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https://www.emerald.com/insight/1476-9018.htm

Received 29 March 2024
Revised 11 June 2024
Accepted 13 June 2024

Exploring the role of an initiator in a population health management initiative: insights from action research

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Abstract

Purpose – The purpose of this paper is to present the learnings of a broker organization that started a new Population Health Management initiative in two regions in the Netherlands. The research focusses on the role of the broker organization itself in supporting stakeholders in the region to adopt a new implementation strategy designed by the broker organisation itself. The basis of this model was to organize, finance and monitor differently to improve the overall health of the population.

Design/methodology/approach – An action research approach was chosen to support the endeavours of the broker organization and to acquire practical knowledge on the role of a third-party in PHM implementation. Qualitative data were collected from documentary analysis, focus groups, logbooks and observational data from team meetings.

Findings – The main result is that the role of the broker organization to implement PHM was subject to change during the more than two years of the research. Several themes emerged that influenced these role changes, both internal and external, showing the complexity of providing PHM implementation support as a third-party to regional stakeholders.

Practical implications – We hypothesize that the role of a third-party changes depending on the maturity of the regional collaboration. The complexity of the transition in healthcare calls for constant adaptations, and thus learning and reflection, from all involved. Action research is a strong tool for this.

Originality/value – This paper is one of the first to report on the role of a third-party in PHM implementation. The action research methodology offered the right amount of flexibility to adhere to the complexity of the context and provided rich insights.

Keywords Population health management, Healthcare transition, Embedded researcher, Collaboration, Learning, Implementation

Paper type Research paper

Introduction

As many other developed countries, the Netherlands is facing a number of growing pressures on their healthcare system. As a result of changing demographics, the health workforce is shrinking and also due to the technical advances the health expenditures are increasing (Vonk *et al.*, 2020). Therefore, change is necessary to ensure healthcare

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The authors thank all team members of the broker organization for their contribution to the project, giving honest insight in the organization and culture of the team.

Conflict of interest statement: The authors have no conflict of interest to declare.

Journal of Integrated Care
Vol. 32 No. 5, 2024
pp. 86-98
Emerald Publishing Limited
1476-9018
DOI 10.1108/JICA-03-2024-0014

remains both financially sustainable and universally accessible while upholding high standards of quality of care. A key element in this change is the focus on health, which includes the social determinants of health (Magnan, 2017). Population Health Management (PHM) is an approach that can be used to make this transition in healthcare (Alton, 2023; Berwick *et al.*, 2008). In this paper, we defined PHM according to the World Health Organisation's continuous cycle with five steps: (1) Population definition and identification (2) Health assessment and population segmentation (3) Risk stratification and impactability modelling (4) Tailored service delivery (5) Evaluation and improvement (WHO, 2023). However, no blueprint or accepted pathway to implement a PHM approach exists (Suter *et al.*, 2009; Steenkamer *et al.*, 2020b). Therefore, a Dutch group of national stakeholders developed a strategy that set up themselves as a third-party to implement this PHM approach in two Dutch regions from 2017 to 2023. The main purpose of the paper is to share the reflection on the role of this third-party in the development of a PHM initiative.

Rationale and context

The initial group of stakeholders founded a new organizational set up to start the transition in Dutch healthcare. This third-party organization started in 2018 as a small team with a mix of people with a scientific, financial and business background in healthcare. The organization received funding from a Dutch philanthropic foundation to develop and roll-out a new implementation strategy. The rationale for a new organization was that someone should break the status-quo and initiate change using existing international knowledge and experience in reforming healthcare. This "broker organization" was based on the concept of a knowledge broker supporting the regions during the implementation of a new PHM approach. As a knowledge broker, the broker organization intended to act as independently as possible. Their main goal was to support regional stakeholders in a defined region to achieve the necessary change in healthcare. To do so, their main assets were knowledge of the Dutch system, knowledge of international lessons learned based on practice and research and their own newly developed implementation strategy based on PHM. They pitched this strategy to several regional stakeholder groups interested in piloting a PHM initiative. In this phase, they expected high willingness and readiness from stakeholders to start implementing changes in their regional healthcare systems (Minderhout *et al.*, 2023). Working with a region with willingness to implement this strategy and readiness as demonstrated through an already established regional decision making organ was considered a necessary prerequisite. As this may speed up the necessary decisions to be made in the change process. In their role of knowledge provider, the broker organization explicitly intended to stay out of the regional decision-making process and focused on providing knowledge and expertise of PHM, change management and the implementation strategy.

