Towards a Governance Framework for Data Platform Ecosystems in the Construction Industry

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Abstract: In today's digital economy, the potential of using data platforms for secure and trusted business data exchange between distinct user groups within a data ecosystem becomes extremely significant. The construction industry is not exempted from the potential benefits of data platform ecosystems (DPEs). While for the effective orchestration of DPEs, appropriate governance is required, due to specific features of the construction industry, existing insights on the governance of DPEs may not be directly applicable to the data platforms in this industry. In this paper, we contribute to our understanding of this phenomenon by developing a governance framework for DPEs in the construction industry. To this end, we develop a governance framework by identifying governance mechanisms from the platform literature and investigating if and why these mechanisms are relevant in the construction industry by conducting a case study. The proposed framework offers an outline for the analysis of data platform governance and provides first insights about governance mechanisms that practitioners of the construction industry need to consider especially during the early stage of the DPEs development.

1 INTRODUCTION

While the construction industry contributes on average about 8–10% to the economies of countries around the world (Opoku et al., 2021), this industry encounters numerous challenges such as low productivity, poor level of data accuracy, and lack of data sharing (Ayodele & Kajimo-Shakantu, 2021; Opoku et al., 2021). Moreover, the fragmented nature of the construction industry— with many geographically dispersed actors working together toward a common goal— leads to inconsistency and delays in data exchange among actors who collaborate on construction projects (Lee et al., 2021). The complex nature of this industry and its heavy reliance on data exchange require the adoption of digital technologies and platforms (El Jazzar et al., 2020). In today's digital economy, platforms have been changing the entire landscape of business and gaining increasing importance and relevance (de Reuver et al., 2018).

The potential of using platforms for the improvement of efficiency and competitiveness as well as for better resource utilization and data-driven innovative services in the construction sector is extremely significant (Begić & Galić, 2021; Opoku et al., 2021). More specifically, data platforms have immense potential to transform data exchange and use in the construction industry just like in other industries. However, the construction industry lagged behind other industries in the uptake of platforms (Linderoth et al., 2018; Opoku et al., 2021). According to a European construction sector report, few platforms have been widely adopted in this sector yet (*Digitalisation in the construction sector*, 2021).

In general, platforms can be defined as a technological foundation upon which additional complementary products or services can be developed (de Reuver et al., 2018; Hein et al., 2019). Platforms can also act as a mediatory marketplace that facilitates the transaction between multiple groups of users (de Reuver et al., 2018). Data platforms are a subset of platforms that specialize in secure and trusted data exchange between user groups (Otto & Jarke, 2019). Similar to other types of platforms, in Data Platform Ecosystems (DPEs), legally independent actors, such as platform owners, data providers, and data users collectively create value in a complex dynamic network around platform-based infrastructures and engage in data exchange and use to leverage data-driven innovation (Lis & Otto, 2020; Otto & Jarke, 2019). An example

of DPEs is a data space which is a data ecosystem of data providers and users cooperating for data-driven innovations (Beverungen et al., 2022).

Appropriate governance arrangements that allow data exchange and facilitate interaction among ecosystem actors are key to orchestrating successful platform ecosystems (Halckenhäußer et al., 2020; Schreieck, Wiesche, et al., 2017). However, findings and understandings of platform governance cannot simply be transferred to emerging data platforms due to specific charactristics of DPEs such as data sovereignty, data privacy, and confidentiality considerations (de Reuver et al., 2022). Moreover, existing insights on the governance of platform ecosystems are dominated by examples from high-tech industries (Hein et al., 2016; Schreieck, Hakes, et al., 2017). Nevertheless, the construction industry has special characteristics (e.g., fragmented structure, project-based nature, high degree of specialization, complexity and long life span of constructed products, internet access problems due to remote sites, unpredictable nature of the project processes) that differentiate it from other industries (Pulkka et al., 2016; Regona et al., 2022). Therefore, it is highly unlikely that the generic platform governance mechanisms of other industries can be directly applied to this industry. Further research on the relevance and applicability of governance mechanisms of DPEs in the construction industry context is thus needed.

The goal of this paper is to identify the right governance mechanisms for DPEs in the specific context of the construction industry and develop a governance framework for DPEs in this context. Specifically, the paper addresses the following research question:

What Data Platform Governance Mechanisms should be incorporated into the construction industry?

