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Smart Sustainable Cities—Case Study Südwestfalen Germany

Mona Treude [1,*], Ralf Schüle [2,3] and Hans Haake [1]

[1] Wuppertal Institute, Döppersberg 19, 42109 Wuppertal, Germany; hans.haake@wupperinst.org
[2] Joint Centre Urban Systems, Faculty of Humanities, University Duisburg-Essen, Universitätsstraße 2, 45141 Essen, Germany; ralf.schuele@bbr.bund.de
[3] Bundesinstitut für Bau-, Stadt- und Raumforschung, Deichmanns Aue 31–37, 53179 Bonn, Germany
* Correspondence: mona.treude@wupperinst.org

Abstract: The transformation of society into sustainable structures is one of the most important tasks for the future. That cities have a decisive role to play in this transformation process has been known at least since Rio 1992. They have enormous pressure to act for change: They are at the same time problem and solution for sustainable development. Currently there is another significant development for cities—the need and external pressure to be "smart", often understood merely as applying the latest digital technologies to become more efficient. The Smart City and the Sustainable City can work hand in hand or hinder each other, depending on their interpretation. In this study we focus on five Smart Cities in Western Germany to get a closer look at how they shape their processes and whether the underlying motivation is to become a technologically Smart City, focus on sustainable development, or both. With the help of the innovation biography research method, we show how cities shape the dynamic process towards forming a Smart City, the role sustainable urban development plays in the process, who the actors involved are, and the important role improved knowledge management then plays for the diffusion of the Smart Sustainable City within the region. It becomes clear how important communication and narratives are both in the process within each City towards forming a Smart Sustainable City and for the first step of diffusion, the adaptation of other cities within the region. This study is intended to serve both as a basis for cross-regional consideration and dialogue for the transfer of successful processes.

Keywords: Smart City; Smart Sustainable City; innovation; innovation biography; inter-municipal cooperation; knowledge and knowledge management

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1. Introduction

"Cities are subject to constant change" [1] (p. 4, own translation). For some years now, the Smart City—an amorphous concept—has been moving cities around the world. Within and with this concept, innovation, knowledge, and development are created in a city [2–4] (p. 3 in ref. [3]). Nevertheless, the leading challenge and principle in and for cities is sustainable development [5]. However, in practice, Smart City concepts can be found along a continuum, ranging from approaches (often driven by the IT industry) that push technology for the sake of technology (and sales) to those advocating for the use of digital tools, but only where clearly necessary for other aims, e.g., sustainability or quality of life. In some cases, "smart" is also used in an entirely non-technical meaning, where a Smart City is just one that works towards its goal, which is generally already oriented towards sustainability [6–8]. Of course, there are a lot technologies in Smart City management solutions that address climate change and adaptation, as well as energy efficiency and the infrastructure of mobility in the city. For example, considering transport, increased smartness can be an important goal, as there are many emissions that can be reduced in this sector [9].

Thus, digitalization indisputably offers opportunities for shaping sustainable development and for socio-ecological transformation, if used responsibly and possible negative

impacts, e.g., through increased energy demand, are taken into account [10–13]. Technology and sustainability are two very complex, multidimensional fields that are in constant development [10], and the innovative Smart City is in between. Wu et al. (2020) gave a good overview of the state of Smart City research and its different foci. For this purpose, they examined 965 research articles and presented the most influential ones for the discourse [14].

In our study we examine the factors driving this "Smart and Sustainable City" innovation using a methodology based on evolutionary economics the innovation biography method. This view of Smart City approaches is intended to further open the framework of Smart City and Smart Sustainable City research and provide, in addition, access to the previously underrepresented perspective of knowledge management in this process [15]. At the same time, the evolutionary economics approach of biographical research should reveal the dynamic processes within the Smart City and show in which steps holistic approaches in the sense of a Smart Sustainable City can be observed in order to contribute to urban development with the goals of sustainable development [16] (pp. 574–576). Promising structures, actor constellations, and topics are elaborated and the Smart Sustainable City is considered against the background of a regional innovation system.

Since 2019, the German Federal Ministry of Transport, Building and Urban Affairs ((BMWSB (formerly BMI)) has been promoting German cities and municipalities with regard to their planning and implementation of "digital strategies for livable cities" with the funding call "Smart Cities made in Germany." In 2019, 13 cities or inter-municipal projects were funded, in 2020 another 32, and in 2021 28 more [17]. In addition to the development and testing of integrated Smart City approaches, the goals of this funding program are to combine sustainability with digitalization. Furthermore, there should be an intensive exchange of knowledge between the cities involved, and transferable open-source solutions are to be developed [17] (p. 6). Some of the cities applied together as a consortium in these three application phases between 2019 and 2021 and formed an inter- municipal model project. One of these inter-municipal cooperations is examined here in terms of its individual city processes in relation to their cooperation and their interaction. The aim is to better understand the processes towards forming a Smart Sustainable City both within cities and in various forms of regional cooperation. This especially includes aspects of learning, knowledge exchange, and collaboration. Some openness towards different possible results is intended and essential to the method applied; however, two main research questions can be formulated: (1) What is the role of sustainability in the Smart City processes observed? (2) What are characteristics of successful collaboration by cities aiming to be smart (and sustainable)? These questions will be answered through the mixed-methods approach of innovation biographies. This method allows us to find structural commonalities and detect diffusion of narratives, strategies, and concrete solutions. In going into depth within a region and looking at small and medium cities using an unusual method, we will add some new aspects to Smart City research.

