9. Contract management and network management in public-private eHealth partnerships

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INTRODUCTION

The healthcare sector is a complex and turbulent environment in which multiple stakeholders are interconnected and demands for new services can quickly emerge. Digital transformation through technological innovation can give healthcare stakeholders the tools to answer these new demands and solve complicated problems that have no obvious solutions (Mergel et al., 2019). Through digital transformation, healthcare information can be exchanged more quickly and more accurately, medical procedures can be made more efficient and less risk-prone, patients can be assisted better in their recovery process, and elderly people can be supported to make their lives more comfortable. As Callens et al. mention in Chapter 8, in the last decade, several of these eHealth technologies have emerged, going from electronic health records, which allow the exchange of patient information between governments and healthcare providers (Kane, 2015; Lehne et al., 2019), to mobile health apps, devices, and robotics, which assist people in their daily activities (Loveys et al., 2019; Pennisi et al., 2016; Steinhubl et al., 2015).

However, digital transformation in the healthcare sector is difficult for individual organizations because of its interconnectedness and complex nature. In a recent literature review on digital transformation in the healthcare sector, Kraus et al. (2021) argue that the contemporary healthcare sector actually consists of healthcare ecosystems, in which various stakeholders together exploit digital technologies to increase the quality of healthcare services. For instance, public hospitals depend on digital patient information from government institutions, pharmacies, general practitioners, nursing homes, home care organizations, etc. Furthermore, digital transformation in the healthcare sector often requires specific technological and organizational knowledge from experts such as information and communication technology (ICT) experts and

business consultants. Moreover, as eHealth innovation creates new services for users, these users are usually at the centre of the innovation process.

This complicated network of stakeholders requires innovators to look beyond the boundaries of their own organizations or institutions and collaborate with the network stakeholders to innovate their services. This type of innovation, that is, collaborative innovation (Sørensen and Torfing, 2011), has the potential to increase the innovativeness of the created technologies for three reasons. First, collaborative innovation increases creative idea generation, as multiple actors from different backgrounds join the innovation process (Torfing, 2019). Hence, new knowledge pools are accessed, out of which creative synergies and enhanced problem-solving capabilities can arise. Second, by collaborating with the network stakeholders, the quality of the evaluation and selection of ideas is improved, as all relevant actors are part of the innovation process, and the diversity of the involved actors decreases the likelihood of groupthink (Hale and Woronkowicz, 2021). Third, collaboration facilitates the implementation of innovation as broader support is achieved by connecting the relevant stakeholders, and the involved actors can share their capabilities to implement the innovation (Torfing et al., 2020).

This chapter addresses how partnerships between public and private stakeholders are managed to create technological innovation. We work further on the results of the explorative analyses of Chapter 8, in which it became clear that specific conditions of contract management and network management were important to produce innovation in the studied eHealth partnership. We see this reflected in the literature on projects, public-private partnerships, and governance, in which there is a lot of attention on the question of how to manage such partnerships (Warsen et al., 2019; Callens et al., 2022). These streams of literature often have quite different perspectives about the best way to manage these partnerships.

In general, two large management traditions can be identified. The first can be found in the more economic-oriented literature. This tradition emphasizes that these projects are dominated by contracts which should deal with the possible opportunistic behaviour of actors (Jensen and Meckling, 1976). Contracts, roughly speaking, then provide the means (sanction and performance indicators for monitoring) to keep the project in line, that is, to secure on time and on budget delivery (Savas, 2000). Thus, contract management aims at monitoring performance and using the contract as a possible 'stick' in case performance criteria are not met. Innovation must be achieved by clear performance criteria related to the desired innovation and innovation standards.

The other tradition emphasizes that although these projects are dominated by contracts, they are also collaborative processes in networks of actors around projects. Such projects are often characterized by their complex dynamics. Nothing happens entirely according to plan, so there is a constant need to

adjust the content of the project and invest in the collaborative process that is taking place to achieve good and certainly innovative results (Agranoff and McGuire, 2003; Huxham and Vangen, 2005; Steijn et al., 2011; Emerson and Nabatchi, 2015). This tradition thus tells us that in these projects it is impossible to foresee all unexpected events and developments and coordinate the behaviour of the partners. In this reasoning, managing the daily interactions and relations between partners in the network, called network management, is essential for achieving good outcomes. In this tradition, collaboration, exchange of information, and sharing of knowledge and skills are essential for innovation (Torfing, 2019).

So far, we have seen some empirical evidence mainly done on (large) environmental or infrastructural projects (e.g., Warsen et al., 2019, Callens et al., 2022) that show that public-private partnerships (PPPs) benefit from both contract-oriented managerial incentives combined with more governance-oriented strategies. However, there are few studies that look at other fields.

In this chapter, we take a closer look at the case study data from Chapter 8, in which 19 different eHealth projects in five different countries were studied. Using this dataset, we explore which of the two mentioned management traditions deliver the most promising management practices for innovation partnerships and argue that we actually need both of these traditions to create highly innovative services in those partnerships. To do so, we first provide a theoretical framework that captures the two traditions and shows how the management practices related to those traditions can be combined to produce collaborative innovation. Next, we perform a fuzzy-set qualitative comparative analysis (fsQCA) on the 19 eHealth partnerships to determine the relationship between this combination of management practices and innovation. We conclude this chapter by discussing these results and by providing management recommendations for practitioners.