We approach this question by adopting a two-step research approach. First, we identify platform governance mechanisms through a systematic literature review (SLR). Second, we investigate if and how these mechanisms are practically relevant in the construction industry by conducting a case study.

The outline of the paper is as follows. Related work is dissuaded in Section 2. Section 3 describes the research methodology. The results of the literature review and the case study that led to the proposed governance framework are presented in Section 4. Finally, Section 5 presents the discussion and conclusion.

2 RELATED WORK

Platform governance defines who makes what decisions about a platform (ecosystem) (Tiwana, 2013). Governance plays a particularly important role for platform owners to make deliberate choices about platform access, ownership, and control to orchestrate a successful platform ecosystem (Mukhopadhyay & Bouwman, 2019). While the focus of traditional views on IT governance is on within-firm or dyadic inter-organizational relationships, platform owners are confronted with the complex task of orchestrating actors (Halckenhäußer et al., 2020). In the context of platform ecosystems, governance decisions are for defining the rules to encourage desirable behaviors of actors and defining how the benefits distributed among the actors are made by the keystone actors (Kretschmer et al., 2022; Otto & Jarke, 2019).

The importance of platform governance has been emphasized by several studies (Mukhopadhyay & Bouwman, 2019; Schreieck et al., 2016; Tiwana, 2013; Tura et al., 2018). In this regard, for instance, Tura et al. (2018) emphasize that the health and longevity of a platform ecosystem depend on the effective governance of the platform. Furthermore, various studies have identified different governance mechanisms for platform ecosystems (Alves et al., 2017; Halckenhäußer et al., 2020; Mukhopadhyay & Bouwman, 2019; Schreieck et al., 2016; Tiwana, 2013; Tura et al., 2018). However, they are usually limited in scope and their resulting governance frameworks are diverse. For example, Schreieck et al. (2016) identify and classify different governance mechanisms for platform ecosystems into roles, pricing and revenue sharing, boundary resources, openness, control, and trust. While Halckenhäußer et al. (2020) categorize governance mechanisms into cooperation, resourcing, control, and market. In some other studies, the focus is solely on the data governance aspect of platform ecosystems (Lis & Otto, 2021; Nokkala et al., 2019).

Although these studies provide useful insights and relevant information about possible governance mechanisms of DPEs, no clear aggregation of these findings exists yet (Halckenhäußer et al., 2020). A more comprehensive and systematic view of the governance of platform ecosystems is thus needed. In addition, only limited information can be found about the governance of DPEs in the context of the construction industry (Alreshidi et al., 2017).

3 RESEARCH METHODOLOGY

The goal of this research is to develop a governance framework for DPEs in the construction industry. To this end, firstly, governance mechanisms and practices of platform ecosystems were identified through SLR. Secondly, the practical relevance of these governance mechanisms for the DPEs in the construction industry was evaluated in a case study.

3.1 Systematic Literature Review

To systematically identify governance practices and mechanisms of DPEs from the literature, we conducted an SRL by following the guideline of Okoli and Schabram (2010). This SLR answered the following research question:

What Mechanisms Characterize the Governance of Platform Ecosystems in the Previous Studies?

The following search query was used in our literature review: (("data platforms") OR ("digital platforms") OR ("platform ecosystem")) AND ("governance")).

We sought papers in the digital library of the Open University, as it gave us the possibility to search multiple databases, such as ScienceDirect, Springer, Emerald, and Wiley, simultaneously. Only peer-reviewed journal and conference papers in the period 2015 to 2020, written in English, with the main objective of governance mechanisms and practices in the context of platform ecosystems were included in this review. Studies in which the main subject is not on the governance of a platform ecosystem were excluded. We also excluded studies that are limited to intra-organizational settings. The literature search yielded initial hits. We then scanned subsequently the titles and abstracts of the papers and removed irrelevant papers. Then the quality of the remaining papers was assessed based on the quality criteria of (Dybå & Dingsøyr, 2008). Data extraction from the selected papers was performed by using content analysis (Elo & Kyngäs, 2008). This process includes open coding, creating categories, and abstraction. Coding was performed by identifying different aspects of governance that characterize governance mechanisms and practices in platform ecosystems and assigning relevant code. Then, coding categories were created in which the codes were arranged in categories, based on the similarities which led to the set of governance mechanisms. Then the relations between the categories were established which resulted in governance dimensions.

