PUBYEAR >1990 AND PUBYEAR <2022
	Policy adoption	Adopting policy, policy translation	**Query3:** TITLE-ABS-KEY((‘policy adoption’ OR ‘adopting policy’) OR (‘policy evolving’)) AND DOCTYPE(ar) AND PUBYEAR >1990 AND PUBYEAR <2022
Smart City & context-complexity	Examination	Smart City good practices, Smart City branding, branding practices, branding credibility, Smart City readiness, Smart City readiness assessment	**Query4:** TITLE-ABS-KEY((‘smart city good practices’) OR (‘smart city branding’ AND ‘credible branding practices’) OR (‘smart city readiness’ OR ‘smart city readiness assessment’)) AND DOCTYPE(ar) AND PUBYEAR >1990 AND PUBYEAR <2022
	Localization	Localizing Smart Cities, localizing Smart City policies, policy localization, policy innovation, policy mutation, policy evolving	**Query5:** TITLE-ABS-KEY((‘localizing smart city ‘OR ‘localizing smart cities’ OR ‘smart cities localization’ OR ‘smart city localization’) OR (‘localizing smart city policies’ OR ‘smart city policies localization’ OR ‘policy localization’ OR ‘localizing policy’)) AND DOCTYPE(ar) AND PUBYEAR >1990 AND PUBYEAR <2022

such that at least one of the key search terms is the main focus in the title. In the next round, articles are filtered by abstract and full text based on their direct relevance to answering the research question, more specifically relating to the steps and actions associated with the process of policy transplantation and/or SC policy transplantation. Studies on legal transplantation in mainstream comparative law are excluded to maintain the focus of the study on policy studies and SC context as they are mainly focused on legality and the legal context. The database search was first performed in early 2020 and repeated in March and April 2022. A diagram of the systematic literature review is presented in Fig. 1.

Data extracted from the included articles is sorted and recorded as the key domains in the five key relevant concepts to ‘Smart City policy transplantation’. They are subsequently coded as the phases and steps related to SC policy transplantation process using a qualitative analysis. Then the coded data are interpreted as the actions and activities related to each step in the process.

2.2. Synthesiszing a theoretical framework

Through a rational integration of the insights from the systematic literature review the identified phases, steps, and activities related to SC policy transplantation are pinpointed in a process (Section 4.1) and a theoretical framework including the steps and actions regarding each phase is developed (Section 4.2). This is followed by a critical assessment of the theoretical framework (with peers), to find out whether some elements are still missing or in the wrong place. The framework is thus improved several times before validation.

2.3. Validation session with a discussion panel

To validate the theoretical framework, the expert panel discussion method was used. The expert panel discussion occurred during a tailor-made workshop for Gulf region delegates in the City of Rotterdam. The workshop was held in September 2022 at Erasmus University Rotterdam (Institute for Housing and Urban Development Studies) in collaboration with the Ministry of Foreign Affairs and coordinated by the Netherlands Enterprise Agency (RVO) for exchanging urban solutions and learning about Dutch practices (Scholten, Fransen, Noori, & Nesselaar, 2022). The first author was a co-organizer of this workshop and one of the presenters. During the workshop the SC policy transplantation framework was introduced. The panel included thirteen officials and experts operating in Dubai, Abu Dhabi, Muscat and Kuwait across twelve various organizations and seven hosts from the Netherlands operating at Erasmus University of Rotterdam, the Netherlands Enterprise Agency, and the Embassy of the Kingdom of the Netherlands. The workshop was tailor-made upon the delegates request for sharing and learning Netherlands good practices in smart and sustainable solutions, and smart governance practices in the water and energy domains. The workshop consisted of presentations on practical examples and academic conceptualizations including the SC policy transplantation framework. Afterwards three rounds of table discussions concerning the challenges of identifying and transferring good practices, and their adaptation to the local context and the role of various stakeholders in these processes were held (Scholten et al., 2022). The panel was asked to reflect on the framework and its elements and sub-elements by sharing their experiences.

2.4. Illustration of the theoretical framework: the case of Helmond

The illustration of the theoretical framework by using a real case provides insights and guidance on the application of the framework. The case of Helmond is selected based on three criteria: having a plan and or vision for SC development, having the approach to learn from good practices in their plan, and data accessibility. The City of Helmond has two active policy programs: Helmond Digital City and the development of a smart district. They are both relevant to our framework and for both programs the City of Helmond has an active research project aimed at learning from good practices in which the authors are involved. Data are accessible through direct involvement in these ongoing research projects. The City of Helmond (with a population of 93,518 in 2021) is located in the southeastern part of the Netherlands, in the North Brabant province. It is a formerly industrial city located in close proximity of the innovation cluster of the Netherlands Technology Hub, in the region surrounding Eindhoven (with the second largest technical university of the country). Trying to make the most of this opportunity the