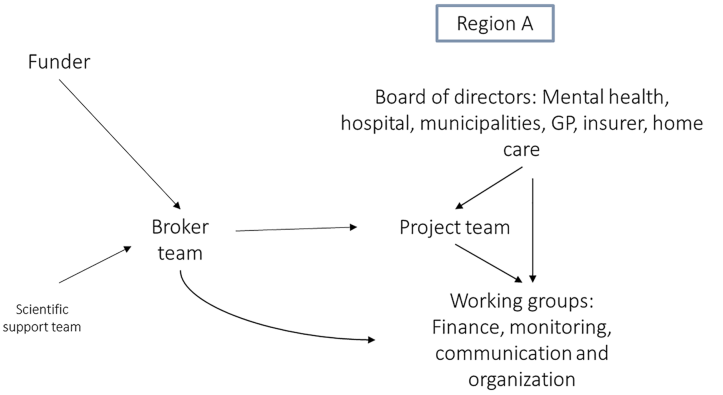
The Dutch healthcare system is considered an etatist social health insurance system, a mixture of state regulation, societal financing and private provision (Böhm *et al.*, 2013). This mix leads to a very siloed health system in which several types of organizations have different accountabilities in providing care, reimbursing care and control the quality of care (Kroneman *et al.*, 2016). In this complex field, the implementation strategy of the broker organization is based on the principles of PHM and inspired by various international examples, such as Gesundes Kinzigtal and Greater Manchester (Steenkamer *et al.*, 2020a). The main elements of this strategy were to (1) Organize differently as regional accountable health organization (2) Finance differently through alternative payment models stimulating health and (3) Monitor differently to assess the progress on health individually and at population level. The main assumption was that the regional stakeholders would take up

joint accountability for the health of the population and that these three elements were necessary to build the right interventions for the specific needs of the population.

Based on the initial pitch presentations by the broker organisation, two Dutch regions agreed to pilot the PHM strategy and were subsequently supported by the broker organization. Both regions cover a relatively green and rural area where around 300,000 people live. The broker organization and the regional stakeholders put substantial effort into installing a regional board where stakeholders such as the hospital, municipalities, mental health care organizations, GP representatives and the largest health insurer would strategize and formulate the new regional ambition and goals to achieve sustainable change. As shown in Figure 1, the broker organization, through its externally funded broker team, would mainly interact with this regional board of directors and the local program manager in the project team, but had no mandate or other resources to force decisions in the region. The results are based on the experiences in both regions, as it focusses on the learnings of the third-party. Despite some differences in progress, most discussions were similar for both regions.

Theoretical background

In literature, not much is known on the support role of a third-party to a regional network (McShane and Kirkham, 2020). Often, the perspective of the stakeholders in the regional network is used to describe concepts such as collaborative governance, interorganizational multilevel networks and an integrator. In a highly cited article, Provan and Kenis opt for three basic models of network governance with their own structural characteristics; shared governance, lead organization (LO) and the network administrative organization (NAO) (Provan and Kenis, 2007). Continued on these modes in their review on interorganizational multilevel healthcare networks (van der Weert *et al.*, 2022). They discuss that the most effective form of governance depends on the type of network. A large, heterogenous network, such as in the regional setting in this research, might benefit from a brokered form of governance with a LO. This mode can build trust and facilitates collaboration, especially during stages in which individual organizations have not yet decided how they would like to be organized. However, having a strong central governance body in the network is considered a success factor for healthcare networks which suggest the benefit of installing a NAO (Hoe *et al.*, 2019). In both network types a third-party can take on different roles, choosing to become part of the network or act as an outsider.