THEORETICAL PERSPECTIVES: INFLUENCING INNOVATION THROUGH CONTRACT MANAGEMENT AND NETWORK MANAGEMENT

The two management traditions mentioned in the introduction each have their theoretical backgrounds. However, before we introduce these two traditions and their respective practices, we need to properly introduce what we mean by innovation, as the concept is often vaguely defined (Torfing, 2019).

Innovation

In the literature, a wide range of criteria is mentioned for evaluating public-private collaborations, of which performance and innovation are the most common. Performance is usually measured by evaluation criteria, such as whether the project stays within the budget (Mantel, 2005), the degree to which cost overruns are made (Flyvberg et al., 2003), and the balance between benefits and costs (Mantel, 2005). Innovation of the outcomes is a bit more difficult to measure than performance in terms of costs and budget. In general, innovation is characterized by two features. First, an innovation is considered as an 'idea, practice, or object that is perceived as new by an individual or other unit of adoption' (Rogers, 2003, p.12). The perceived newness of an innovation is therefore an essential component of the concept. Second, new ideas can only be regarded as innovations if they are adopted in a real-life context (Anderson et al., 2004; Walker, 2007). This aspect of innovation distinguishes it from related concepts such as creativity and invention (Anderson et al., 2014).

Furthermore, innovation can both refer to the product itself (product innovation) or to the process in which the product is realized and used (Nooteboom, 2002; Torfing, 2019). The eHealth collaborations we studied in this chapter include both product innovations such as telehealth and mobile health tools, robotics, wearables, etc., and process innovations such as new ways to exchange patient information, data centralization tools, central communication, monitoring system, etc.

Contract Management: The Importance of Innovation Output Criteria

Public-private collaborations are often perceived as instruments of public procurement, as a public procurer collaborates with a private contractor to procure a product or service (Grimsey and Lewis, 2007). This view on public-private collaboration is particularly common in literature on PPPs. In this literature, innovation is achieved through a demand-sided rationale, in which a procurer demands innovation from a contractor through contractual means (Callens et al., 2022). Such a 'procurement for innovation' relies heavily on contract conditions to manage the collaboration and to control the output of the collaboration (Edquist et al., 2015).

Strict contract management is an essential aspect of procurement for innovation because it secures both 'compliance' of the (private) contract party that realizes the service and specifies the indicators for the desired innovation. In this reasoning, strongly embraced in transaction economics (Jensen and Mecklin, 1976; Williamson, 1996; Brown et al., 2016), principal-agent literature, and (more classical) project management literature (Mantel, 2005), the content of projects and services are fixed by clear indicators and specification

of the product. Success in implementation depends on this specification and the performance indicators which derive from it.

It is important in this way of looking at public-private collaborations that they are seen as relations between a principal (usually the public actor that initiates and commissions the project/service) and an agent (the private consortium that realizes the product/service). This relation is characterized first of all by opportunistic behaviour and necessary (incomplete) information collection (Akintoye et al., 2008; Savas, 2000). The principal must know how the agent performs but, for making that judgement, the principal needs information about the agent's behaviour to monitor the agent and its performance. The agent, however, has a better-informed position about her own actions and overall performance and will try to hide that information. After all, keeping that information for itself as much as possible provides the agent with a better position and more possibilities to underperform.

So, monitoring is crucial because the implicit assumption is that the process will be dominated by the opportunistic behaviour of the implementing party (Williamson, 1996). That party will try to put less work into the project than agreed to, or otherwise try to maximize profit at the cost of the contractor (Jensen and Mecklin, 1976). This means clear specifications of the innovation upfront is important and help to guide the project in its process (Mantel, 2005). Thus, strict contract management for the purpose of procurement for innovation is mainly setting good and measurable innovation indicators and monitoring them.

Uyarra et al. (2014) synthesize these contract management practices, of which two of the most often used are 'output specifications' and 'contractual incentives'. *Output specifications* are detailed specifications in a tender or contract regarding the features of the delivered innovation. Such output specifications are preferred to detailed project designs which might hinder contractors to propose innovative solutions (Geroski, 1990). *Contractual incentives* to innovate refer to the criteria the procurer uses to stimulate the contractors to work towards a desirable, innovative solution (Georghiou et al., 2014). Indeed, even when output specifications regarding the innovation are stipulated in a contract, the contractor might still not be incentivized to innovate and reuse already existing solutions (Uyarra et al., 2014). Contractual incentives to innovate emphasize that ithe nnovative behaviour of the contractor (e.g., through exploring and pooling new knowledge, experimentation, and testing) is required.

Network Management: Connecting and Exploring in Complex Processes

Against the transaction economic perspectives elaborated above, one could position a quite different perspective on public-private collaboration which

comes from the extensive literature on collaborative and network governance of the last decades (Kickert et al., 1997; Huxham and Vangen, 2005; Ansell and Gash, 2008; Emerson and Nabatchi, 2015; Klijn and Koppenjan, 2016). In this perspective, the complexity of these partnerships is emphasized. It shares the idea with the economic perspective that actors have different interests and conflicts will emerge during the project. However, it also stresses both the interdependency between the actors and the fact that interactions between partners are dynamic and characterized by a lot of unforeseen events and developments. This literature argues that these complexities cannot be regulated by a contract because contracts are by nature incomplete and cannot foresee future events and developments. The different strategic actions of the partners alone, but also external events that happen will certainly affect the partnership (Huxham and Vangen, 2005; Ansell and Gash, 2008). Thus, active management, usually called network management, is needed to achieve good results in partnerships (Steijn et al., 2011; Callens et al., 2022).