The consortium "5 für Südwestfalen" was selected for this comparative study. At the time of the analysis, this consortium already had a two-year process behind it that could be examined. In addition, all participating cities are medium-size and small towns. About 70% of the German population live in cities of that size [18]. Thus, the results of the study can be fruitful for many more German cities and municipalities, which in terms of numbers alone have enormous transformation potential for socio-ecological development.

The article is structured as follows. In the subsequent section we explain the selection of the case study and briefly describe the region and its structures. Then we highlight the multidisciplinary method of innovation biographies and the underlying theories. Afterward, we present the two-part results with regard to the five cities studied, their underlying processes and approaches towards Smart Sustainable Cities, and the role of knowledge management for diffusion into the region. This is followed by a conclusion and a discussion.

2. Case Study: The Inter-Municipal Project "Smart Cities—5 für Südwestfalen"

For the investigation of the processes towards forming a Smart Sustainable City, a region was chosen in which five cities jointly form part of the federal funding program "Smart City made in Germany" mentioned above. The region is located in the west of Germany and comprises 59 cities and municipalities in five counties with around 1.4 million inhabitants (as of 2021) (see Figure 1). Südwestfalen is a strategic cooperation region and was established in 2007 as part of North Rhine-Westphalia's REGIONALE, a temporary structural development program of the federal state North-Rhine Westphalia [19] (p. iii). In total, there are nine of these regional development organizations in North Rhine-Westphalia, the most populous of Germany's 16 federal states. In connection with the REGIONALE (2008–2013), the Südwestfalen Agentur was funded, which operates as a limited liability company (GmbH) and is supported by the five counties of the region, namely, Märkischer Kreis, Kreis Olpe, Siegen-Wittgenstein, Kreis Soest, and Kreis Hochsauerland, as well as the "Wirtschaft für Südwestfalen" association since 2012. Its fields of activity cover topics of regional development, regional marketing, and the Implementation of numerous projects and programs. The Südwestfalen Agentur acts as a kind of knowledge hub and network center and is also part of the "Smart Cities made in Germany" funding program and has a coordinating role in it [17,20] (p. 11).

Figure 1. Location and size of the Südwestfalen region in Germany. Source: own illustration.

The Südwestfalen region is interesting for a case study investigation in two respects. Firstly, it represents numerous German cities, as mentioned above, and its small and medium-size cities have hardly been studied so far. Secondly, the aim of this region is not only to develop some individual cities into Smart Cities, but to strategically select some pioneers from which the whole region should learn. The inter-municipal consortium has set itself the goal of becoming the smartest region in Germany [21]. The five cities participating in the funding program are thus consciously pursuing the goal of diffusion within the region. This means that the five cities are not only interesting to study in terms of process comparison, but also with regard to their inter-municipal cooperative structures and their role as mediators to the other 54 cities and municipalities in the region. The five model municipalities are four medium-size cities (Olpe city, 24,612 inhabitants; Menden, 52,238 inhabitants; Soest city, 47,422 inhabitants; and Arnsberg city, with 73,457 inhabitants) and one small town (Bad Berleburg, with 18,809 inhabitants) (as of October 2021) [22]. Functioning structures and effective mechanisms for cooperation can therefore be transferred to many other German cities.

3. Method and Theoretical Background

So far, innovation research approaches within Smart City research are rare, as are the perspectives regarding targeted knowledge management and the cooperation of relevant stakeholders. "At present, cities tend to work in isolation and communication is often ad-hoc and more through individual relationships" [15] (p. 10). Studies show that resilience, mentioned in Sustainable Development Goal 11, i.e., the ability of a city or region to respond to change, depends, among other things, on actor networks and their interactions as well as collective learning processes. Thus, competitive thinking and passivity prevent the development of resilience [23] (pp. 276–277).

So, in order to learn how cities are currently developing and the possible insights this allows us to draw into future developments with regard to sustainable urban development, it is worth taking a look at the actors involved and how they work together to achieve this: "Cities are first and foremost people [. . .]" [1] (p. 59, own translation). Research on knowledge and learning processes as well as their influence on endogenous developments and innovations can be found, in particular, among representatives of evolutionary economics and also in economic geography [23–26]. The chosen method of innovation biography research originates from these disciplines and has already been used by us once before for the investigation into another Smart City—the Smart Sustainable City of Vienna [4]. Before then, the method had been used to study regional innovation processes of product and service innovations or sectoral innovations [8,27,28]. When applied to Vienna's Smart City process in 2020, the method provided interesting insights into structures and the direction of thinking within the Smart City, which was designed for sustainable development from the very beginning. [4]. Through the combination of different qualitative research instruments, consisting of narrative interviews, a document, and network analysis, a deeper understanding of the investigated innovation dynamics regarding Smart (Sustainable) Cities can be shown [28]. Narrative interviews are an important tool in the social sciences, as they give the opportunity to capture the processes as described by the interviewee. This does not give direction to the conversation, but leaves an openness for the most important topics from the interviewee's point of view [29,30] (pp. 575–577). This can avoid some of the established biases, especially when talking about normative areas such as sustainability [31].