Source(s): Own work

Figure 1.
The relations of the broker organisation and the regional stakeholders of both regions

A practical example of a third-party that made the choice to be part of the network can be found in the case of the Gesundes Kinzigtal initiative. In this initiative Optimedis became part of the NAO and therefore shares the accountability for the regional objectives with the stakeholders in the region (Pimperl *et al.*, 2016). Gesundes Kinzigtal showed that by sharing the accountability they were able to set up shared governance and accountability, a shared savings contract and a data-infrastructure. Part of the success was the availability of budget and competences within the shared governance (Hildebrandt *et al.*, 2010). Other forms of collaborative governance are seen in the accountable care organizations (ACO). A recent review demonstrated that ACOs have contributed to the cost control of the Affordable Care Act in the US by transferring responsibility for the cost of service and quality of care from the insurance company to the provider. Several studies on the type of network structure of ACOs demonstrate that the quality of the relationships in the network are more important than the formal structure (Comfort *et al.*, 2018; D'Aunno *et al.*, 2018; Ouayogodé *et al.*, 2017). Linking these examples to the literature suggests that the most effective form of governance of the stakeholders in the region depends on the type of network and the quality of existing relationships.

This research aimed to provide practical support and acquire actionable knowledge and understanding about the role of this type of broker organization (knowledge and expertise partner and implementor) as a third-party to accelerate transition in healthcare by using a PHM approach in a regional setting. In the Dutch case described in this article, the broker was new to the region, and new relationships had to be formed. Part of the development process was the use of learning cycles in the broker organization. The objective of this paper is to formulate lessons learned for new initiatives based on our experiences with the implementation of this knowledge broker strategy.

Methods

Methodology

To fit the complexity of the context and the broker's dual aim of enabling change and acquiring new knowledge simultaneously, we executed an action research methodology (AR). As the focus was on the role of the broker organization, we chose to follow the tradition of AR in organizational development (OD) (Coghlan and Brydon-Miller, 2014; Coghlan and Shani, 2014). Within this methodology a dynamic process of learning cycles with problem identification, planning, action and evaluation was adopted (O'brien, 2001; Waterman *et al.*, 2001). The length of these learning cycles relied on the timing of the actions during the research and are thus reported in the findings.

Research team

The broker organization consisted of a team of approximately ten thought leaders that were given the freedom by their employer (financial services, health insurer, academia, healthcare consultancy) to contribute. The leading action researcher was embedded in the broker organization and participated as a team member in the acceleration efforts. The leading action researcher joined the team at the start of the research with an explicit focus to structure and report the learnings of the team. The team of the broker organization acted as co-researchers. The composition of the team changed during the research period. Upon starting, each participant was informed about the purpose and logistics of this research. During the research period, balancing confidentiality and conflicting interests were continuously integrated in research progress meetings.

Research team lead. The leading action researcher was advised by an expert on implementation and methodology who was an outsider to the team. Other key team members

for the research process were the program director of the broker organization and the scientific PHM expert. Together with the leading action researcher, they safeguarded both organizational and research aims, ensured scientific quality and discussed dilemmas that occurred. The program director secured the practical outset of the research in the overall management of the small organization.

Ethics approval. The non-WMO Review Committee of the Leiden University Medical Centre declared that they had no objection to the research and approved the research for exemption from review by the Medical Ethics Review Committee according to Dutch standards (23-3035).

Data collection

This paper does not go into detail about the AR process. Rather it focusses on the outcomes of the research. Therefore, this section describes in retrospect what forms of data collection were adopted focusing on the role of the broker organization during the AR process. As inherent in the adaptive nature of AR, the methods of inquiry were fitted to the stages of the organization's processes. Ultimately, there were four phases between January 2021 and March 2023.

Phase 1 – Q1/Q2 2021: The leading action researcher adopted an observational role to become familiar with the team and their role. Data was collected from documentary analysis and observational data from team meetings.

Phase 2 – Q3/Q4 2021: The leading action researcher and scientific PHM expert engaged with the team actively and pitched several ideas to further the structure of planning, action and evaluation. It was collectively decided to install monthly knowledge sessions with external expert input. Data was collected from documentary analysis, observational data from team meetings and these knowledge sessions.