Collaborative and network governance literature stresses that it is highly unlikely that contracts and monitoring are sufficient to deal with uncertainty and changing events (Huxham and Vangen, 2005). When innovative solutions are needed, this argument becomes even more important. Technological innovations are the output of innovation processes which combine an idea generation phase with a phase of idea implementation (Damanpour and Schneider, 2008). In both phases of the innovation process, a lot of information exchange and coordination between the partners is needed. Ideas and perspectives of the involved actors need to be explored when developing novel ideas, and partners and their resources need to be sufficiently connected to select, test, and implement these innovative ideas (Callens et al., 2022).

The literature mentions a wide variety of network management strategies to guide and structure interaction processes, so an exhaustive list is difficult to provide (Gage and Mandell, 1990; Agranoff and McGuire, 2003). Table 9.1 provides a summary (of the types of strategies that have been identified, providing examples of each of the categories (Klijn et al., 2010). In the following, we shortly discuss the various types of network management strategies.

In networks, many actors with various organizational backgrounds are active and need to be *connected*. Network managers thus act as in-between actors as they try to establish connections among various actors and other project activities in the network (Van Meerkerk and Edelenbos, 2014). The network management literature emphasizes that the network manager first needs to identify the actors required for an initiative and actually create a situation in which they become interested in investing their resources (on activation, see Scharpf, 1978; Klijn and Koppenjan, 2016). The interactions in the collaborative process itself also have to be managed. This can be done

Table 9.1 Overview of network management strategies

Types of strategies	Process agreements	Exploring content	Arranging	Connecting
Main strategies mentioned in the literature	Rules for entrance into or exit from the process, conflict regulating rules, rules that specify the interests of actors or veto possibilities, rules that inform actors about the availability of information about decision-making moments, etc.	Searching for goal congruency, creating variation in solutions, influencing (and explicating) perceptions, managing and collecting information and research, creating variation through creative competition	Creating new ad hoc organizational arrangements (boards, project organizations, etc.)	Selective (de) activation of actors, resource mobilizing, initiating new series of interactions, coalition building, mediation, appointment of process managers, removing obstacles to cooperation, creating incentives for cooperation

Source: Adapted from Klijn et al. (2010).

by appointing a process manager or broker, who invests time and energy in connecting the actions and strategies of actors to other involved actors.

When the collaborative process has started, strategies for *exploring content* are important to clarify the goals and perceptions of actors (Fischer, 2003) but also to build (packages) of goals and creative solutions that: (a) keep the actors interested in the process, and (b) are able to build coalitions of support among involved actors (McGuire and Agranoff, 2011; Koppenjan and Klijn, 2016). It is important how knowledge and information are used, and especially how the discussion about creative solutions that match actors' interests is managed. Network managers thus have an information processing role, as they constantly select, transmit, and interpret relevant information originating in the organization's environment (Huxham and Vangen, 2005; Van Meerkerk and Edelenbos, 2014).

In addition, the collaborative process must also be *arranged* and guided by organizational arrangements and process rules. The managerial strategy-arranging means setting (temporary) structures for consultation, interaction, and deliberation, like project organization, communication lines, etc. (Rogers and Whetten, 1982). The transaction costs of these arrangements must be kept as low as possible (Williamson, 1996), but at the same time, the arrangements have to be acceptable to the actors involved (Klijn and Koppenjan, 2016). Various arranging forms have been described and the most well known is the distinction between shared governance, lead organization-network administrative organization (Provan and Kenis, 2008).

Another important strategy mentioned in the literature is *process agreements* that draft temporary sets of rules for interaction that structure the interactions and protect each actor's core values (Klijn and Koppenjan, 2016). The rules can be seen as ground rules for behaviour and interaction in the network that the actors in the network have (explicitly) agreed on.

From empirical research, we know that connecting and exploring network strategies seem to be the most important (Klijn et al., 2010). So, in the research, we especially looked at these two types of strategies.

Combining Contract Management and Network Management in Public-Private Collaborations

Recent research into PPPs indicates a combined effect of conditions related to contract management and network management on the performance (Warsen et al., 2019) and innovation (Callens et al., 2022) of these partnerships. Callens et al. (2022) show that in PPPs, the intrinsically unpredictable innovation process benefits from network management conditions such as exploring and connecting strategies, but contract management conditions have the potential to reinforce these network management conditions by providing room in the contract to deliberate, explore, and experiment. For instance, instead of working with a detailed project design, the contract might allow more freedom to incorporate emerging insights on how to proceed with the project. This then reinforces the impact of network management on the innovation process.

Something similar might occur in public-private collaborations. The public-private collaborations that are studied in this chapter differ from PPPs as they have a less formal contract/tender stage, are often short-term collaborations, are established in very complex service environments such as the healthcare sector, are primarily focused on producing innovative services, and are highly dependent on experiences of specialized users. Hence, these partnerships have a lot in common with public-private innovation partnerships (Di Meglio, 2013; Brogaard, 2021). However, the core mechanism of the combined effect of contract management and network management should not solely be related to PPPs. Other collaborations also try to control risk and uncertainty by establishing formal or informal agreements when the project starts, which define the expectations of the partners and the boundaries of the project, and by applying network management strategies to control complexities throughout the lifespan of the project. Hence, we propose the following hypothesis:

H1: eHealth partnerships which combine conditions of contract management, such as output specifications and contractual incentives, and conditions of

network management, such as exploring and connecting strategies, generate highly innovative eHealth services.