Application of the Method in the Inter-Municipal Consortium in Südwestfalen

In the five original model municipalities of the project "5 für Südwestfalen", a total of 11 narrative interviews were conducted, all of which lasted about one hour. Due to the ongoing COVID-19 pandemic, the interviews were conducted via video conference. The narrative interviews were not restricted in advance by questions from the researcher, so the interviewee decided which topics have relevance [30]. We chose this form of interview because it ensures the openness we need for the explorative nature of the method. The debate around sustainable development issues has, in part, a normative character. The open form of a narrative interview therefore also serves to prevent the interview from being influenced by this normativity. In addition, we ensured that the responsible persons in the cities and in the Südwestfalen Agentur addressed the points that were relevant to them without us limiting them beforehand by means of a questionnaire or by making a pre-selection of points. The The prompt for the narrative was, "Describe to me the progress of the Smart City process so far". For the interviews, we chose the responsible Smart City managers in the municipality, as well as the chief digital officers and employees of the cities' climate protection management, if available. In addition, three interviews were conducted with responsible persons from the Südwestfalen Agentur. This was followed by eight more interviews with responsible Smart City managers from other cities. All 22 interviews (cited below as IP 1 to IP 22) were subsequently transcribed and analyzed (for detailed procedure, see Table 1). The results from the interviews, the document analysis, and the creation of an ego-centered network were then triangulated into an innovation biography, contributing to the validity of the results in this very qualitative approach [28].

Table 1. Methodical procedure for the creation of the innovation biographies.

1	Document analysis of freely accessible internet sources (existing council resolutions, Smart City strategies, and websites of the cities and the consortium as well as the Südwestfalen Agentur) and selection of a key person in the process
2	Agreement and conduction of a first narrative interview with the identified key person
3	Creation of an ego-centered network, where the ego in this case is the project "5 für Südwestfalen"
4	On the basis of the ego-centred network, selection of further interview partners and creation of initial biographies of the whole "5 für Südwestfalen" process and expansion of the ego-centered network
5	Conducting further narrative interviews in the 5 original cities and accompanying document analysis to validate the interviews (Smart City strategies, council resolutions, websites)
6	Development of the five city-specific biographies and comparative analysis with regard to organizational structures, participation formats, and actor links within the cities
7	Interview with another key person from the Südwestfalen Agentur to validate the results obtained so far with regard to overarching networking activities in the region of Südwestfalen and further interviews with follower cities in the region
8	Qualitative content analysis of the transcribed interviews, the freely accessible documents according to Mayring, and the reconstruction of the biographies according to Rosendahl [30,32,33]

Source: own presentation based on [28].

4. Results

We start with a brief presentation of the overall process drawn from the individual innovation biographies, starting with the joint application for the funding program (The individual innovation biographies compiled for the five cities cannot be shared in their entirety as they would clearly reveal the identity of interviewees and thus violate the anonymity they were assured of). Then we show the first results by comparison of the five original municipalities and their processes, evolving from the first idea of becoming a Smart City to the completion of their respective Smart City strategies.

For the first idea of becoming a Smart (Sustainable) City, the underlying motives were of interest, as well as whether they are oriented toward sustainability goals in the sense of a holistic approach. It is also shown where in the respective municipality the topic of the Smart City is located (in a department or as a staff unit). Since all cities developed their own strategy in addition to a common framework strategy, this two-year process was also examined comparatively, and the similarities and differences are presented. Finally, the results of the analyzed intermunicipal cooperation and its structures, orchestrated by the Südwestfalen Agentur, are presented. The important role this agency plays in the diffusion into the region is explained at the end.

4.1. Smart Sustainable Cities in Südwestfalen—Five Individual Paths, One Framework

The call and the initiative for a joint application for the funding program "Smart Cities made in Germany" in 2019 came from the Südwestfalen Agentur. This agency invited the cities in the Südwestfalen region to apply jointly for the funding and received 14 applications. One town from each of the districts was to be included. The participating cities needed to be representative of the Südwestfalen region in terms of the number of inhabitants, i.e., be a medium-size city or a small town, and form a diverse portfolio in their first approaches to the Smart City topic (IP 1, IP 3, IP 13). In the last quarter of 2019, the five chosen cities, together with the Südwestfalen Agentur, received a commitment for funding until 2026. Three of the five cities created one to one-and-a-half staff positions and filled them at the beginning of 2020. One city added the position to an existing position and one city created a limited-liability company (GmbH) together with the municipal utilities in which two positions for Smart City management were created in fall 2020. The

Südwestfalen Agentur also created a position for project management with the role of external communication and networking.