Phase 3 – Q1/Q2 2022: From January onwards, the monthly knowledge sessions were enriched with a reflection moment, guided by monthly logbooks from all team members. Data was collected from these logbooks, documentary analysis, observational data from team meetings and these knowledge and reflection sessions.

Phase 4 – Q3/Q4 2022 and Q1 2023: While the monthly logbooks were continued, the knowledge and reflection sessions were only held quarterly. Data was collected from the logbooks, documentary analysis, observational data from team meetings and the knowledge and reflection sessions.

To finish the period of inquiry, a reflection session was held on the research process and the learnings of the broker team. Data was collected from observational data from this meeting. In Table 1, all collected data entries are displayed.

Research tool	Timeline	Number of data entries
Observational data	Phase 1–4	230 A5 pages
Documents	Phase 1–4	60+ documents
Knowledge and reflection meetings	Phase 2–4	9 session presentations
Team member logbooks	Phase 3–4	60 logbook entries +8 short summaries
Reflection meeting	End	2 h of recording + minutes

Source(s): Own work

Table 1.
Data entries collected per research tool

Analysis

The analysis was divided into two parts. Part 1 of the analysis followed the dynamic process of the organization to build continuously on the learning cycles. After each learning cycle, short summaries of learnings were made and discussed with the team. To ensure reliability, these short summaries included member checks and the research teams' ongoing reflection. Part 2 of the analysis took place at the end of the data collection period. Based on data on the adopted role of the broker organization per learning cycle, inductive thematic analysis was performed to identify recurring themes that influenced role changes (Braun and Clarke, 2006).

Results

The role of the broker organization

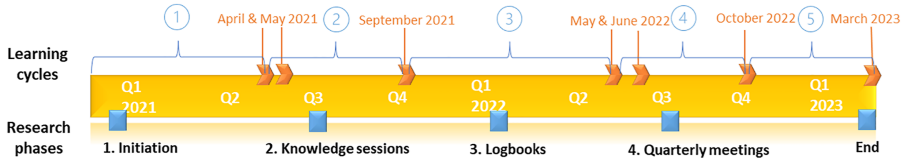
In total, five learning cycles were completed on the role of the broker organization. These learning cycles did not align with the rhythm of the data collection process but were marked by key meeting sessions with the whole broker team in which the strategy of the broker organization was discussed. In Figure 2, the five learning cycles are set in time next to these key meeting sessions and the research phases.

Learning cycle 1

The broker organization started off in the role of an accelerator for healthcare transition. They aimed to do so by guiding regions to set up and implement the broker's theoretical model. The mission of the broker organization describes their aim and role from January 2021 onwards quite nicely:

> Mission 2021: As [broker], we guide across the Netherlands those regions where there is enough urgency, collaboration, courage and leadership to design, set up and implement the [theoretical model]. Our strength is deep knowledge of the Dutch healthcare system, systems and challenges; independent and unique expertise in the [theoretical model] (interventions, financing, governance, culture change and monitoring); supported by broad and deep data insights. (translated by author)

The first actions were to position team members of the broker organization in the region. One member was involved with the regional board, while others were placed in working groups. One of the guiding principles from the theoretical model is that the region should take the initiative and accountability for the overall progress. Therefore, all broker team-members encouraged the stakeholders in the region from the start to do so. Unfortunately, the start of the collaboration took place during a COVID-19 lockdown. Therefore, all meetings were online, which impacted the forming of new relationships and building trust among team-members and with regional stakeholders. Until the end of June 2021, the Dutch government strongly advised everyone to work from home. While the formal positioning of the team members was successful, team members reported back that their informal position in the regional network was difficult due to low network maturity and the lack of mandate of the broker organization. During this first learning cycle, the broker organization realized that



Source(s): Own work

Figure 2. Timeline of the different research phases, learning cycles and key meeting sessions

the implementation of the model in the region would ask more than explaining the theory of the model, as the regional stakeholders kept asking how to proceed, struggling with the complexity of the implementation. The main stumbling block seemed the deployment of resources and collaboration between organizations in the region, forming a joint strategy.