CASES AND METHODOLOGIES

Case Selection

The European Union emphasizes the importance of digital solutions in the health sector and pushes its member states to adopt new eHealth technologies (European Commission, 2018). However, knowledge about collaborative innovation in these eHealth technologies is still limited (Wass and Vimarlund, 2016). For this reason, we selected eHealth partnerships in this study. A total of 19 eHealth partnerships from five different European countries (Belgium, the Netherlands, Denmark, Spain, and Estonia) were selected. The same case sample was used for Chapter 8, to which we refer for an elaboration on the case selection criteria. A detailed overview of the selected cases can be found in the Appendix (Table 9A.1), or on the TROPICO[1] case study repository (https://tropico-project.eu/case-studies/).

Fuzzy-Set Qualitative Comparative Analysis

The case data is analyzed through fuzzy-set qualitative comparative analysis (fsQCA), which is a case-sensitive method that uses Boolean logic to infer patterns between certain conditions and an outcome (Ragin, 2008). We used this methodology because it allows us to examine the combined effect of conditions on a certain outcome (here 'innovativeness'). The method also enables a qualitative comparative analysis between more cases than is feasible with in-depth qualitative analyses (i.e., medium N-sized samples), which is required if we want to gain insights on public-private eHealth partnerships in Europe. The downside of this method is that it uses its own terminology (e.g., 'conditions' and 'outcome' instead of respectively 'independent variables' and 'dependent variable') and is sometimes quite technical. For the purpose of this chapter, we only explain the features of fsQCA that are necessary to understand the results. A more detailed introduction to the methodology can be found in the handbook of Schneider and Wagemann (2012).

Through fsQCA, researchers can uncover if conditions (thus in our case output specifications, contractual incentives, exploring strategies, and connecting strategies) are necessary or sufficient for a particular outcome (in our case innovativeness). A condition is *necessary* when the outcome is always present when the condition is present. A (combination of) condition(s) is *sufficient* when it consistently leads to the outcome. By determining the overlap between

sets of conditions and the set of the outcome, one can uncover the necessity and sufficiency of the conditions for this outcome.[2] The fsQCA analyses (i.e., analysis of necessity and analysis of sufficiency) subsequently calculate how much the sets overlap with the set of the outcome, which shows how strong the relationship between the (combination of) condition(s) and the outcome is. For this, two measures are determined, that is, *consistency*, which calculates the degree of overlap between the sets, and *coverage*, which determines the number of cases that are covered by this overlap.

Data Collection

Data was collected through a collaborative endeavour in the five selected countries. Each research team gathered data for their country, which culminated in a dataset of more than 130 observations. More specifically, 132 semi-structured interviews were conducted with project coordinators, public actors (e.g., governments, public hospitals, etc.), private actors (e.g., firms, non-profits, consultants, etc.), and service users (e.g., physicians, patients, medical professionals, etc.). Prior to the interviews, survey data was collected from 124 of these respondents through an online questionnaire. The use of multiple data collection instruments (and types of respondents) reduces the likelihood of common method/source bias but also has direct advantages for the calibration procedure and analysis of the result. On the one hand, the survey data allowed a standardized data gathering, which enabled a systematic and consistent calibration of the data. On the other hand, the interview data enriched the calibration procedure with in-depth qualitative data and made it possible to search for causal mechanisms of the discovered fsQCA patterns.

However, the use of multiple data sources also made the calibration procedure more challenging, as proper data triangulation is necessary. To remain highly consistent in our calibration, we chose to collect the interview data in a standardized manner. Each research team filled out an extensive questionnaire in which they added all the necessary data from the interviews per condition/item. To capture the remaining contextual information that was neglected due to the standardized approach, each research team also wrote a concise summary for each case. As such, all the necessary data could be collected in a semi-standardized manner and centralized for the purpose of calibration.

Measurement of the Outcome and Conditions

Innovation is defined in this chapter as 'an idea, practice or object that is perceived as new by an individual or other unit of adoption' (Rogers, 2003, p. 12). The concept is therefore composed of two elements. On the one hand, the perceived newness of innovation is an important element to distinguish

something innovative from something that is not innovative (de Vries et al., 2015). On the other hand, innovation is, in contrast to related concepts such as creativity and invention, something that is implemented in a real-life environment (Walker, 2007; Anderson et al., 2014). For this reason, we measured both the degree of novelty and the level of adoption, using a bipolar, seven-point scale. The specific items are illustrated in the Apppendix (Table 9A.3). Some of these items were asked in the survey, while others were asked during the interviews. Factor analysis showed that all the items loaded on the same factor, which urged us to calculate the mean value of these items for each respondent.

The conditions were measured in similar ways. The contractual conditions 'output specifications' and 'contractual incentives' were measured on a seven-point scale (1 – Not at all; 7 – Completely), respectively, with the questions: 'The written agreement described in a detailed way the features of the innovation that had to be developed' and 'The stipulations in the written agreement or procurement criteria provided strong stimuli for developing something innovative'. The network management conditions 'exploring' and 'connecting' were measured through validated items of Klijn et al. (2010), measured through a bipolar, seven-point scale. An example of the used items for 'exploring' is 'There has been a lot of attention for involving external organizations who could bring in new ideas', and an example for 'connecting' is 'In case of deadlocks and problems in the project, it was tried as much as possible to align opposing interests'. The entire constructs for these conditions are shown in the Appendix (Table 9.A.4).