3.2 Case Study

After identifying platform governance mechanisms, we investigated if and why those governance mechanisms are relevant in a real-life DEP in the construction industry. Besides validation, we were also looking for explanations and reasoning for the relevancy to provide a more in-depth understanding of the research topic. To this end, the case study research approach was selected as it allows an in-depth inquiry into a phenomenon within its real-life setting (Yin, 2014). We focused our analysis on one type of business in this industry; housing construction, which is currently faced with a highly competitive environment due to various customer needs, and market pressures. As data platforms enhance accessibility and exchange of data, enable integrated construction information, and involvement of all relevant actors in the housing construction process, these platforms have gained increasing attention in housing construction projects (Li et al., 2022).

The selected case was a data platform ecosystem— and not a single organization—that focuses on secure data exchange in the development of housing. Given that in the DPEs multiple organizations (actors) are involved, their views should be considered therefore, in the selected ecosystem-wide case, we collected data from three main actors; i.e., platform owner, data provider, and data user as suggested by (Otto & Jarke, 2019). We evaluated the practical relevance of the governance mechanisms in the early phase of this DPE development (i.e., the planning phase), to allow actors to assess those mechanisms and express their opinions and reasonings without any prejudice and influence from the implementation phase.

The data were collected using semi-structured interviews, as this allows for in-depth questions and follow-up questions for further explanation. Within each involved organization, we planned to interview multiple people from different organizational positions (e.g., business/project managers, IT managers) to ensure triangulation. Participants should be knowledgeable and experienced in either data or platform governance. In addition, participants should have a relevant background in governance, and platforms as well as have higher education for better abstract reasoning. at the beginning of each interview, an introduction to the research topic and its purpose was given. It also contains questions about the participants and their general view on the subject, before they see the initial list of governance mechanisms and be biased by it. In the second part of

the interview, we validated the initial list of governance mechanisms by asking respondents if they are relevant. As we also aimed to get an in-depth understanding, the interviewees were also asked for the reasoning behind their answers by asking *why* questions. In the closing section, by asking open questions, we inquired if any further governance-related aspects have been experienced by the participants, which were not covered yet.

We conducted 8 interviews with eligible people from the three actors of the selected DPE (see Table 1) in October 2020 and each interview lasted about 1.5 hours. Due to the Covid-19 pandemic, all interviews were held online, in a video meeting, and (with permission of the interviewees) were recorded and transcribed. The transcription was shared with the interviewee for final checking and verification.

Table 1: Profile of the interviewees.

Role of the organization in the DPE	Participant Position	Work Experience	Education	Int. #
Data user	Manager digital platform	2 years	Academic	Int#1
	Director development & realization	11 years	Bachelor	Int#2
Data provider	Product manager & commercial manager	2 years	Bachelor	Int#3
	Project manager & commercial director	3 years	Bachelor	Int#4
	IT manager	12 years	Bachelor	Int#5
Platform Owner	Manager DCC	4 years	Bachelor	Int#6
	IT Director	3 years	Academic	Int#7
	Data Manager	5 years	Academic	Int#8

We used a content analysis method suggested by Elo and Kyngäs (2008) to analyze the data. The initial list of governance mechanisms identified from the literature was used as starting point for the analysis. We began the data analysis by open coding to recap each interview's key statements. After the coding process, we synthesized the outcome by removing duplicates and classifying similar governance mechanisms into one group. A difference between empirical and theoretical governance mechanisms can be a refinement of an existing element or a new element. This data analysis process led to a governance framework of a DPE.

4 RESULTS

In this section, we, first, present the results of the SLR. Then, the results of the case study are presented.

We executed our search and identified 101 papers of which nine were duplicates. We then screened the 92 papers based on our inclusion and exclusion criteria of which 15 were selected for a full-text assessment. During this assessment, we excluded another five papers. We reviewed 11 papers in detail and extracted relevant data. The data synthesis process resulted in an initial list of 15 governance mechanisms under six dimensions (see Table 2).