Learning cycle 2

Based on the first experiences, a renewed discussion with the broker team took place in April 2021. The main topic was the role of the broker organization including the funding structure of the collaboration with the region. They explored several possibilities to provide more support based on the brokers' competencies and capacities in the team. A few different funding structures, such as risk sharing in a so-called Health Impact Bond, were reviewed to create accountability for the broker in the region. Ultimately, the broker organization decided to concentrate on equipping the region for change in the role of a coach and not taking a financial risk themselves. The main reason for this choice was the guiding principle of the theoretical model that the region should take the accountability for the progress. Along with the lack of funding and available competencies to go into the region and illustrate themselves. In this coaching role, the broker became more aware of the complexity of relationships and working processes in the stakeholder organizations in the region. The main evaluation point was that the expectations about tasks, roles and responsibilities were not clear within the broker-team and were also diffuse for the stakeholders in the region.

Learning cycle 3

During a two-day session in September 2021, the tasks, roles and responsibilities were discussed within the broker team. During these sessions was made explicit that most team-members acted on their own accord to what they thought should be done in relation to the regional stakeholders. Again, there was discussed what would be considered a success for the broker organization and to establish what competencies and resources would be necessary for the broker organization to succeed. In this, there was no alignment within the team. What followed during this learning cycle were more team discussion, using the input from the knowledge sessions, on the role of the broker and individual contributions to create one clear vision and plan of approach. A consequence of the choice made to be an organization without direct financial responsibilities towards the regions was the ongoing precarious relationship with the stakeholders in the region. The broker organization could mainly offer knowledge and expertise but had no decision power in the region or additional financial resources available. The development of the broker organization and redefining their success led to the conclusion that national parties would be needed to back the transition in the region. Two members mainly focused on involving national level organizations about the changes and the required support in regulations. This was also added to the broker's mission of 2022.

> Mission 2022: Mission 2021 + We deploy this knowledge to help the region make the transition as well as use it to guide the system in the adaptive change necessary to facilitate the regional transition. (translated by author)

Unfortunately, also 2022 didn't start well with an unexpected COVID-19 lockdown, when most people thought and hoped the lockdown in 2021 would be the last. This lockdown forced the broker-team to work from home again, which hampered all relationships. Evaluating this learning cycle, there was no uniformity on what the role of the broker organization should look like. Due to these differences and other personal considerations, there were multiple changes of personnel in the team. Another aspect was that by coaching, the broker organization adhered to the rhythm of the region. In doing so, some elements of the

theoretical model that might have been the critical ones to succeed receded into the background as they did not come up in the data anymore. An example of such an element is the appeal for an investment loan and the instalment of an accountable organization that could be the budget holder for that loan. The greatest difficulty in postponing some elements was that it was unclear what the crucial elements of the theoretical model were as the broker organization was learning and doing at the same time.

Learning cycle 4

The changes in personnel, getting everyone aligned again, led to delay in actions all across the broker organization. This was visible in the planning phase of learning cycle four in May and June 2022 as the emphasis was primarily placed on discussing the potential options on the role of the broker organization. Balancing the role that the stakeholders in the region preferred and the capacity of the team led to a new role of program manager of the regional PHM initiative. This role was reinforced by a new national health policy, the Integrated Health Agreement (in Dutch: Integraal Zorgakkoord (IZA)). This agreement was signed by the national representatives of hospitals, GP's, mental health care and elderly care in September 2022 to keep care affordable, accessible and of high quality. The IZA provided a distraction from the transition efforts that were already ongoing. Especially the accompanying budgets were a trigger for several organizations to change their focus to what was asked to receive funding. This led to a new evaluation of the role of the broker organization in October 2022. Keeping the termination of their own subsidies in mind, the broker organization reconsidered the funding structure of the collaboration with the region again.

Learning cycle 5

The limited budget of the broker organization influenced the continuation in a different role including financial coverage for services. This changed the discussion from "what is the next step in the region – what do we need to do about it – what do we need as an organization to make that happen" to "what can we offer the market as organization – what can we offer to help the regions". This change is also reflected in the mission of 2023.