4.2. Development of a Common Framework Strategy

In the first year of funding (2020), the five model municipalities fulfilled the first task set by the funding agency: the creation of a Smart City strategy. The municipalities developed this together with the Südwestfalen Agentur as a framework strategy for the entire region, using the preliminary work of an already established regional vision "Südwestfalen DNA—Digital, sustainable, authentic" from the structural funding measures of the REGIONALE (2017–2025), which the region was able to acquire again in 2017 under the coordination of the Südwestfalen Agentur. In 2016, as part of the application for this funding program, there was a major participation process with business, science, administration, and citizens, in which the common vision and the guiding idea of "Südwestfalen DNA" emerged [34]. In terms of content, the joint Smart City framework strategy describes the understanding of the five original cities, which are to be committed to sustainability and the idea of a good life. Digital technologies, or more generally, innovative solutions, can help in the implementation of these goals. For the target year 2030, the focus is on people, which has already been implemented in the vision for the region from 2016 [20]. Thus, both the REGIONALE and "Smart Cities made in Germany" funding programs are to be thought of together and used to make the region livable and sustainable [20,21]. The topics of urban design, mobility, health, citizen participation, administration, education and digital sovereignty, civic engagement and political co-determination, tourism, CO_2 neutrality, and infrastructures are integrated. Digital offerings should complement existing portfolios and be open source whenever possible.

4.3. Visions and Narratives

All five cities studied in the Südwestfalen region work with a common vision, a common narrative, for their respective city. These are each based on the previously developed joint framework strategy together with the Südwestfalen Agentur. This is where the preliminary work of the entire region comes together and feeds back into the concepts of the municipalities.

The two cities of Olpe and Menden began the strategy process with the development of a vision, shared by all relevant actors. In Olpe, no such shared vision and goals for the city, co-developed between the administration and citizens, had ever been developed. The cities of Soest, Bad Berleburg and Arnsberg integrated the goals of the existing strategies into an overarching vision for the cities. In Soest, for example, this became the "Climate Neutral Smart City Soest." This narrative is tangible for citizens in the city (IP 11). Menden, together with more than 1,500 citizens, created the guiding principle "The New Us" and identified the desired topics of the citizens for their own city, e.g., "Environment and Climate" [35]. Bad Berleburg and Soest showed approaches to alternative future scenarios in the form of co-developed visions or alternative actions, as recommended by Bibri (2018) for the development of Smart Sustainable Cities [36]. Arnsberg is shaping this process in the coming months and wants to derive possibilities and target years for climate neutrality based on different roadmaps (IP 7). Thus, all cities show the development of a narrative future image of their respective city with defined goals and normative sustainability references, often based on the Sustainable Development Goals (SDGs). The same applies to the description of the current situation, both in terms of their digital equipment and competencies as well as their social, ecological, and economic starting points (all cities). All strategies work with visions of medium-term horizons, namely, the target year 2030. By integrating the citizens in the cities into the process of goal and vision development, acceptance is created for the upcoming development and transformation process that is needed for sustainable urban development (IP 11), [36].

Together with the definition of a Smart City, which is oriented towards both people and sustainable development, the visions developed clearly show the image of a Smart

Sustainable City and a holistic approach. This view of the role of a Smart City was revealed throughout the course of the study by both the Smart City managers and the CDOs of the cities, and even more so by the climate protection managers interviewed. The same seems to be the case with all model municipalities of the whole funding program: "Sustainability is the focus" [17] (p. 1, own translation).

4.4. The Process Design—Similarities and Differences

The first step in creating a Smart City strategy in each municipality was a SWOT analysis or inventory of the status quo together with the citizens (Soest, Olpe, Menden, Arnsberg). Bad Berleburg had already completed this step for the creation of the sustainability strategy in 2018. All interviewees mentioned a high identification with the topic and with the process; the same applies to the CDOs interviewed. All climate protection managers of the municipalities are involved in the creation of the Smart City strategies except in Olpe, because in this city the position has not been filled due to illness. In the municipality with the longest commitment to sustainability, cooperation between these two departments is most evident. The Smart City strategy is not independent in any of the cities, i.e., detached from the existing strategies and concepts, but in three of five municipalities it is an umbrella strategy (Menden, Soest, Olpe). The goals of the existing strategies flow into the Smart City strategy in these three cities. Bad Berleburg and Arnsberg handle this somewhat differently. In Bad Berleburg, the sustainability strategy remains the umbrella strategy and the Smart City, namely, the handling of digitalization and its possibilities for sustainable development, is integrated into it. Here, the goals of the sustainability strategy are to have top priority, and the Smart City with its innovative approaches to solutions, for which digital tools can help, is to serve as a toolbox. In Arnsberg, the goals of the Smart City strategy are to support the existing strategies of the city, including those of the sustainability strategy. However, the direction is very clear: It is not about the creation of another strategy, but about the integration of the Smart City strategy into the existing ones, or the other way around.

All the cities created new organizational adaptations in their administrations in the course of introducing the Smart City. Most of them have their own agile and very autonomously acting teams in the departments, e.g., "Innovation and Digital Change," as in Soest, or as a staff unit, as in Arnsberg. Menden takes a special path here in that the city and the municipal utility have founded a limited-liability company (GmbH) as a joint venture to oversee the strategic and operational implementation of the Smart City. The interviews and organizational charts clearly show the cross-sectional character of the Smart City in the five municipalities and the proximity to the top management, which indicates a high level of political commitment.