In the evaluation phase of this study, to provide an in-depth understanding of the relevance of governance mechanisms in the real-life DPE in the construction industry, 8 semi-structured interviews were conducted within the three organizations from the selected DPE in the housing sector. In general, the interview process went as planned. The participants were able to provide sufficient data and had an in-depth understanding of the topic.

A definition of each governance dimension and example participants' quotes for the relevance of the associated governance mechanisms are provided in the following.

Governance Structure decides the ownership and decision rights in the platform ecosystem. This can either be formal or informal, depending on the needs of the ecosystem. (Abraham et al., 2019; Katz et al., 2019; Schreieck, Wiesche, et al., 2017; Wang et al., 2017).

Three participants prefered an informal governance structure as, in their opinion, it would bring trust and speed, and ease in development. *"From our experience: informal governance is good for the start-up phase. Formal governance often holds heavy contracts, which slows adoption and innovation."* (Int#3). The other five stakeholders, however, suggested a formal governance structure; their reasons are security, the legal value of data, and avoidance of discussion. *"Always go for a formal governance, that way you avoid discussion. Stakeholders who participate will know what to expect, it will give clarity."* (Int#7). The governance structure of this DPE thus forms a continuum ranging from informal to formal.

The case study shows that the ownership status is important. "*it must be clear who is the owner of a certain element of the ecosystem*" (Int#5). "*The ownership of a platform is always crucial, but the ownership of data is important as well.*" (Int#8). However, the participants have mixed opinions regarding the centralization of the ownership of a

DPE. While the participants from the platform owner think a central approach should be taken, the other actors prefer a decentral approach. For example participant (Int#6) stated "*the ownership of the data platform should be centralized and owned by one company which is composed of tooling, data storage, and master data management.*"

Regarding decision rights, as the second mechanism of governance structure, all participants believed that all actors should, in some form, have decision rights and be able to influence decision-making for the platform, and most of them agree that the decision-making responsibility remains with the platform owner. "*It would be an advantage for the data source to have influence in the decisions on the platform, and which data is available."* (Int#4)

Accessibility and Control of the platform are linked to the formal or informal structure of the governance. The control can be formal, using the input and output control mechanisms, or informal using the self-control and clan control mechanisms. The accessibility is governed by entry rules (Goldbach et al., 2018; Katz et al., 2019; Lis & Otto, 2020; Schmeiss et al., 2019; Schreieck, Wiesche, et al., 2017; Thies et al., 2018).

All participants believed input control is a relevant mechanism in the governance of their DPE because it protects the level of quality in the ecosystem and allows verifying "what" and "who" enter the ecosystem. *"it checks if the standards are met and prevents pollution in the platform."* (Int#7)

Output control was seen as a relevant mechanism by all participants in order to verify the quality of the output and check compliance with regulations "*Output control is important to not lose track of data, to meet regulation and to secure rightful access."* (Int#6).

Four participants believed that self-control is relevant in combination with formal control mechanisms. "*Solely self-control will not be sufficient in the ecosystem.*" (Int#1). Two participants conclude that it is relevant to check the quality of data or to ask verifying questions to platform users or data providers.

Finally, six participants argued that due to competition in the ecosystem clan control is a mechanism with limited possibility, and "*safeguarding privacy is required*" (Int#6). While all eight interviewees corroborated the formal control mechanisms (i.e., input and output control), a smaller number of participants stated that informal control mechanisms (i.e., self-control and clan control) are relevant if they are along with formal control. These findings are in line with generic platform studies that suggest that formal control is in use in the early stages of platform ecosystem development, while formal control is in use during implementation (de Reuver & Bouwman, 2012; Hodapp et al., 2019).

Besides the control aspects, all participants argued that entry rules which regulate entrance to the ecosystem are a relevant and necessary mechanism for the governance of their DPE in order to protect the competitive position of data providers. "*data providers with the same products should not be able to see their competition."* (Int#2). According to Schmeiss et al. (2019) control mechanisms, like entry rules, require a clearly articulated set of values that allows competing stakeholders to collaborate. Five participants stated that the platform owner should set up these rules, with input from platform users.