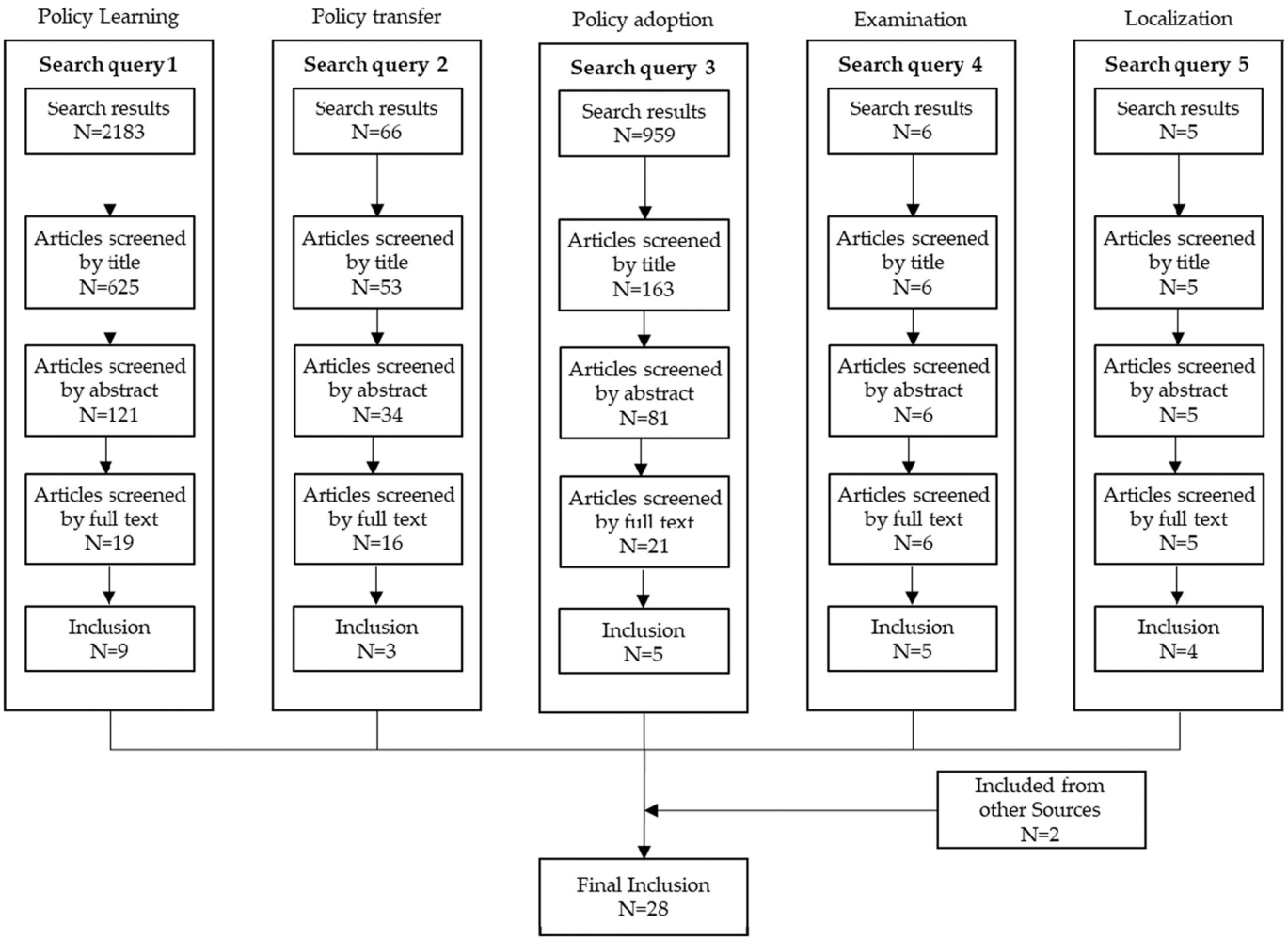

Fig. 1. Flow diagram of systematic literature research.

municipality of Helmond, in collaboration with regional partners, initiated a Smart (digital) City plan and started planning a transition towards becoming a Digitally Inclusive Smart City, as stipulated in its Ambition Plan 2024. In line with this, in a collaboration with Erasmus University of Rotterdam a joint research project was initiated in 2021 to develop a roadmap for Helmond's Smart (digital) City program. The joint research project which involves two of the authors of this paper aims at implementing the SC policy transplantation framework whilst focusing on the actual transplantation of digital policy and programs to Helmond as a recipient city. The data are collected from policy documents and interviews,[2] and site visits.

3. Results of the systematic literature review

3.1. Concepts and theory on policy transplantation from the policy studies discipline

There is a long tradition in conceptualizing the mobility of policies from the venue where they originate to a recipient public authority or entity (be it a local, regional or national government). Roughly, they can be classified under: (i) policy learning; (ii) policy transfer; and (iii) policy adoption.

Lesson-drawing or policy learning is associated with learning from a public program in another polity that focuses on a similar societal problem in need of a solution (Robertson, 1991; Rose, 1991). Lesson-drawing refers to clarifying the circumstances in which an effective program from one place can be transferred to another place and remain effective (Rose, 1991). The term 'learning' here refers to the acquisition of new knowledge generated by cognition of the practices that affect identifying new ideas and fundamental beliefs for policy formulation (Rose, 2002). Therefore, learning could just as likely lead to policy innovation or termination of existing policy considered as outdated. Rose (2005) has presented a ten-step scheme for learning policy lessons, i.e., 'lesson-drawing'. He suggests that policy makers do not expect to find 'one-size-fits-all' solutions, but instead rather stresses to focus on 'where we look for a lesson', 'when we do it', and 'how well we learn' as the critical challenges in this learning process. Rose (2005) also highlights that policy makers usually look for solutions that work, and there is enough evidence of their success. Therefore, they seek to retrieve lessons through formal and informal issue networks. Using a conceptual model for learning from good practices is highly recommended in Rose's lesson-drawing scheme (Rose, 2002). In this sense, Maheshwari and Janssen (2014) suggest to use 'benchmarking' as a process performed by policymakers to make comparative assessments of the performance of cities, provinces, nation states and other public organizations in fixing policy problems (Maheshwari & Janssen, 2014).

Inspired by Rose's steps on lesson drawing, Dolowitz and Marsh (2000) have presented a framework for learning from abroad through policy transfer. In their framework, policy transfer is understood as a

[2] Interviewing business development manager Digital (Smart) City, program manager Digital (Smart) City, policy advisor Digital (Smart) City at municipality Helmond.

process by which 'knowledge about how policies, administrative arrangements, institutions and ideas in one political setting (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political setting' (Dolowitz & Marsh, 2000). Their policy transfer framework refers to a set of decisions and actions related to the implementation of the policy transfer process, which includes determining the actors involved, the subject of transfer (idea, program, etc.), the scope of transfer, the degree of transfer (copying, emulation, inspiration), and its communication tools. To adopt the transferred policy in the recipient context, Benson (2009) developed a framework to assess the existing structural constraints (context and application). Here, policy adoption refers to receiving the transferred policy in the recipient context and knowing how the transferred policy can be embedded in the recipient context. This also refers to policymakers formulating considerations when localizing transferred policies by assessing their contextual and application constraints (Benson, 2009). Table 2 provides an overview of the three classifications.

Table 2 shows that despite the emphasis on the importance of recipient preparation and readiness assessment, none of the existing concepts incorporate them. The policy transfer process as such has been examined in several studies, but only few of these explored the process of 'planting' the transferred policy in the new context directly (De Jong & Stoter, 2009; Dolowitz & Marsh, 2000; Rose, 2002); that is, they describe the transfer of ideas or policies between countries but do not clarify the mechanism of implementing the policy after their arrival in a new political setting. Therefore, we suggest the term 'policy transplantation' to properly incorporate those steps (i.e., preparation, adoption, and mutation) within the policy transfer and provide a more comprehensive overview of the entire implementation process.

The term transplantation has been extensively used as 'legal transplantation' in the field of comparative law (Watson, 1993). In this body of literature, the concept of transplantation has evolved from the diffusion (derived from the diffusion theory in cultural anthropology) to the reception and transplantation of laws by nation states (Twining, 2005). Kahn-Freund (1974) co-initiated the transplantation debate in comparative law, referring to the metaphor of organ transplantation in the human body and its comparison with the transfer of one part from a machine to another. In addition, he addressed the differences between transfer and transplantation and the nature of their applications in different systems. Kahn-Freud concluded that there are certain degrees of transferability (Kahn-Freund, 1974). In this spectrum transplantation represents the highest degree. He also holds that transplantation in addition to the transfer process, fully accounts for the accommodation that takes place in the transfer process.

In the policy studies' literature, (de Jong, 1999; De Jong, Lalenis, & Mamadouh, 2002; p. 4) introduced the general idea of institutional transplantation to bring improvements to the host society. Following this debate (De Jong & Stoter, 2009) proposed design heuristics for good institutional transplantation. In their perspective institutional transplantation is aimed not only at realizing legality but also at achieving acceptance of policy initiatives among recipient countries or institutions (De Jong & Stoter, 2009). Inspired by de Jong (1999) idea of institutional transplantation, the concept 'transplantation' can also be applied in the context of SC policy. A policy thus becomes a set of actions, programs, and tools (taking a systems perspective) for developing a SC. Policy transplantation in this sense can be understood as a policy learning, transfer, and adoption approach for drawing lessons from abroad which pays special attention to the context and environment, or as institutional system transfer and adoption that is influenced by political objectives and cultural differences. Policy transfer is thus part of this transplantation process.

3.2. Concepts and theories on policy transplantation within the Smart City domain

Preparation and readiness though mentioned in the literature as critical for the reception of SC policies appear absent among the presented concepts and theory on SC policy transplantation studies. Noori, Hoppe, and de Jong (2020) have introduced an SC readiness assessment framework that includes socio-economic factors (i.e., education and innovation, awareness, perceived usefulness, mentality and values, and

Table 2
Overview of concepts and theory on 'policy transplantation' in policy studies.