The differences in the individual municipalities are particularly evident in the internal framework conditions, such as the existing preliminary work, which in turn affect the participation structures during the strategy process. Thus, they are as varied in all dimensions (volume, time, bottom-up vs. top-down, etc.). All those interviewed consider broad participation to be very important. In addition, it is a requirement of the funding agency. Accordingly, all five municipalities operated a participation process that began in 2020 and lasted from 10 months to two years (IP 1, IP 3, IP 5, IP 6). The duration of participation was not necessarily determined by the extent of participation, but also by previous experience with such processes and human resources.

The roles of the actors involved in the participation process also determine the intensity. Those cities that aim for a broad activation of the citizenry have a corresponding demand for extensive participation (Arnsberg, Menden, Olpe, Soest). Of these, Soest and Arnsberg have already established strategies (strategic program for the future, sustainability strategy or digital strategy, integrated climate protection concepts, etc.) and corresponding network and participation structures, but nevertheless opted for an additional multi-stage participation process. The city of Soest has also been involved in a funding program of the state of North Rhine-Westphalia since 2018, in which the focus is on digital model regions.

Here, initial experience has already been gained in the area of Smart Cities. Bad Berleburg, having also already integrated participation processes in previous strategy processes, e.g., for the creation of a common vision for the municipality, chose a somewhat more narrow participation approach in this project, focusing on administration departments and select experts.

In summary, the development paths in the original five cities show a clear citizen-oriented, bottom-up, integrated multi-stakeholder orientation, as mentioned by [6,37]. There are Subtle differences in the five cities, e.g., the city of Olpe started first with the participation of the heads of office, whereas Menden began with a broad survey of the wishes of the population. In both cities, a people-centered perspective is evident, with Olpe starting with the activation of the administration and Menden with the activation of the citizenry (Olpe first top-down, Menden first bottom-up). On the other hand, Menden shows a stronger affinity for digitalization, whereas Bad Berleburg places a strong focus on sustainability goals (more technology-led vs. more sustainability-led). In addition, although the operational level is located in one department, the entire development process towards a Smart Sustainable City runs as a cross-sectional task across all administrations.

4.5. Cooperation Structures within the Consortium

In May 2020, the five municipalities, together with the Südwestfalen Agentur, adopted joint rules of procedure that regulate both responsibilities and working methods in this project (IP 3).

The entire consortium of the five municipalities, together with the Südwestfalen Agentur, is structured within the project according to working and functional levels. The Smart City managers coordinate and control the process within the respective city. As a coordinating role, a position was created in the Südwestfalen Agentur to control the overall process and knowledge transfer within the consortium and into the region (see Figure 2). The agency thus has a decisive role in the project. It initiated the whole process, and in this, it prepares the experiences gained in the cities as guidelines for the interested region and communicates them online via various channels. The Südwestfalen Agentur is supported by the five districts and the Association Wirtschaft für Südwestfalen. The telecommunications company Südwestfalen and Südwestfalen IT are involved in the project as regional partners for the implementation of digital solutions—for example, the first common project is the regional data platform. Three of the participating cities were supported in the strategy process by a joint consulting firm (UNITY AG). The superiors at the Smart City management level, mostly the CDOs of the cities or the administrative board, occupies an advisory function as an advisory board. In addition, there is a steering committee staffed by the five mayors of the participating municipalities and the program management within the Südwestfalen Agentur. At the operational level, however, when it comes to the upcoming implementation of the strategically developed measures, the tasks are again hierarchically delegated from the office managers to the employees in the departments. Here, the Smart City managers act as knowledge brokers and facilitators of the inner-city process (IP 2). Implementation takes place in and between the individual departments (IP 1, IP 3, IP 5, IP 6). Learning processes and regular exchange take place as well as jointly organized conferences for and in the region (in November 2020 and November 2021).

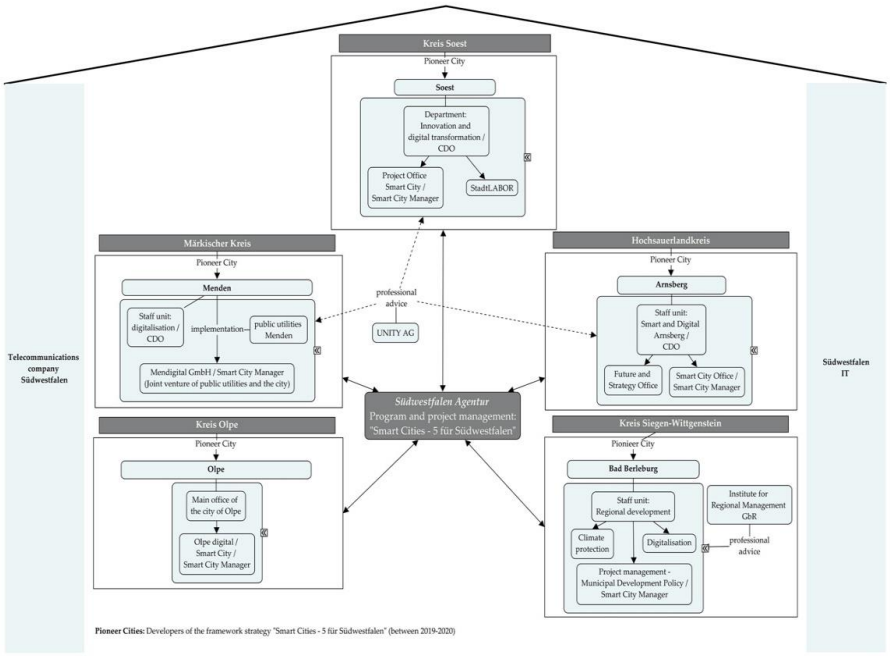

Figure 2. Inner-city structures in the pioneer cities and cooperation structures within the consortium of the "5 für Südwestfalen" project. Source: Own Illustration.