As mentioned earlier, each case is assigned to sets for the conditions and a set for the outcome. High set membership means that the case has high levels of a specific condition or outcome. To ensure a coherent calibration, the calibration procedure was centralized to one research team. The calibrated dataset is shown in the Appendix (Table 9A.2). A detailed overview of the calibration steps for each condition/outcome is highlighted in the Appendix (Table 9A.8).

Results

We made use of the fsQCA software package version 3.1b to perform the analysis (Ragin, 2017). The results are reported using standards of practice (Schneider and Wagemann, 2012). First, the analysis of necessary conditions is discussed, after which the analysis of sufficient conditions is addressed. As we are particularly interested in the combined effect of contractual conditions and network management conditions, the analysis of necessary conditions is only shortly discussed. Before we do this, however, it is useful to first examine the distribution of the cases in the set of the outcome. Figure 9.1 shows the distributions of the cases in the set of 'high innovativeness' of the generated eHealth technologies. As is visible from the figure, there is a relatively even

distribution between the countries, the types of healthcare systems, and the type of innovation. Regarding the latter, seven of the highly innovative eHealth services were aimed at innovating the information flows between patients, professionals, and government (e.g., integrated data sharing platforms, central communication, and monitoring systems), while five were aimed at innovating the end product/service itself (e.g., technologies based on motion sensors, mobile apps, smart cameras, and robotics).

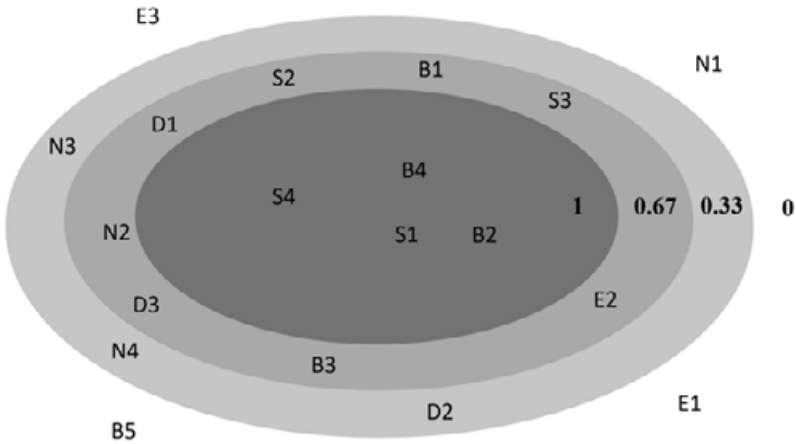

Figure 9.1 *Distribution of cases in the set of the outcome 'highly innovative eHealth services'*

We first performed the analysis of necessary conditions, both for the presence and absence (~) of the conditions. In fsQCA, a condition is regarded as 'necessary' if the condition is always present when the outcome is present A consistency threshold of 0.90 is advised when assessing the necessity of conditions (Schneider and Wagemann, 2012). As is clear from Table 9.2, none of the conditions reaches a consistency value of 0.90, and, thus, none of the conditions can be considered to be necessary for the creation of highly innovative services. Similar results arise for the absence of the outcome (Appendix, Table 9A.4).

Second, the analysis of sufficiency is performed. The first step in this analysis is the construction of a truth table, which lists all the logically possible combinations of conditions (Ragin, 2008). The truth table is shown in the Appendix (Table 9A.6). The first three rows of the truth table were retained for further analysis.[3] The second step in the analysis of sufficiency relates to the calculation of the final results.[4] Table 9.3 reports the results of this analysis. The results show that partnerships that employ output specifications and

Table 9.2 Analysis of necessary conditions

Presence of highly innovative services		
Conditions	**Consistency**	**Coverage**
Output specifications	0.664669	0.769053
~Output specifications	0.499999	0.484526
Contractual incentives	0.665667	0.645692
~Contractual incentives	0.499001	0.576701
Exploring	0.866266	0.721529
~Exploring	0.496007	0.713056
Connecting	0.731536	0.628106
~Connecting	0.531935	0.727149

Table 9.3 Results for the presence of highly innovative services

	Consistency	**Raw coverage**	**Unique coverage**	**Cases in path**
Output specifications * Exploring * ~Connecting	1	0.364271	0.033932	S3, S4
Output specifications * Contractual incentives * Exploring	0.941593	0.530937	0.200598	B4, S3, B1, B2
Solution consistency	**0.944908**			
Solution coverage	0.564869			

exploring strategies but do not use connecting strategies (~) generate highly innovative eHealth services. In addition, the results also indicate that partnerships that use output specifications, contractual incentives, and exploring strategies also generate highly innovative eHealth services. With a very high solution consistency of *0.94*, the empirical data shows that these combinations of conditions consistently lead to the outcome.[5]

Note that these results relate to the intermediate solution (QCA has three types of solutions, that is, the parsimonious solution, the complex solution, and the intermediate solution (Schneider and Wagemann, 2012), which considers the directional expectations that relate to our theoretical assumption in H1.

According to Schneider and Wagemann (2012), potential causal relations between the conditions and the outcome should always be interpreted using qualitative case information. The case information of the two covered cases in the first combination of conditions shows that the presence of a contract was important to align the differences in objectives and perspectives, but that stimulating the exploration of each other's ideas and knowledge was also indispensable. Indeed, the contract did not stimulate the emergence of collaborative

synergies, which could be used to create new, innovative ideas, which was the reason for the presence of the exploring strategy. As the contract, and more specifically, the output specifications, had a large impact on the alignment of objectives and perspectives, the connecting strategy was not needed in these partnerships.