> Mission 2023: The consortium's mission, under the label [broker], for the transition from care to health, is to co-develop and disseminate national knowledge development and, additionally, to support regions in practice to realise the change in practice. (translated by author)

Learning cycle five ended with a final evaluation on the role of program manager. Also because of the need for funding and the new national policy in place, the broker-team agreed that this role was the way forward for that moment. After the data collection of this research, the broker stopped offering their support free of charge. As response to this, the stakeholders in one region decided to stop the collaboration. They were not ready yet to take accountability for the regional objectives accompanied by sufficient resources.

Role over time

The experiences of the broker organization to implement a PHM approach were a constant dilemma in positioning themselves in what role to take on. The broker organization wanted to succeed in the region to prove the value of their implementation strategy to be able to convince other Dutch regions. But they did not have the competencies to do everything themselves and they assumed that the region would take up responsibility. This led to a precarious relationship with the region as they provided the context needed to test the model, but the stakeholders in the region experienced pushback from several people in personal and organizational interest to back this up with sufficient resources.

Themes that influenced the role of the broker

From the overall analysis, six themes emerged that continuously influenced the role of the broker organization.

Budget: This theme relates to the budget of the broker organization itself and the budget that was available for the transition in the region. Both ended up being inadequate for the ambition of the transition. This also influenced the availability in time and effort of people with the necessary competencies and affected the relationships.

Competencies: This theme relates to the necessary competencies of people working on the transition of healthcare. The different roles of the broker organization required different competencies of the team, as was the case with the different positions in the stakeholder network in the region. The main challenge was to have people with the needed competencies in the team and the resources necessary to draw on these people.

Mission: This theme relates to the changing mission of the broker organization. It demonstrates the changes the organization went through and the focus that was present. It is related to relationships and competencies, mainly in the phase that the team of the broker organization was not aligned on the mission.

Network maturity: This theme relates to the network maturity of the region that is supported by the third-party. By staying out of the network, the broker's role depended on the strength of the network. They hoped to relate to the network using one voice as representatives of multiple organizations, but in reality they had to relate to all stakeholders individually.

Relationships: This theme relates to all relationships forming and changing during the time of the research. Most focus was on the relationships within the broker-team and the relationships with the stakeholders in the region. Both were influenced by the competencies of the people involved, the allocation of budgets and the changing mission of the broker organization.

External factors: The two most influential external factors were COVID-19 and the instalment of new national policies, the IZA. Both impacted the other themes and put pressure on the ongoing transition in healthcare.

Discussion

The results describe the changing role of the broker organization to accelerate transition in healthcare. The different themes that influenced this role are budget, competencies, mission, network maturity, relationships and external factors. The diversity of these themes indicates the complexity of a change process. This is stressed further by the interrelatedness of the themes, and by the extent to which they mattered in different phases of the transition. This complexity suggests that the role of a third-party should be flexible throughout such a change process. The constant struggle was the broker's vision that at all costs the stakeholders in the region should bear the accountability for the progress of the transition in the region. The limited resources and changing competencies of the broker team did not meet the expectations from the stakeholders in the region that were created during the presentation of the compelling strategy prior to implementation start. As a result, discussing and adjusting their own role over time, the broker organization sought to facilitate the transition to the best of their ability.

At first, the broker organization went in with a clear vision on their role as outsider thinking that the network maturity of the stakeholders in the region was high enough to establish a NAO themselves. The main setback for the broker organization was the realization after three months that the regional network was not as strong as they had anticipated. This was the main reason to rethink their role the first time. They deliberately chose to stay out of the network and continue as a coach, having limited influence on the formation of the network. However, acting as a LO and taking on shared accountability for

the regional objectives could have been a more effective option. In this role, the broker organization could have taken the lead in bringing the stakeholders together and have some control and accountability for the budgets. By staying out of the network, they relied upon the region's competences to learn and grow into a formal network. This way, they could only provide advice. However, in this role they were able to share and implement PHM principles in line with the changing mission.