4.6. Regional Diffusion

Beyond its own self-image of helping the pioneer cities become sustainable and future-proof Smart Cities, it is the goal of this consortium for as many municipalities as possible to join, with the aim of becoming the smartest region in Germany [21] (see Figure 3). To this end, the remaining 54 municipalities in the region are to learn from the experiences of the five municipalities and exchange information on the topics in a network. In addition, all municipalities have the opportunity to join the framework strategy with a council resolution, a letter of intent, or a declaration of intent from the major. In this way, these so-called "join-in" follower cities (14 so far) adopt the goals set out in the Smart City Framework Strategy (Figure 3). Accordingly, the Smart City Framework Strategy is strongly oriented towards the region and, in its openness to the implementation of these aforementioned goals, offers a great deal of self-sufficiency for the individual municipalities in its implementation. In addition to the creation of usable open-source solutions, the municipalities in the region are to benefit in particular from the experience gained in their own processes and the knowledge gained as a result, thus making it easier for the learning municipalities to become Smart Cities without the financial support of funding.

Within just two years, 20 cities and municipalities joined the network (see Figure 4). This means that the first step in the diffusion chain according to Rogers has been taken. In 1995 he stated that "Diffusion Is the Process by Which (1) an Innovation (2) Is Communicated Through Certain Channels (3) Over Time Among the Members of a Social System" [38] (p. 11). The Südwestfalen Agentur has been an established communication medium for the region since 2008 and already moderated joint cooperation during the first REGIONALE structural funding program from 2008–2013 and the second program since 2017. The interviewees agree that the cities in the region have learned to work together over the years. The funding programs have been an important driver for this, as they have allowed the collaboration to become institutionalized and the agency to emerge to initiate further collaborations, such as the joint application to the "Smart Cities made in Germany" funding call. As a result of the institutionalized communication and the regular approach of the cities, more and more municipalities are joining the framework strategy or becoming part of the network (see Figure 4).

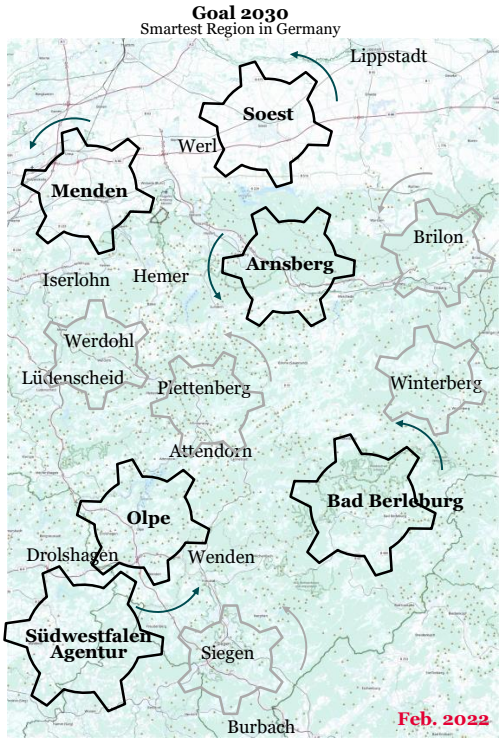

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Figure 3. Smart Sustainable Cities as accelerators for a Smart Sustainable Region (pioneer cities and the Südwestfalen Agentur) and cities that have signed up with the framework strategy (14 so far). Source: own presentation.