Concepts	Key concepts	References	key domains
Policy learning	lesson-drawing, policy learning, policy-oriented learning, learning from good practices, political learning, instrumental policy learning, social policy learning	Rose, 2002; Rose, 2005	instrumental learning, community and networks, institutional interactions, developing a conceptual model, creating a new program
		May, 1992	instrumental learning; policy instruments/implementation design, social learning; the scope of policy or policy goals
		Rose, 1991; Rose, 1993	scanning programs in effect elsewhere, transferring (imitation, emulation, innovation), adopting, prospective evaluation
		Sanderson, 2002; Nowlin, 2021	evidence-based policy making, evidence in accountability and improvement; what works, for whom, in what circumstances, and why (the key challenge: context complexity), changing in beliefs, policy learning through information processing
		James & Lodge, 2003	criticizing 'lesson-drawing' (Rose, 1993) and 'policy transfer' (Dolowitz& Marsh, 2000) conceptual frameworks
		Bennett & Howlett, 1992	government learning (state officials, process-oriented learning, organizational change), lesson-drawing (policy networks, instruments, program change), social learning (policy communities, idea, paradigm shift)
Policy transfer	transferring policy, moving policy, policy mobility, policy borrowing, policy diffusion	Peck, 2011	three approaches to policy mobility: diffusion approach, policy transfer approach, and neodiffusionist approach (transformation & mutation)
		Peck & Theodore, 2010	policy mobility and policy mutation, the influence of social and political practices
		Dolowitz & Marsh, 2000	level of transfer, transfer degree, transfer mechanisms, actors involved
		Mukhtarov, 2014	the process of modification of policy ideas leading to policy innovation
Policy adoption	adopting policy, policy evolving	De Jong, 2009	the impact of local institutions on policy adoption, six heuristics
		Stone, 2017	negative lesson-drawing, adoption, and localization
		Jiao & Boons, 2017	a processes of interpretation, mutation and assemblage by fluid multi actors
		Benson, 2009	the linguistic mutation of policy ideas, a dynamic process of policy formation by actors
			Constraints on policy adoption; application constraints, contextual constraints

investment), technological factors (i.e., ICT infrastructures, data infrastructures, and data management capabilities) and political factors (i.e., leadership, national policy and governance, and municipal policy and governance) (Noori, de Jong, Janssen, Schraven, & Hoppe, 2020). Wiig (2015) notifies the high potential of changing urban governance following the adoption of SC policies and stresses that it is crucially important to map these in advance (Wiig, 2015). Performing readiness assessments would assist cities in developing a theory of change (i.e., a normative development pathway) towards becoming a SC and envision a transition pathway (Noori, de Jong, Janssen, et al., 2020). According to Orlowski (2021), readiness here refers to '*willingness or a state of being prepared for becoming smart*'. SC researchers stress that the transition of cities towards SC can be seen as a multi-faceted urban development process. To prepare for such as process local governments are advised to perform a 'Smart City readiness' assessment using social, technological, and political indicators (Achmad, Nugroho, & Djunaedi, 2018; Ibrahim, El-Zaart, & Adams, 2018; Mora et al., 2021; Noori, de Jong, Janssen, et al., 2020; Orlowski, 2021). Here, it is also important to note that SC readiness goes beyond mere branding, marketing and window dressing (Noori & De Jong, 2018). And if branding practices occur they have to be credible in the perception of target groups (like residents, business enterprises and investors) (Noori & De Jong, 2018). Recent negative experiences with SC projects (like Masdar City in Abu Dhabi, and Sidewalk Labs in Toronto) show that target groups easily notice whether Smart City branding is credible or not (Naafs, 2020; Noori, Hoppe, & de Jong, 2020). If not, the project and its urban protagonists are in fear of quickly losing legitimacy.

Wathne and Haarstad (2020) highlight three characteristics of SC policy mobility: glossiness, fragmentation, and randomness. Glossiness refers to shaping the SC practices as success stories and branding them to be transferable. SC policies are commonly decomposed when transferring and reproducing in the arriving context and transfer is mostly incomplete. And lastly by randomness it is stated that many procedures during the transfer process happen ad hoc and there is rarely an underlying systematic approach (ibid).

The literature review also revealed scholarly attention to monitoring and evaluation of SC policies and projects. Three key indicators for evaluating the success of SC policies and initiatives were discerned: i.e. policy integrity, clear branding strategy, and a predominantly demand-based approach (Nam & Pardo, 2011).

Table 3 presents an overview of the main results of the systematic literature review. Although the insights from the literature study have a lot to offer, they come across as haphazard and lacking in narrative, and they require theoretical embeddedness and explanation. There is a need for better understanding why local governments seek to identify, 'borrow' and adopt so-called SC 'best practices', policies and projects. In this light the SC and policy studies literature provides theoretical insights to address this apparent lack of theoretical embeddedness, conceptualization and explanation. More specifically, this touches upon a debate in policy studies on policy diffusion, policy borrowing, which more particularly ended up in a theory on policy transplantation (De Jong, Lalenis, & Mamadouh, 2002). In conclusion, transforming a city into a SC through learning from good and/or bad practices is not only a policy transfer but also a complex process of preparation, lesson-drawing, transferring policy, and adopting and reproducing an (innovative) policy.

Table 3
Results of the systematic literature review on smart city and policy.

Concepts	Search terms	References	Key domains
Examination	Smart City good practices, Smart City branding, Smart City readiness, Smart City readiness assessment	Orlowski, 2021; Achmad et al., 2018; Ibrahim et al., 2018	smart city readiness assessment; technological readiness
		Noori, Hoppe, & de Jong, 2020; Wiig, 2015	technological, socio-economic, political readiness assessment framework for smart cities
		Yigitcanlar, Han, Kamruzzaman, Ioppolo, & Sabatini-Marques, 2019	lessons learnt from smart city good practices
		Noori & De Jong, 2018	credible branding practices; the overarching policy
Localization	localizing Smart Cities, localizing Smart City policies, policy localization, policy innovation	Baker & Temenos, 2015; Robinson, 2015; Mora, Deakin, & Reid, 2018; Wathne & Haarstad, 2020	territorializing policies redevelopment of cities through global relational connections, reproduction of political-institutional settlements, the role of materials (e.g., policy documents, press releases, websites, and manuals), and techniques in policy mobility processes

4. Theoretical framework for transplanting Smart City policies

4.1. The SC policy transplantation process

Using the insights from the systematic literature review, this section synthesizes the identified steps, and actions of SC policy transplantation and systematizes them. SC transplantation can be conceptualized as a four-phase process. The four phases (as presented in Fig. 2) pertain to: (1) preparing the recipient for transplanting smart policies; (2) identifying and learning from good and bad practices; (3) transferring the policies, and eventually (4) adopting the policies and shaping them accordance with local requirements for transplantation. Phases 2 and 3 address the policy learning and transferring process, while phases 1 and 4 imply accommodation of the transfer. Although this process looks one-directional, it should be approached with great caution, because policy transplantation does not necessarily have to start in phase 1 and end in phase 4. It can also start in phase 2 or phase 3. And in case a perceived 'good practice' is 'unmasked' as a 'bad practice' along the way it may never reach phase 4 and will not be adopted as (formal) policy, action or practice by the recipient local government. To accommodate this process a theoretical framework is proposed (See Table 4). However, this theoretical framework is mainly based on a synthesis and integration of the theoretical insights developed above.