We see something similar in the second combination of conditions, in which the connecting strategy could be present or absent in the covered cases, and which means that there is no clear relationship between this condition and the outcome (at least not in this configuration of conditions). In these cases, we also see a strong presence of contract management, as not only output specifications but also contractual innovation incentives are present in these cases. In all the covered cases, contract management provided the framework of participation, which made an explicate use of connecting strategies not always necessary. However, contract conditions could not incentivize the partners enough to produce innovation during the innovation process; they needed exploring strategies during the innovation process to come up with innovative ideas.

DISCUSSION

Our findings indicate that our hypothesis, that is, that combinations of contract management, like output specifications and contractual incentives, and network management, such as exploring and connecting strategies generate highly innovative eHealth services, is only partially confirmed. Indeed, although we find that both conditions related to network management and conditions related to contract management are combined, different combinations of these conditions are present. Particularly the combination of output specifications and exploring stand out in our results, as this combination is present in both solution paths (Table 9.3). These findings are partly a confirmation of earlier research findings, both in PPP and in governance research, but also deviate from those, in the sense that particular combinations of conditions seem to exist in these innovation-oriented partnerships. Below, we reflect on related literature and provide some final conclusions.

Findings Related to Earlier Research

That we need a combination of more ‘soft’ managerial conditions combined with ‘harder’ (contractual) conditions to get good outcomes in PPPs was already known. For instance, Warsen et al. (2019) and Callens et al. (2022) showed this using a larger number of cases and QCA, both for performance and innovation. The importance of network management strategies has been shown in survey research (Klijn et al., 2010; Cristofoli et al., 2019). In that sense, our findings contribute to the ongoing empirical data we have received

over the last decade about the performance and innovation of PPPs. The data consistently shows that the original idea of PPPs at the start, to achieve good performance, get the contract right, and monitor and punish (Savas, 2000; Hodge and Greve, 2010) is not the correct answer. This is related to the complexity of public-private collaborations. Public and private partners engage in relations that last for a longer period, and the ongoing interactions in the project also contain unexpected events that cannot be met and be foreseen by contract rules. The output specifications can never be enough to achieve good performance or innovation since they are unable to cover unforeseen events, difficulties emerging in the project, and new ideas that come up during the project. Given this character of public-private collaborations, it is logical that we find solution paths that both contain managerial activities and contract characteristics. This insight is very important because it shows that these collaborations have to be managed despite their contractual arrangements, and thus they need nurturing and effort to function.

In previous research, connecting as a management strategy is found to be important (Klijn et al., 2010; Warsen et al., 2019; Callens et al., 2022), while in this research it was not. This may very well be related to the specificities of the innovation process in the studied eHealth partnerships. Innovation thrives in turbulent and creative environments, in which connecting strategies might lead to premature closure of the idea-generation phase, which is detrimental to innovation (Basadur et al., 2012; Sousa et al., 2014). The exploring strategy, however, will stimulate idea divergence, which triggers idea generation and innovation (Puccio and Cabra, 2012; Burch et al., 2019). However, it may also be that there is another explanation for our finding. In comparison to previous research on PPPs, in which the connecting strategy also seems to be required to generate innovation (Callens et al., 2022), the studied eHealth partnerships had a shorter lifespan, were smaller and more focused on specific eHealth services, and emphasized experimentation, trial-and-error, and creative ideation. Especially the smaller size of these partnerships compared to those earlier studied may explain the lack of importance of the connecting strategy. After all, intensive connecting strategies are not necessary in smaller partnerships where contacts are usually more frequent and fewer actors need to be connected anyhow.

FINAL CONCLUSIONS

Our research seems to indicate that other conditions are more important for innovation than for performance, and other conditions are more important in public-private eHealth partnerships than in, for instance, infrastructural PPPs, which is the research topic of the majority of the available public-private collaboration research. Other Dutch research, for instance, showed that larger

PPP projects usually have more innovation but perform less well than smaller projects (Koppenjan et al., 2022), and that network management is less effective for innovation than for performance (Klijn et al., 2023). Future research might look beyond the well-known assumptions of both economic theory and governance theory and explore other conditions than contract characteristics and management to fully unravel the puzzle of innovations. One can think of conditions that have to do with the characteristics of the partners (are they similar or different), characteristics of the innovation process (i.e., idea generation versus idea implementation), or characteristics that are connected to the nature of the innovation (e.g., technological sophistication of ICT-enabled service innovations). Such research might further unravel the core dynamics of cross-sectoral collaboration for innovation.

NOTES

1. The TROPICO project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 726840. For more information: https://cordis.europa.eu/project/id/726840.
2. Using the case data, cases are assigned to the sets of conditions and the outcome. During the calibration procedure, these set memberships are determined. Four types of set membership are used in this chapter, that is, '0' for full non-membership, '1' for full membership, '0.33' for partial non-membership, and '0.67' for partial membership. For instance, a case in which the empirical data shows that a certain condition is absent receives a membership score of 0. This calibration is performed for each condition and for the outcome (thus a case that shows no innovation is scored with 0).
3. We only retained the three first rows for the subsequent step in the analysis because of several reasons (see also Schneider and Wagemann, 2012). First, a raw consistency value of at least 0.80 is advised to select truth table rows, which excludes rows 6–11. Second, a substantial drop in consistency is observed between row 3 and row 4, which indicates that the consistency threshold is reached. Third, a contradictory case (i.e., a case that is present in the set of the solution path, but not in the set of the outcome) is present in row 4, which indicates that the empirical information is not entirely solid. Fourth, the PRI consistency (Proportional Reduction in Inconsistency), which is a measure of the degree to which the row not only leads to the presence of the outcome but also to the absence of the outcome, drops substantially in row 4 (Mendel and Ragin, 2011). Fifth, the product of the raw consistency and the PRI consistency for row 4 (0.50) is much lower than for rows 1–3 (respectively 1; 1; 0.77) (Mendel and Ragin, 2011), which indicates that only rows 1–3 consistently lead to the presence of the outcome.
4. The calculation of the final results is performed through the logical minimization of the truth table rows and the execution of the Standard Analysis, which estimates, based on the three remaining truth table rows, which combination(s) of conditions is/are sufficient for the outcome (Schneider and Wagemann, 2012).