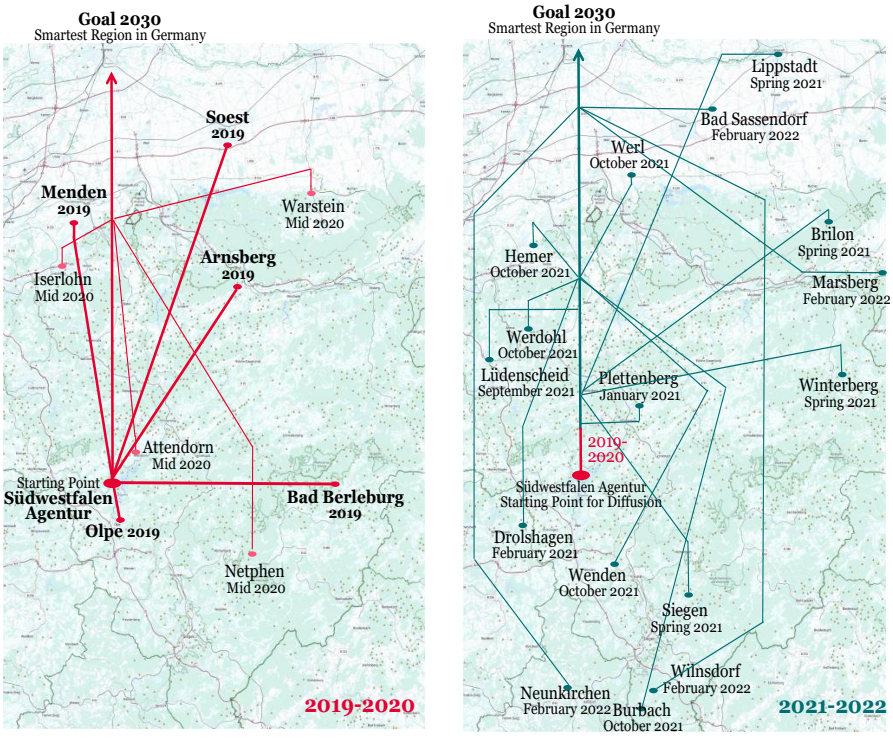

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Figure 4. Space–time path of the emerging network in the Südwestfalen region during 2019–2020 and during 2021–2022 (as of February 2022). Source: own illustration.

In the consortium, the Südwestfalen Agentur actively manages knowledge in and for the region by transferring knowledge from the municipalities to other municipalities, collecting experiences from the municipalities, and publishing them on a joint website, via newsletters, or on social media. So far, there are numerous guides to the processes in the five model municipalities, in which they present their lessons learned briefly and concisely [39].

5. Discussion

Although the method applied did not allow for narrowing down specific topics in advance, all of the interviewees provided diverse input relevant to the research questions. We structure our discussion by four areas of analysis also used as steps within the section above: narratives and visions, process design, cooperation, and diffusion.

5.1. Narratives/Vision

The interviewees described the Smart City in terms that indicated a holistic view within the framework of the United Nations Sustainable Development Goals, as called for by, among others, [16,40]. In this way, narratives can serve as a guide for future action and create an experiential link between what is narrated and what is practiced [41] (p. 13). Studies indicate that shared visions and narratives lead to more identity, confidence, and motivation in and for urban planning [42–44]. The innovation biography research of the Smart City Vienna showed this very clearly with regard to the actors involved [4]. The five cities of South Westphalia each developed a community-specific vision together with the citizens and administration in which they integrated the wishes of the citizens. This is particularly important for all interviewed persons in order to create acceptance.

5.2. Process Design

With regard to targeted and controlled knowledge management, it is evident that institutionalization in a regional agency (in our case, the Südwestfalen Agentur) is very successful. Where the participating municipalities have their own cities and the desired goals in mind, the agency can take up these experiences on a meta level, bundle them, and communicate them further in a way that is appropriate for the target group. We were allowed to follow one such format as participating observers. At the municipal level, the Smart City managers in the five municipalities could become change agents of the administration [45] (p. 199), activating and motivating them to try new forms of interdepartmental collaboration or new ways of working. They certainly set out to do so (IP 2, IP 5). In addition, to perpetuate and expand networks within the city is the goal (IP 11). This is because there is also a lot of know-how in the urban community that can be used and integrated if participation is done correctly (IP 2). Thus, in addition to the trust-building and activating function, participation has the function of controlled knowledge management.

5.3. Cooperation/Collaboration and Participation

Recent studies show that transparency, collaboration, communication, and participation not only contribute to improving governance processes within the city, but also improve the perceived quality of life of the population in the city [46–48].

The type of participation in all five processes analyzed shows genuine participation in the form of active involvement on the part of the citizenry [49]. These multi-stakeholder collaborations have been pointed out by researchers for years (see, among others [50–54]). In the narrative atmosphere during the interviews, the respondents revealed an openness regarding inter-municipal collaborations that Israilidis et.al (2021) still lacked in their comparative study from 1990–2018 [15]. Inter-municipal cooperation can help to avoid duplicate structures. The consortium studied shows this very clearly in their first joint project: the joint creation of a regional open data platform. Here, the municipalities can share financial resources in particular and benefit from economies of scale the more municipalities from the region participate.

All of the interviewed Smart City managers showed a clear interest in sustainable urban design within the Smart City process. That these were not mere declarations of intent can be validated by the interviews with the associated climate protection managers of the cities. They know each other very well and work together in the strategy development process whenever possible.

5.4. Diffusion

It is known from innovation research that the diffusion of innovations can be seen as a process within a social system. In the first step, called the knowledge phase, different forms of knowledge (awareness, how-to, and knowledge of principles) decide whether and to what intensity the innovations diffuse. Awareness knowledge, i.e., the knowledge that the innovation exists, is the key prerequisite. If the imitators have poorly accessible how-to knowledge, they usually do not pursue the adoption of the innovation. The same applies to knowledge of principles [55]. Within this diffusion process towards a smart region, the Südwestfalen Agentur plays a decisive role as a moderator, knowledge broker, and networker.