4.2. Theoretical framework on Smart City policy transplantation

Table 4 and Fig. 3 present the key elements of a theoretical framework on SC policy transplantation. For developing the framework data and insights were used from the systematic literature review. Once the smart profile is officially introduced in the recipient context, intended goals and visions are proclaimed. The intended goals of the SC policy development determine the specific domains where the adoption of smart city innovations is intended (Noori, de Jong, Janssen, et al., 2020). The goals and visions and the consistency of the policy with these overarching claims signal a desirable starting point for the preparation by the recipient. This preparation also entails a (socio-economic, political, and technological) readiness assessment of the recipient context (Noori, de Jong, et al., 2020). Assessing the alignment of current city branding practices and clarifying how SC innovation can contribute to that assists policymakers in discerning priorities for the development of various SC domains (Tan et al., 2021).

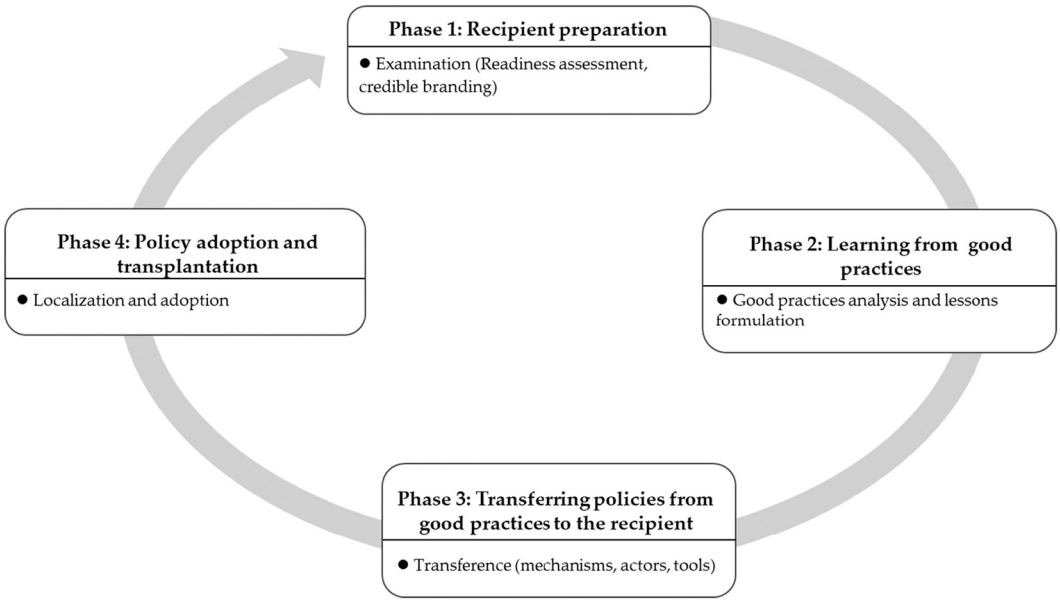

Fig. 2. smart city policy transplantation process.

In the next phase, the recipient looks outside for good practices to explore policies, programs, networks and connections and learn from them in the specific domains based on their intended goals (Noori, Hoppe, & de Jong, 2020). Joining the SC policy networks and communities enable policymakers to identify good practices and workable solutions (Rose, 2002). When searching for good practices and learning from them with the aim to improve quality, 'benchmarking' practices are of importance. The Input-output (IO) model of SC development introduced by Noori, Hoppe, and de Jong (2020) provides a systematic approach to analyse (good) practices in and can be used as a benchmarking tool (ibid).

At this point, the results of the good practice analysis can be selected and transferred to the recipient in the form of political and policy lessons, including ideas, visions, beliefs, institutions, programs and policy instruments for Smart City development. Transferring good practices and insights on supportive policy instruments and/or tools often takes place via transnational networks i.e., via SC policy networks and interactions relevant players engage in (Dolowitz & Marsh, 2000). Knowledge exchange resulting from interaction may shift policy preferences or beliefs of decision-makers and encourage them to select policy ideas. Facilitating transplantation of SC policies requires offering supportive platforms that also imply funding for organizing innovative SC experimentation and pilot demonstrations in cities. For example, in its research and technological innovation framework programs the European Union has tenders in place that provide funding to and allow cities to experiment with SC policy concepts (Noori, Hoppe, & de Jong, 2020).

When the Smart City policies arrive in the recipient context, the results from the preparation stage form the input for selecting policies based on local circumstances. Adopting and localizing policies is normally conducted by various actors (Borrás, 2011). This requires exerting contextual constraints, application constraints, and entails the mutation of transplanted policies which leads to so-called policy innovations (Benson, 2009). Policy innovation refers to a new policy on an issue formulated based on improving and refining understanding of the related concepts around the issue or identifying and responding challenges to adopting the concepts (Mukhtarov, 2014). Innovation in policy can be seen as either incremental (improvements and adjustments) or radical (fundamental change) based on how big and how novel the particular change is. Incremental innovation in policy takes place when the stimulus is the change in management or programs whereas radical innovation involves a paradigm shift (Sabatier, 1998). Policy adoption should start from a critical reflection on selected and transferred policies and distinguishing good from bad practice considered for transplantation, after which fine-tuning them to ready them for the actual implementation in a real-life context transplantation. After monitoring and evaluating the performance of the policy in the new context, a plan for readjustment, upscaling and eventually termination can be designed if needed (Benson, 2009; Sabatier, 1998).

Fig. 3 presents an overview of the Smart City transplantation policy framework.

5. Validation: expert panel discussion

During a workshop for Gulf region delegates held in September 2022 at Erasmus University Rotterdam and coordinated by the Netherlands Enterprise Agency (RVO) for exchanging urban solutions and learning about Dutch practices, the framework was presented by the first author of this paper. Panel members were asked to reflect on the framework and its elements and sub-elements by sharing their professional experiences. The first reflection on the framework was that the phase of recipient preparation is something important that they had previously missed in their work in policy/program transplantation. The experts pointed out that in practice the transfer phase mostly happens before recipient preparation takes place, which is the main reason for incomplete transfers and failure. The participants acknowledged that the process of learning from good practices often takes place with the participation of external consultants from the private sector. They also mentioned that crystalizing the problem situation before searching for solutions as well as differentiating good from bad practices was essential. For identifying and learning from practices, the workshop participants highlighted that using online platforms, benchmarking, field trips and excursions, workshops, and network activities were the main tools in use. For the transfer phase, regarding the legality underlying the process and commitments, the issue of lack of support from the original policy host and being committed to agreements between the latter and the recipient, especially when the degree of transfer is high, were raised as of vital importance. It was highlighted that lack of trained workforce to accept working with the newly adopted policy represents another barrier to implementation. In phase four, monitoring and evaluation, the main discussion revolved around the importance of documentation for managing the acquired knowledge during the process as well as transforming

Table 4
Key elements in a framework on analysis of smart city policy transfer.