5. There are also no contradictory cases in these combinations of conditions (i.e., cases that are covered by the combination of conditions but do not exhibit the outcome), and there is no model ambiguity (i.e., multiple tied prime implicants).

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APPENDIX

Table 9A.1 Selected cases

Cases	Collaborative eHealth innovation
Belgium	National portal website which provides information for all the citizens, created through a collaboration between government agencies, ministerial cabinets, hospital networks, regional governments, private health suppliers, and insurance organizations, and user organizations
Mixed Napoleonic – Etatist Social Health Ins.	Patient information sharing tool for GPs and home care organizations, created through a collaboration between private nursing organizations and federation, ministerial cabinets, national government agencies, hospital networks, individual GPs, and several private health organizations
	A way of creating, validating, and disseminating official evidence-based guidelines for healthcare providers, created through a collaboration between universities, private health organizations, national and regional government agencies, red cross organizations, knowledge organizations, ICT suppliers, and individual health professionals
	Several technologies in a nursing home (wearables, smart cameras, etc.), created through a collaboration between a public nursing home (local government), private construction companies and contractors, consultant companies, nurses, and patients
	Platform which brings people with health/social care demands together with volunteers, created through municipalities, communal network, private hospitals, private ICT companies, consultant companies, citizens, and health professionals
The Netherlands	ICT platform which facilitates the exchange of health information between partners and patients, created through the collaboration between a municipality, public hospital, and several private health organizations
Continental adm. Regime	Digital platform designed to foster neighbourhood collaborations between clients and consultants, created through the collaboration between a municipality, private healthcare provider, neighbourhood teams, citizens
Etatist Social Health Ins.	Tracking technologies in a nursing home, created through the collaboration between a semi-private association, software developer, and patient organization
	'Smart diaper' for elderly people, created through the collaboration between a semi-private association, ICT company, consultant company

Cases	Collaborative eHealth innovation
Spain	Electronic prescription system, patient appointment system, robot for automatic storage and dispensing, created through the collaboration between several public hospitals, private ICT companies, several patient organizations, university
Napoleonic – National Health Service	Home health ICT tools for chronic patients, created through the collaboration between a public hospital/health service, regional government, ICT companies, consultancy companies, several other private companies, universities, health professionals and patients
	Web application for computerized cognitive behaviour therapy (CCBT), created through the collaboration between public hospitals and healthcare services, public research institute, private technology centre, several health professionals (e.g., psychiatrist, psychologists, physicians, etc.)
	AI used to diagnose uncooperative patients, created through the collaboration between public hospitals, ICT and telecom companies, physicians
Estonia	Centralized patient registration system, created through a collaboration between the ministry, government agencies and public authorities, ICT companies, private healthcare providers, physician associations, hospital associations, individual physicians
Eastern European – Etatist Social Health Ins.	Integration of application processes for rehabilitation, disabilities, aids, created through a collaboration between ministries, public health insurance authority, government agencies, physician association, interest groups
	Voice command app to guide healthcare providers, created through a collaboration between a ministry, public health insurance authority, colleges, network of healthcare providers, ICT companies, several healthcare organizations
Denmark	E-learning programme regarding dysphagia, created through a collaboration between a regional government, municipalities, public hospitals, ICT company, representatives of health professionals
Nordic – National Health Service	Smartphone app for patient reported outcomes, created through a collaboration between a public hospital, ICT company, health professionals
	Smartphone app that helps convey the results of bone scans to patients with osteoporosis, created through a collaboration between a public hospital, university, ICT and health service companies, patient associations, health professionals

Table 9A.2 Calibrated dataset

Case	Output specifications	Contractual incentives	Exploring	Connecting	Perceived innovativeness
N3	1	0.67	0.33	0.67	0.33
B5	0	1	0.67	0.33	0
E1	0.67	0.33	0.67	1	0
E3	0	0.33	0.67	0.67	0
D1	0.33	1	0.67	1	0.67
B3	0.33	0.33	0.67	0.33	0.67
N4	0	0	0.67	1	0.33
N2	0	0	0.33	0.33	0.67
S3	0.67	0.67	0.67	0.33	0.67
B1	1	1	0.67	1	0.67
B2	1	1	0.67	0.67	0.67
D3	0.33	0.33	0.67	0.33	0.67
S2	0.33	0.67	1	0.67	0.67
E2	0	0	0.67	0.67	0.67
D2	0	0	0.33	1	0.33
S1	1	1	0.33	0.67	1
S4	1	0.33	0.67	0.33	1
B4	1	1	1	0.67	1
N1	0	0.67	0.67	0	0