Meanwhile, the broker organization continued to struggle with their role. One of the reasons for this was the limited resources, competencies and relationships to freely choose their role. Part of the team would have liked a more active role in the region, demonstrating how things could be done. However, the budget of the broker from the external funder was insufficient to have multiple team members working full-time on the change initiative in the region, so choices had to be made on what to prioritise. In addition, the pandemic also influenced the newly formed relationships. Working from home, only meeting online, made it harder to truly understand each other and to help each other out. This was within the broker team, but also in the relationships to the region. As the stakeholders in the region didn't speak for one, much more relationships had to be managed. All in all, we hypothesize that the role of a third-party changes over time and must adapt to the PHM implementation process, but also depends on the maturity of the regional collaboration. Both teams, the third-party and the regional stakeholder network, learn and change over time, and as such their relationships but also their knowledge and needs for support change. Prior studies have noted the importance of organizational design principles, such as team tasks, team composition and organizational support for effective and successful teamwork (Rydenfält *et al.*, 2017; West and Lyubovnikova, 2013). The third-party therefore needs to be equipped with sufficient resources and competencies to take up the necessary role and embrace the uncertainty that is related to this role.

Strengths and limitations

The flexibility inherent in AR allowed for continuous adjustments throughout the research process, enabling a responsive approach to the evolving situation. This adaptive approach additionally facilitated the identification of questions that were not initially perceived as significant, but subsequently emerged as relevant and important questions to look at, highlighting in this paper the role of the broker organization. The learning cycles provided insights on the possible role of a third-party in regional networks, supporting practice real-time and adding to literature. Involving only the team members of the broker organization in the research process has limited the possibility to reflect the views on their role and actions from outside. This research could be strengthened with a reflection on the functioning of the broker team within a matrix organization (Burton *et al.*, 2015). Where this paper specifically focused on the role of the broker organization, using AR also offered the opportunity to reflect on the broader dynamics encountered in healthcare transitions (Maniatopoulos *et al.*, 2019; Ong *et al.*, 2018; Pearson and Watson, 2018). This was especially valuable for practice as the low degree of decomposability makes this transition in healthcare difficult to break into parts and knowing about the individual components is not enough to completely understand it (Braithwaite, 2018). In this case it is impossible to determine with some certainty the exact reason for limited progress. It could be the functioning of the broker-team or the strength of the regional network for example. And while the relationship between the broker organization and the stakeholder network was highlighted in this paper, it is also possible that the implementation strategy of the broker organization caused a setback.

Implications for PHM implementation

This paper specifically illustrates the fluctuating role of a third-party in PHM implementation. The learnings of the broker organization show that getting to a certain

network maturity involves building relationships which takes time. In this low mature network, taking accountability for the health of the population may form a problem if the regional network, or the individual stakeholders, are also unconsciously incompetent on the challenge that lies ahead and the process that is needed to change (Wilson, 2005). If they do not recognize the complexity and dare to do things differently, how will they ever be able to take up the necessary accountability for a shared vision? This also suggests that regional networks who start with a PHM approach may not be aware of the guidance they need. As long as the stakeholders in the network remain unconsciously incompetent, they will not be able to identify the right questions and support needed. Then, they require support, for instance from a third-party, in the development of competencies to become consciously incompetent on the way towards the implementation of the PHM approach. The Kinzigtal example shows that a third party with a strong vision, sufficient resources and skin in the game has at least impact for a longer period and might be less vulnerable to external influences. Future research on the different roles of support for PHM implementation depending on the PHM implementation maturity of the network could add on existing knowledge. Next to this, this research demonstrates that AR is a strong tool for PHM implementation as it supports the flexibility needed. For practice, including learning and reflection in the process, for example through AR, as soon as possible might be imperative for the success of a PHM-initiative. Also, policy makers and third-parties should be aware of the aforementioned knowledge gap, also among themselves. They should therefore encourage competencies development and support sharing of knowledge and experiences of PHM implementation transparently with other initiatives. They also should provide resources to install reflection processes. As each individual tends to check their own interests first, the reflection process is required to ensure that advancements keep being made towards the shared objectives of the regional network (Bradbury and Divecha, 2020). This research demonstrates that AR is one of such reflection tools that supports this process in a structured manner and also adds to sharing experiences to a broader audience.

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