Phase	Key element/Steps	Sub-element/activities
1. Recipient preparation	Map main goals, agendas and current programs to which smart city innovation can potentially contribute	
	Smart City Readiness assessment	Socio-economic assessment Politics and governance assessment Technological and infrastructure assessment
	Discern current brand(s) and frames used by the city and assess how smart city innovation can contribute	
	Discern sectoral domains to which smart city innovation can contribute (e.g., energy, ICT, water, healthcare, mobility)	
2. Identifying and learning from practices from abroad	Join policy and innovation networks to enable identification of good practices	
	Attract funding (to develop a project or program that enables policy transplantation)	
	Identify good practices from (leading and exemplary cities) abroad; differentiate good from bad practices	
	Organize field trips and excursions	
	Benchmarking Smart City good practice (using a comprehensive model e.g., IO model)	
3. Transferring policy to recipient	Transfer mechanisms, decisions, and actions	Manage actor-interactions (effective communication, commitment to agreements, and building trust) Determine the subject and degree of transfer Manage platform to accommodate transfer (e.g., seminars, workshops, conferences, webinars, blogs, online media, databases) Make sure that resources are available to accommodate transfer (i.e., funds, expertise, infrastructure)
4, Policy adoption and implementation	Critical reflection	Discern good from bad practice by critically reflecting on practices considered for transplantation.
	Assess fit of new smart solution to current programs and policies, and assess how to fit it in.	Discern contextual constrains
	Adapt current policy where possible to accommodate a flexible transplantation process	Discern application constrains
	Policy Innovation	Innovation in program, institutions, or paradigm
	Capacity	Train workforce to accept working with adopted new policy.
	Planning and implementation	Implement newly adopted smart city policy or project in real-life context (like a city district).
	Monitoring and evaluation	Monitor performance of newly implemented smart city policy or project, critically reflect on it, and readjust, scale up, or terminate when needed.

tacit knowledge as best as possible into explicit knowledge. For all phases, the involvement of knowledge institutes and academia, as well as building trust were highlighted as crucial elements.

The results from the two rounds of discussion indicate that the rationality behind the process and the necessity of using the framework were generally acknowledged. However, some elements not clarified in the framework were addressed by the workshop participants. Based on the results of the discussion some adjustments were made. This included mentioning making the distinction between good from bad practices alongside the sole identification of good practices. 'Organizing field trips and excursions' was also added to the framework as a key manner for identifying and more importantly differentiating good and bad practices. It was mentioned that 'formulating lessons from good practices' (mentioned as a step within phase 2) is rather a general statement than a practical step. Participants also suggested to further clarify the method. However, in the framework (See Section 4) we mention using the IO model (which serves as a benchmarking model) for learning from good practices. Therefore, it was decided to change the step of 'formulating lessons from good practices' into 'benchmarking Smart City good practices' for more clarification. Having a knowledge management department involved and developing a good practice portal were mentioned as crucial factors for leveraging knowledge transfer missing in the framework. In response, it was decided to incorporate this insight and include it as a sub-element in the framework. Concerning the issue of the legality underlying the transfer process it was decided to highlight this under the sub-element of 'managing actor-interactions' as effective communication, commitment to agreements, and building trust. Training the workforce to accept working with the newly adopted policy is also added to implementation and adoption phase based on the insights from the expert panel discussion.

6. Illustration: the case of Helmond City

This section illustrates how the four phases of the policy transplantation framework were and/or can be applied in the Helmond case.

6.1. Phase 1: Recipient preparation and readiness assessment

In the City of Helmond's ambition plan 2024, a main focus on 'broad prosperity' and 'inclusion' is obvious. In line with this, its local government has established a Digital City program and an ambitious residential area development project entitled 'Brainport Smart District' (BSD), with the aim to become the '*Smartest district in the world in 10 years*', whilst using the slogan, 'Living the future' (Helmond Ambition Plan, 2024). Within the program digital inclusion is the core value, linked with several initiatives. The program and the project are mainly funded by regional actors, i.e., the City of Helmond, the North-Brabant province, and Brainport Development (a semi-public independent regional economic development company). This is done through subsidy programs as well as one-on-one contacts with governments. In many subsidy programs, and certainly at the European level, the applications often take place in a consortium, and in such cases, it is essential to be present in SC policy networks and maintain contacts with various

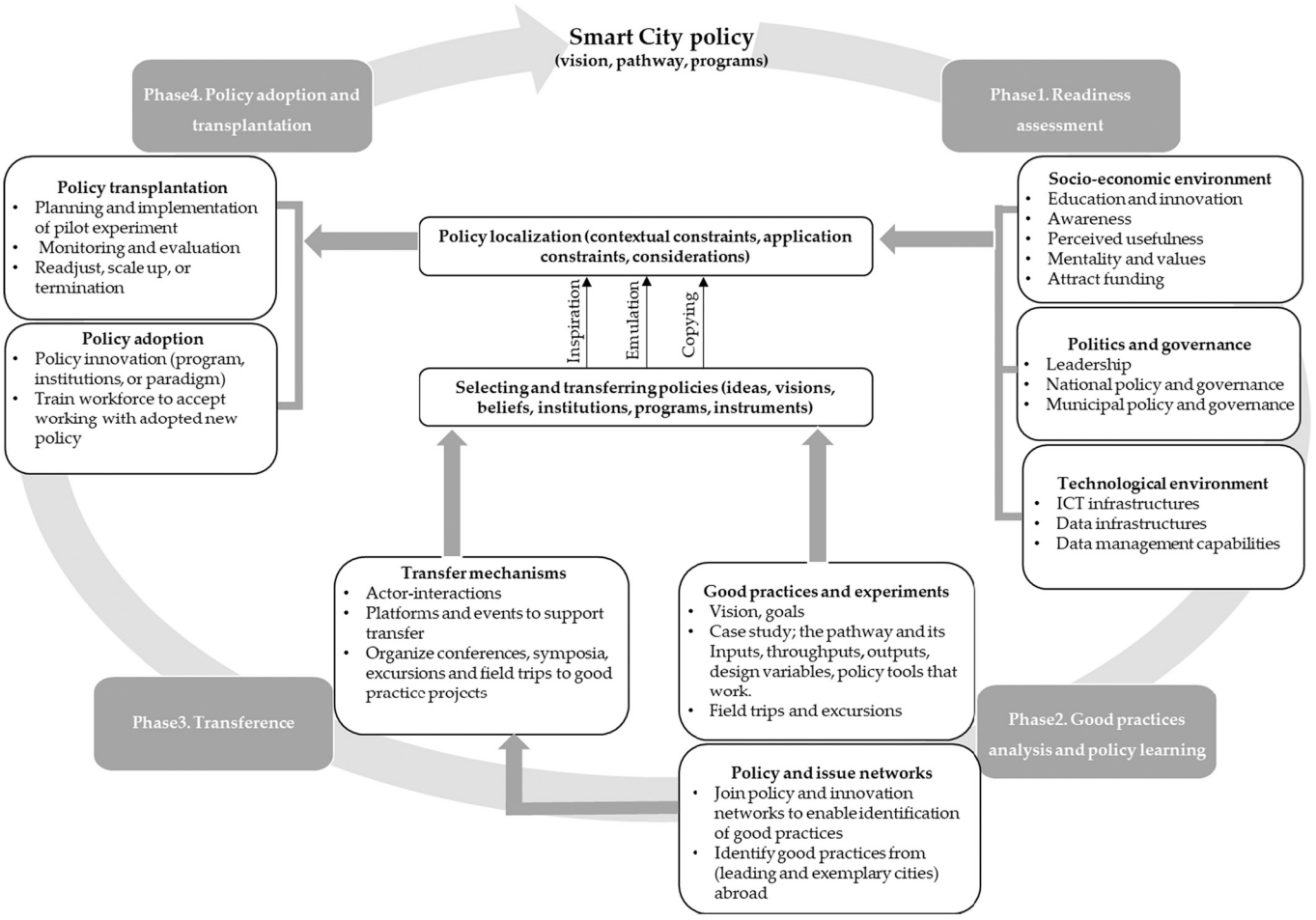

Fig. 3. The Smart City Policy Transplantation Framework (compiled by authors).

relevant municipalities and companies. Funding sources are provincial fundings (e.g., SmartWayZNL, ReactEU[3]), national funding (e.g., RegioDeal Brainport, Min. BZK,[4] National Growth Fund through Ministry of Infrastructure and Water Management, SBIR through Netherlands Enterprise Agency), and supra-national (EU) funds (e.g., Horizon Europe, Digital Europe Program, and European Digital Innovation Hub participation).