Table 9A.3 Operationalization of innovativeness

Newness	Adoption
No/A lot of innovative ideas are developed in this project	The frequency of use will typically be very low/high
The innovativeness of the developed innovation is very low/high	The effect on a user's life will be very small/ extensive
The innovative character of the project is lower than/exceeds my initial expectations	Only a selective subgroup of users/All users that would benefit from this innovation can use it
The users could do exactly the same thing with other tools/would be unable to do those things without this innovation	The innovative ideas that are developed in the project are not feasible at all/very feasible
It is very easy/difficult (or impossible) to find tools that have the same functionalities as this innovation (at the moment of implementation)	The innovation does not deal with the problems at hand at all/really deals with the problems at hand

Table 9A.4 Operationalization of network management

Survey items	Interview items
Exploring strategy	
There has been a lot of attention for involving external organizations who could bring in new ideas	Did actors in the project try to reveal as much as possible different perspectives and integrate them into the decision-making? YES/NO + examples
When gathering information and knowledge in this project, there was a lot of emphasis on determining the joint information needs	Did actors in the project stimulate the exploration/ acquisition of new information/knowledge or the inclusion of new actors with such information or knowledge? YES/NO + examples
It has been attempted to include as much as possible different opinions and perspectives in the decision-making	
Connecting strategy	
In case of deadlocks and problems in the project, it was tried as much as possible to align opposing interest	Was it tried in the project to align/reconcile opposing views or opinions? YES/NO + examples
Besides the coordinator(s), all the other actors were involved actively in taking decisions	Confronted with conflicts or deadlocks, was it attempted to enhance the interactions between opposing actors or to weaken the interactions between opposing actors. Enhance/Weaken + examples
In this project there has been a lot of attention for the relationships between the involved individuals and organizations	

Table 9A.5 Analysis of necessary conditions – absence of highly innovative services

Absence of highly innovative services		
Conditions	**Consistency**	**Coverage**
Output specifications	0.406460	0.421478
~Output specifications	0.777285	0.675048
Contractual incentives	0.591315	0.514037
~Contractual incentives	0.592429	0.613610
Exploring	0.777285	0.580216
~Exploring	0.626950	0.807747
Connecting	0.777285	0.598115
~Connecting	0.516705	0.633015

Table 9A.6 Truth table

	Output specifications	Contractual incentives	Exploring	Connecting	Innovation[a]	#cases	Raw consist.	PRI consist.
1	1	0	1	0	**1**	1	**1**	**1**
2	1	1	1	0	**1**	1	**1**	**1**
3	1	1	1	1	**1**	3	**0.933735**	**0.858974**
4	1	1	0	1	0	2	0.831658	0.598802
5	0	0	1	0	0	2	0.801205	0.507463
6	0	0	0	0	0	1	0.750943	0.34
7	1	0	1	1	0	1	0.74717	0.33
8	0	1	1	1	0	2	0.701807	0.407186
9	0	0	0	1	0	1	0.697885	0
10	0	0	1	1	0	3	0.689815	0.202381
11	0	1	1	0	0	2	0.441472	0

Note: [a] The 1 in the columns indicates that rows 1 through 3 consistently lead to the outcome.

Table 9A.7 Parsimonious solution for the presence of highly innovative services

	Consistency	**Raw coverage**	**Unique coverage**	**Cases in path**
Output specifications * Exploring * ~Connecting	1	0.364271	0.033932	S3, S4
Output specifications * Contractual incentives * Exploring	0.941593	0.530937	0.200598	B4, S3, B1, B2
Solution consistency	**0.944908**			
Solution coverage	0.564869			

Table 9A.8 Calibration of outcome/conditions

Innovation of services Output specifications Contractual incentives	**Exploring**	**Connecting**
Survey data leading	***STEP 1: Survey data***	
All answers of the respondents above the cross-over point → 1 More than half of the answers above the cross-over point → 0.67 More than half of the answers below or on the cross-over point → 0.33 More than half of the answers below the cross-over point → 0 Equal amount above and below/on the cross-over point → Larger distance to the cross-over point of answer resp. above and below/on cross-over point is indicative for assigning case score above or below cross-over point (i.e., 0/0.33 or 0.67) + qualitative interpretation to assign 0 or 0.33	All answers of the respondents above the cross-over point → 1 More than half of the answers above the cross-over point → 0.67 More than half of the answers below or on the cross-over point → 0.33 More than half of the answers below the cross-over point → 0 Equal amount above and below/on the cross-over point → Larger distance to the cross-over point of answer resp. above and below/on cross-over point is indicative for assigning case score above or below cross-over point (i.e., 0/0.33 or 0.67) + qualitative interpretation to assign 0 or 0.33	
General qualitative check of the assigned scores using the interview data		
	STEP 2: Interview data	
	Number of examples of the network management strategy from the interviews	
	0 or 1 examples → 0 2 or 3 examples → 0.33 4 or 5 examples → 0.67 6 or more examples → 1	
	STEP 3: Qualitative interpretation	
	Using qualitative case information extracted from the interviews, a third score is assigned by the researcher	

Innovation of services	Output specifications	Contractual incentives	Exploring	Connecting
			STEP 4: Final score	
			Calculate mean of survey and interview score If not exactly 0;0.33;0.67;1, round towards the qualitative interpretation If qualitative interpretation is lower than cross-over point and mean is higher, case score will always be lower than cross-over point (e.g., mean = 0.67, no rounding necessary, but qualitative interpretation is 0, case score becomes 0.33). Idem when qualitative interpretation is higher than cross-over point and mean is lower	