This process is thus closely linked to the shared narratives, a shared vision, as described above. These form the basis. The 54 remaining municipalities in the region are part of the overarching vision and can identify with it (knowledge of awareness). The Südwestfalen Agentur acts as a knowledge broker by communicating the results and lessons learned of the five pioneer municipalities to the region via website, newsletter, and direct contact (how-to knowledge). The resulting network of municipalities interested in the Smart City topic is constantly growing. Within two years of the eight-year project duration, 14 municipalities have joined the common framework strategy and another six are interested in and involved in the process. With the takeover of 14 more municipalities so far, a successful process of diffusion can be assumed.

Another point worth mentioning is that structural support programs in particular have been crucial for this institutionalized governance. These have provided the impetus to establish the Südwestfalen Agentur, which then initiated and moderated the process toward a shared vision (IP 13), [19]. Through transparent communication by the Südwestfalen Agentur with the original cities, comparability of strengths and weaknesses can be helpful for follower cities to cherry-pick. After all, each city has its own dynamic development paths that are culturally and historically shaped. A broad portfolio of options for smart and sustainable urban planning would be helpful for this, as already stated by [6].

6. Conclusions

The starting point of the present work was to better understand Smart City processes, especially with regard to their orientation (technology, people, and/or sustainability). This revealed a controlled knowledge-management process within the region. This is controlled by an agency that, through its neutral role in the existing network of (municipal) responsibilities, uses communication channels established over the years to disseminate the lessons learned and thus diffuse the innovative Smart City into the region. Therefore, an adequate structure for Smart Cities might vary from case to case; however, within a region of small and medium-size cities with limited resources, establishing a specialized regional agency (like the Südwestfalen Agentur) as a knowledge broker and communication hub has proven very successful. Combined with at least one staff position close to the mayor in each city to be in charge of diffusion into their own administration, such a model can lead to highly efficient processes and strong commitment.

Table 2 gives an overview of the most important success factors in the region studied as well as the lessons learned. These could certainly be transferred to other cities and regions to help in process design towards smart sustainability. The fact that there are examples of such good cooperation could encourage cities that are still working alone to do so.

Table 2. Success factors and lessons learned.

Funding structures and the acquisition capabilities of the municipalities
Cooperation in the strategy phase to activate the citizenry and the administration
Communication of the strategy and its benefits to increase the level of information of the citizenry and the administration. This creates trust [56] (p. 76)
Policy coherence in order to avoid discrepancies in existing strategies and to create responsibilities
Providing a framework to manage Smart City projects and the diffusion of Smart Cities
Initiation of inter-communal learning processes and communication for the diffusion of what has been learned
Regular exchange within and between cities to avoid duplication, learn from each other, and benefit from economies of scale in joint projects
Recognizing the value of knowledge and sharing it so that diffusion succeeds

Source: own presentation.

Of course, the cities studied are still in the beginning of their processes towards becoming Smart Sustainable Cities. Whether and how successful this will bring them to sustainable urban development will be seen accordingly and should be investigated after the funding to determine the transformative potential of the Smart City here. In addition, sustainable development is multidimensional and complex and cannot be measured by only one metric. The first step, however, is always goal setting, which focuses on this very direction, and a strategy for implementing these goals. The study so far has not only highlighted the successful collaboration of the last two years, but also shows the success of years of learned collaboration (2008–present) when purposefully managed. Here, the relevance of narratives and their communicative potential [41,57] is also evident. Through the broad participation process to identify the potentials and goals for the region, an overarching goal has emerged under which the consortium to create the framework strategy could find itself (IP 1, IP 2, IP 5, IP 6, IP 11). In addition, the quick connection of the 14 participating municipalities so far confirms this. Every investigation has its blind spots. This is also the case here. Although the innovation biography method was able to identify the dynamic processes and thus successful drivers and barriers, this was only possible in one case region. Further studies on successful cooperation and the identity within the regions would be interesting.

The holistic approach described for all cities is partly due to the funding agency's requirement to be guided by the Smart City Charta 2020, which is committed to the very definition of enhancing quality of life and thus shapes the Smart Sustainable City. Thus, it cannot be evaluated completely independently in this framework. Accordingly, the strategies are all similar, which in turn is due to the duration and financial scope of a funding period. Thus, there is hardly any room for truly individual solutions, which, however, could also be effective but have not found their way in here. Here, further comparative studies of cities not in the same funding program could certainly be informative. Similar studies exist against the background of transition research, e.g., [58].

During the interviews, it quickly became clear that there is an incredible amount of knowledge in the individual people, processes, and cooperation. All of the knowledge in the cities should be collected and processed. This would certainly save many cities from redundant replications. Intermunicipal cooperation and targeted knowledge management, as is currently happening in the model region of Südwestfalen, is certainly an important step in this direction. In conclusion to the project, an investigation of the co-adaptive processes, especially of the non-supported municipalities in the region, could offer interesting insights with regard to diffusion research and inter-municipal cooperation. In addition, an in-depth study regarding conflicting urban strategies and their effects would certainly be helpful. In this case, the Smart City strategy has often become the overarching strategy and has combined the goals of climate protection strategies and integrated urban

development concepts, but how, for example, a mobility concept relates to this was not part of the investigation.

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