In 2020, the municipality of Helmond conducted a citizen survey to ask citizens' opinions on Helmond's identity. The results of this survey show that citizens listed transparency, conservation, innovating, inviting, fashionable, and small but ambitious as the main characteristics of Helmond, and are proud that Helmond is transitioning from an industrial gray city, and relatively poor socio-economic city to a modern city (The municipality of Helmond official website, n.d.). In 2021, a joint research project was initiated in collaboration between the municipality of Helmond and Erasmus University Rotterdam concerning Helmond's digital inclusion program. The project aims at co-creating Helmond's digital city policy document and based on that an action plan through learning from good practices using the 'SC policy transplantation' framework (See Section 4). To formulate the policies and translate them into actions, programs and initiatives, a number of good practices are studied for leaning and inspiration.

To assess to what extent the City of Helmond can be considered ready to become a SC, the readiness assessment framework developed by Noori, Hoppe, and de Jong (2020) is used. In this assessment, international indices and rankings show that the Netherlands is in a rather favorable position in terms of technological readiness. This especially applies to the high-tech Helmond-Eindhoven region. As mentioned, the municipality of Helmond has a comprehensive policy document and action plan for its Digital City program and Smart District. The program is constructed having three main foundations: fiber-optic network infrastructure (connectivity layer), sensors layer (IoT infrastructure), and an open data platform (data management) layer which the smart application layer to be built on that. The fiber-optic network is developed in Helmond by being a testing ground for the region (i.e., 'Brabant Ring'). The development of the sensor layer is carried out through partnerships with Eindhoven University of Technology and a local company. For the data management layer and open data platform, the City of Helmond works closely with Erasmus Centre for Data Analytics aiming at developing an integrated openly accessible data platform opening up the opportunities for businesses to develop smart applications. In all of these developments the City of Helmond follows the General Data Protection Regulation (GDPR) and the Dutch Practice Guideline for Open Urban Platforms. Privacy and safety issues are considered in Helmond's Digital City framework; however, the program does not mention the establishment of a framework for cyber security (The digital city of Helmond, 2021). Detailed and comprehensive programs mentioned in Helmond's Digital City policy program and action plan are evidence of its technological readiness (see for more detail the Appendix). One important aspect for the municipality of Helmond to consider in order to become technologically ready was big data establishment for developing smart solutions (Naafs, 2020).

The Netherlands are considered an innovation leader according to

[3] European subsidy through the provincial section
[4] Digital Government Innovation Budget

the European Innovation Scoreboard in 2017 (Hoppe, Jeliazkova, Woldendrop, & Bandelow, 2018). Demographic data regarding education level in Helmond indicate that 35% of citizens have low education level, 41.8% have secondary education level, and 23.2% have high education level (Central Bureau of Statistics (CBS) of the Netherlands, 2020). According to the Netherlands' Statistics Center (CBS), the socio-economic score on the basis of income, level of education, and participation in the labor market shows that in some districts (in Helmond) the score is below average comparing to other districts and municipalities in the Netherlands (Central Bureau of Statistics CBS of the Netherlands, 2019). Therefore, citizens' participation and educations are the main challenges to address in terms of socio-economic readiness. To prepare Helmond socio-economically and make its human and entrepreneurial resources available, the Municipality of Helmond initiated several partnerships and joint-research projects with universities, especially the two universities nearby: Eindhoven University of Technology (TU/e) and Tilburg University (Knowledge Agenda Helmond, 2020). To add the innovation capital to its programs, the City of Helmond collaborates with start-ups and innovation hubs such as the Innovation Hub West (Automotive campus) and the TU/e Innovation Space to explore and set the urban innovation solutions in motion within the city. The budget overview of the Digital City program indicates a specific budget for incubators and start-ups in 2021–2024. Nonetheless, the social readiness assessment from the perspective of citizens still needs to be conducted. Evaluating citizens' awareness, their perceived usefulness, and their mentality and value related to the Digital and Smart City programs are also required to prepare the city for the intended transition since Helmond intends to take a participatory approach on this path (at the time of writing, that study was underway).

In terms of political readiness, the context of the City of Helmond can be rated as ready based on the scores of the Netherlands on rankings and indexes - based on the indicators of transparency, leadership, and trust (The World Bank, 2021a; OEDC, 2020; The World Bank, 2021b). The Netherlands has a parliamentary constitutional monarchy governance structure, governing cities through a decentralized approach. The government body consists of central government, 12 provincial authorities, and 344 municipalities, water boards, and administrative authorities (Chamber of commerce, Center for Work and Income, etc.) Each city has a municipal council, a mayor and an alderman with its own municipal laws and regulations that must be aligned with the national development and urban policy. Municipal councils and waterboards are directly elected by citizens but not the mayor. In terms of national urban policy, since 2010, the Conservative Liberal cabinet led by Mark Rutte has shifted the national urban policy approach from national investment to City Deals and transferred the responsibility of socio-developmental policies to municipalities alongside financial decentralization (Denters, 2021). So, the role of the national government is that of a facilitator, indicating facilitative leadership at the national level. At the local level Helmond's Ambition Plan specifies a visionary leadership. This is also illustrated by the City of Helmond having public officials in place who embrace SC policy goals, as well as its 'public-private-people' partnership and participatory policymaking approach. However, the assessment also shows that there are concerns and considerations regarding current governance structures and arrangements, suboptimal alignment with regulations and laws, as well as limited citizen participation.

6.2. Phase 2: Learning from Smart City practices abroad

The City of Helmond actively sought to learn from Smart City practices elsewhere. In particular with regard to the BSD area development project and its Digital City program. It did and does so to learn from good practices but also to learn from negative lessons. This included civil servants visiting Toronto and Barcelona several times to learn how to implement Smart City principles such as digitization, participation and inclusion. Inspired by inclusion policies in Amsterdam Smart City and Barcelona's (digital) Smart City programs, Helmond started its local Smart City program with a focus on inclusion policy. Organizing field trips, actively participating in Smart City expos and conferences, active involvement in associations and Smart City networks including maintaining close ties with Amsterdam and Barcelona constitute ways for Helmond to identify good practices. The municipality's business developer (2022), expressed that,

> *'We organize trips abroad and it's desirable to do it in a mixed group although this is sometimes difficult budget-wise […] because then the chance of result is bigger […] You need to have the problem owner with you when you try to find solutions […] We make some kind of report stating what we did there and whom we met, and then we spread that within the organization.'*

He also highlighted that to learn from good practices benchmarking, peer reviews, and occasionally external consultants were used albeit not in systematic ways thus far. For this purpose, the joint research project with Erasmus University Rotterdam was initiated to adopt a systematic approach for learning from good practices. This is in line with the theoretical framework proposed in the present paper to (develop and) use a comprehensive model and benchmarking framework to identify and assess policies, processes, projects, and programs that align well with the SC vision, goals and ambition plan(s). For the City of Helmond, learning implies drawing lessons from both good and bad practices. For deploying high-tech solutions unlike many existing Smart Districts, BSD and Helmond's digital city program both focus on resident needs first, and based on bad experiences tries to avoid making mistakes related to putting industry interests first. This would avoid installing high tech solutions without critically considering patterns of human-machine interaction and perceived loss of privacy (as showcased in the Toronto case). The City of Helmond has also commenced in branding of BSD as the 'first' SC district in the Netherlands. Given its emphasis on broad prosperity and inclusion, the City of Helmond has planned to continue learning from smart participatory projects in Barcelona, and Amsterdam. This also holds for valuable insights from Amsterdam Smart City projects in relation to public-private partnerships and fostering urban innovation (Noori, Hoppe, & de Jong, 2020). Next to the lessons adopted from the Toronto program there is potentially a list of key practices, 'success stories', narratives, programs and dedicated projects to be considered for transfer and adoption into Helmond's program for instance in Helsinki and Linz (at the time of writing, that study was underway).

6.3. Phase 3: Transferring Smart City policies to the recipient

The first step for the City of Helmond is to start playing an active role in the SC network in order to gain access the relevant knowledge pool. Helmond's approach to identifying actors involved in good practices is mainly through active participation in national and international events, conferences, and face-to-face meetings. Events like the Barcelona Smart City Expo are used to determine who is involved in the policy, project, or program development and what the networks surrounding the subject of transfer are. The Helmond business developer once again stated that,

> *'Once the subject of transfer is identified (e.g., ideas, program, project, policy?), we think about making the right links and initiating partnerships […]. In the case of projects, this may end up in business-to-business or business-to-government partnerships.'*

When the subject of the potential transfer (a digital solution/project, or an initiative) is specified based on the excursion reports, the degree of transfer is determined. Based on that the transfer mechanisms are designed through different types of partnerships (B2B, G2G, or B2G[5]) or

[5] Business to business, government to government, or business to government.

by initiating regular meetings with solution owners. Learning lessons from Amsterdam, Barcelona, and Toronto, Helmond transferred the idea of digital inclusion for its SC development program. Considering the readiness factors, the transfer was at the level of general ideas and inspiration (though their policy documents). However, some initiatives related to this idea (digital inclusion) were also transplanted later. A recent example is a campaign called 'you are your profile' for digital awareness and security from the City of Amsterdam. The initiative was identified through participation in the Smart City Expo in Barcelona and transplanted by initiating regular meetings with the solution owner and his direct involvement.

The City of Helmond recently joined a new consortium that applies for European funding, called 'European Digital Innovation Hubs'. It currently also participates in a Dutch societal innovation program which looks at digitization for solving societal challenges, and it is about knowledge sharing, as well as dissemination, and drawing lessons from other European Innovation Hubs. This program is funded by the European Union and jointly coordinated by the Dutch Association of Municipalities (VNG) and the Dutch Association of Provinces (IPO).

6.4. Phase 4: Policy adoption and localization

In this phase, contextual and application constraints Helmond faces when aiming to transplant and adopt perceived SC good practices, and the considerations for policy adoption are discussed. The contextual assessment shows that at the national level, in many aspects the Netherlands are considered fairly well-prepared for digitization and Smart City development. Nonetheless, there are some concerns related to the lack of executive capacity and accountability of public bodies that hinder further ICT penetration and e-government development (Hoppe et al., 2018). Whereas decentralized policies give local governments more authority to implement appropriate regional development policies, in 2015 sudden budget cuts in the social domain caused many local governments to suffer from funding shortage. More in general, Dutch municipalities suffer from shrinking budgets, the consequences of which can be observed in decreased executive capacity; these in combination with persisting problems related to ICT systems negatively impact public service delivery (Denters, 2021; Hoppe et al., 2018). Moreover, budgets are not equally distributed among municipalities, with medium-sized and small municipalities being allocated smaller budgetary amounts.

In the adoption process, legal considerations for SC policy implementation were addressed by public servants working for the City of Helmond, especially with regard to EU and Dutch data laws, as well as data privacy. Data ownership and sovereignty also received critical attention as well as application constraints involved in implementing Helmond's policy: 'Data belongs to citizens', which were considered major concerns (Naafs, 2020). Other considerations concern education (of both working staff, citizens, utilities and business companies) and citizen participation that may hasten the acceptance of transferred programs or projects. Therefore, citizen skills and awareness requirements for adopting smart city innovations should be carefully considered and the implementation process adapted accordingly. These policy mutations can provide the opportunity for incremental (management/making program changes) or radical policy (paradigm shifts) innovations. The abovementioned official mentioned the recent experience as an example when a so-called 'burglar proof district' from the City of Rotterdam (the second largest city of the Netherlands) in which sensors were used in a residential district that enabled the detection of patterns burglars make when they walk through the streets […]:

> *'It was about prevention and community policing, not so much about catching the burglar, but more about what kind of countermeasures you can take, for example, by intensifying the street lights or making noises or sending apps to residents […] Originally, we planned to copy and replicate the project in its elements, but seeing that Rotterdam had trouble really having it implemented and getting the results that they were hoping for, we tried to do it in another way. Although the project was adopted from a Dutch city, considering our contextual and application constraints, we first made some adjustments before implementing it […] considering ethical issues and privacy concerns, we were not focusing on burglaries and tracking everything in the district, but emphasizing a sense of safety and measuring the rhythm of a district to identify those services that could refer to safety and security.'*

The mutated (burglar proof district) project needed to be evaluated before it was transplanted to a residential district. It was consequently implemented as a pilot project in the Automotive Campus (a research area in Helmond), where it required less preparation for adaptation in terms of citizen awareness and participation. However, it was acknowledged that implementing the project in residential districts requires preparations mostly related to citizens' awareness and acceptance. The residential districts were not ready to adopt the solution resulting in the project eventually being stopped. And this indicates the challenge regarding adopting innovative but immature solutions. It appears that in Helmond, however, there is a strong focus on preparation before implementation; it happens after transferring the solutions. The evaluation and monitoring steps are (still) less well-developed. There does not appear to be any general platform available to store knowledge or experiences.

7. Discussion

In the previous sections, a structured stepwise framework grounded on knowledge in the existing academic literature was developed, then fine-tuned it based on comments from experts from the Gulf region in a panel and finally illustrated its operational workings in a Dutch city where such transplantation is currently attempted in practice. The stepwise theoretical framework of Smart City policy transplantation is the main contribution to the academic body of literature on SC policy. Although the steps we discerned in our prescriptive framework are universally acknowledged as being valid and ought to be preserved in their respective order, it turns out to be important to allow for feedback loops whenever new input emerges or complications arise. Moreover, it appears that among adopting cities possible (lack of) readiness for accepting new smart city policies is often insufficiently accounted for or at least seriously underestimated (Achmad et al., 2018; Ibrahim et al., 2018). It is normally simply not acknowledged that specific political, economic or cultural preconditions are to be in place before transplantation can fruitfully be implemented or have the desired impact(De Jong, Lalenis, & Mamadouh, 2002). Results from both expert panel discussion and the illustrative case indicate that the preparation phase is usually neglected and that the process of learning from good practices suffers from a lack of systematic approach and use of a comprehensive benchmarking framework. Finally, as known from the academic literature (Baker & Temenos, 2015; De Jong, Lalenis, & Mamadouh, 2002) and as shown in the recent transfer experience of transferring a project in Helmond, paying attention to contextual and application constraints even in cases where transplants are adopted from a relatively similar institutional environment is necessary and a decisive factor in the success or failure of its reconstruction in the new context. Transplanting smart policies is simply a tailor-made process where each step of the way specific solutions is to be fleshed out, discussed and adjusted suitable to the local context. To some extent even adapted projects can be considered new projects which require additional examination for localization. In the Helmond case, the adapted project had to stop not because the recipient context was not prepared for implementing the project in residential areas (mostly for social readiness and citizens' awareness) and required policymakers to terminate it. This empirical evidence aligns with our framework's emphasis on the preparation, adjustment, and adaptation stages, and how important it is to start with assessing the recipient's readiness first. In line with the very motivation that drove us to develop our step-wise prescriptive framework suggests, (flexibly)

using a model for benchmarking and learning from good practices that could arguably prevail over relying on reports (Noori, De Jong, & Hoppe, 2020; Rose, 2002).

Finally, in both the expert panel discussion and during interviews related to the Helmond case concerns were expressed regarding knowledge management and documenting the transplantation process. It is therefore concluded that having a knowledge management framework as well as knowledge management department are crucial elements that should be considered more deeply when it comes to a further elaboration of our policy transplantation framework (Tan et al., 2021). The same holds for having knowledge management infrastructure available. The issue of commitment for a complete transfer, especially in case of a high degree of transfer (e.g., transferring an entire project), is also relevant as a success factor in the policy transplantation process. Signing a partnership agreement between recipient and the original policy host clarifying the level or degree of transfer and both sides' commitments during the process is final key element deserving thorough consideration.

8. Conclusion

This paper set out with the questions: How are Smart City policies, practices, or projects transplanted from an originating city to a recipient city, and how can a theoretical framework be developed to support analysis into this process?

Following a systematic literature review a policy transplantation concept was introduced representing an integrated approach to increase understanding in SC policies transplanted from one place to another, whilst putting context-related considerations at the core.

The theoretical framework developed can be conceptualized as consisting of as a four-phase process: (1) recipient preparation; (2) learning from good (and bad) practice; (3) transfer; (4) adoption and implementation. The usefulness and value of the framework were debated and assessed in a panel discussion, leading to slight modifications, and finally illustrated by showcasing a real-world example how the City of Helmond and its BSD project fleshed out its SC policy transplantation in practice. The final result embodies a constructive synthesis of an extensive but somewhat disparate academic literature on the topic of policy transfer and policy mobility, as well as the contextualization and localization of SC ideas, notions, policies and projects in their new recipient environment. The validation of this theoretical framework by practitioners and its illustrative applications to a real city ensure that it has both the academic merits of reflecting state-of-the-art knowledge on disseminating constructive and promising practices in SC development beyond the global leaders and the prescriptive quality to assist SC planners and policymakers in utilizing mechanisms of interaction and learning to successfully transplant SC initiatives and support them in evaluating the relative effectiveness and suitability of various transplantation options, projects and ideas in their specific context.

Next to its merits, this study also has a number of limitations. A first limitation refers to the fact that the validation was performed with a single group of experts commenting and adjusting the theoretical framework in a workshop setting. Future research should deploy a larger set of validation methods and pay particular attention to phases 3 and 4 of the framework (transferring and implementing the SC policy, respectively) which have been less thoroughly tested than the first two phases. It is thus far only tried with only one case, which in addition might give the impression that the framework and application tilt towards Western-European cities and projects. To avoid a possible bias from emerging, it is recommended that it be also applied to cities in other parts of the world, including a critical discussion and possible elaboration and adjustment afterwards. Moreover, the case at hand here is clearly a front runner, whereas local governments in other cities interested in transplanting SC policies and projects from elsewhere may encounter conditions less supportive to their SC transplantation enterprise. Finally, the SC transplantation project in Helmond had not been finalised by the time of writing, and therefore certain limitations apply in our interpretation. Validating and elaborating a new theoretical framework is an iterative process and requires the completion of several rounds. If done well, both academia and policy practice stand to gain a lot from the result.

Appendix A. Appendix. Helmond's Digital Smart City readiness assessment (adopted from Noori, De Jong, & Hoppe, 2020)

	Factors/Contexts	Indicators/Definitions/ Practices	Description
Technological Readiness	Data aggregation	Big data establishment	Presence of an Open Data platform and data ecosystem is considering
		Sensors and actuator equipped devices, CCTVs & cameras	An exploration for asset management of sensors is currently implemented
	Connectivity	ICT infrastructure Development	A fiber optic network infrastructure is under construction
	Data processing	Data science centers	Working closely with Erasmus Centre for Data Analytics
	Data real-time analysis	Data visualization platforms	A data visualization platform exists, yet it is limited in terms of transforming data to information
	Establishing a data authorization	Data Laws	General Data Protection Regulation (GDPR) Dutch Practice Guideline for Open Urban Platforms
	Security	Establishing a cyber security framework	Establishing a cyber security framework is considered.
Social-economic Readiness	Education	Education level, Number of universities and research centers	The majority of citizens have secondary level of education Having TU/e and Tilburg University nearby also universities of applied sciences nearby such as Fontys
	Innovation	Knowledge transfer and knowledge sharing programs	Partnership programs and joint-research projects with universities and knowledge institutes
		Specific policies are in place to promote smart city innovation	BSD project: branded as the 'smartest city district in the world' in ten years
		Supporting and encouraging programs for innovative companies (science and technology parks, free zones, etc.)	Innovation Hub West: supporting innovative mobility solutions with TU/e Innovation Space
	Awareness	Level of citizens' awareness of the smart city program in their city	N/A
		Level of citizens' awareness of the smart city concept and technologies	N/A
	Perceived usefulness	Level of perceived usefulness of the smart solutions for the city's challenges by citizens	N/A
	Mentality & Value	Citizens' opinion about what a smart city means	N/A

(continued on next page)

(*continued*)

	Factors/Contexts	Indicators/Definitions/ Practices	Description
Political Readiness	National policy and governance	Citizens' image of their city	N/A
		Different ideas citizens have about quality of life	N/A
		National leadership	Conservative Liberal government coalition with a green and innovation-oriented approach
		Government structure, governance arrangements, policy networks	Parliamentary constitutional monarchy Central government, Provinces, Municipalities & City Councils, and Waterboards
		Rules, laws, legal and regulatory reforms	Development Cooperation Policy City Deals Policy Dutch Digitalization Strategy
		Legitimacy, transparency, and trust	Transparency as a public Policy Principle High anti-corruption index (2021) High level of trust in government (78.1% in 2020)
	Municipal policy and governance	Local leadership	Supporting the Digital Inclusion Program
		Partnerships with industry, academia, and citizens	Public Private People Partnership Approach for urban management
		Providing a platform for multi-stakeholder partnership	Absence of an integrated partnership platform Presence of a City Panel participation program
		Smart city innovation clusters and networks	Circularity, Smart Citizens, Smart Energy, Smart Environment, Smart Healthcare & safety, Participation

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.giq.2023.101802.

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