Trust and Values aspect of governance means that all parties in the ecosystem should have a shared set of values and build trust in the reliability and continuance of the platform (Huber et al., 2017; Schmeiss et al., 2019; Schreieck, Wiesche, et al., 2017).

Seven participants concluded that trust is a relevant dimension for the governance of a DPE, with three interviewees pointing out it is crucial. "*No trust, no trade. Trust is the basis, and always is part of a transaction."* (Int#6). They also agreed that trust should be complemented with regulations, or that regulations even enforce trust in their DPE.

Seven interviewees argued that shared values are relevant, "*Someone's shared values will be the basis for how they collaborate. It does not have to be a written set of values, but more if a person's behavior is trustworthy.*" (Int#2). When a shared value is established among ecosystem partners, informal control can be more effective than formal controls (Mukhopadhyay & Bouwman, 2019). In contrast, one participant (Int#3) believed that "*shared values are unnecessary as rules and regulations will automatically enforce the trust.*"

Incentives govern the way value is shared in the ecosystem. This can be done by a pricing mechanism in which parties pay for access or get a fee for their data (Lis & Otto, 2020; Schmeiss et al., 2019; Schreieck, Wiesche, et al., 2017). Both monetary and non-monetary rewards were mentioned by the participants. "*Data sources should be paid for the worth of their data within the total consolidation.*" (Int#1). "*receiving relevant data is an incentive for us as it helps us better serve our clients and get insights* (Int#8).

Boundary Resources refers to technical tools (such as APIs and SDKs) and documentation . These tools are complemented with documentation and can

be standardized or personalized, depending on the needs of the collaboration. They support the platform ecosystem and internal collaborations (Foerderer et al., 2019; Huber et al., 2017; Schreieck, Wiesche, et al., 2017).

Six participants argued that boundary resources keep the ecosystem dynamic and working properly. "*It is good to get ecosystem-wide standards, agreed to by all stakeholders*" (Int#7). While only one participant argued that it depends on the value of the data ("*Platform owners should decide if the data providers are valuable enough to be facilitated for free.*" (Int#6)) the others stated that boundary resources should be freely available in the DPE. The data platform owner should facilitate the technical platform to put different data together— this includes data exchange, storage, and integrations— with any necessary APIs, and reporting capabilities (such as documentations) (Int#7).

Data Governance in the platform ecosystem refers to defining, applying, and monitoring the patterns of rules and authorities for ensuring accountability for the entire data lifecycle (creating, processing and sharing, and using) (Janssen et al., 2020). It encompasses three types of governance mechanisms. The procedural mechanisms encompass strategy, policies, contractual agreements, performance management, and compliance monitoring. The structural mechanisms encompass the roles and responsibilities, and location of decision-making authority. The relational mechanisms encompass communication, training, and coordination of decision-making. Data governance also encompasses six data decision domains: data quality, data security, data privacy, data architecture, data lifecycle, and metadata (Abraham et al., 2019; Katz et al., 2019; Lis & Otto, 2020).

As confirmed by seven participants data quality, data security, and data privacy are the most important data decision domains for the governance of the DPE. "*Security, privacy, and quality are the core of data governance, if these are not good the other aspects (e.g., data lifecycle, and metadata) do not matter.*" (Int#6).

The participants agreed that data quality should be part of the governance framework; "*To protect the level of data quality, unified quality standards could be part of the DPE entry rules.*" (Int#7). As stated by participant (Int#1) "*The platform owners should make sure that the data in the ecosystem is on a qualitative level to provide information for all the stakeholders.*" In addition, all participants believed that data providers should be responsible for their data quality,

while the platform owner is responsible for the data quality on the platform.

Seven participants argued that data security should be governed with an ecosystem-wide approach because "*in this way, all actors have a good security basis.*" (Int#4). Most of them suggested a split in responsibility: the platform owner should arrange the security of the platform and set up a minimum standard for the ecosystem, while the other actors are responsible for their own data security within these minimum standards.

In terms of data privacy, the interviews stated that "*with sensitive personal data, privacy is a big governance component*"(Int#8). The seventh participant noted that all data privacy concerns should be handled before data arrives on the platform. Furthermore, multiple privacy measures were mentioned by the interviewees. In this regard, for instance, the participant (Int#8) stated "*As a platform ecosystem you should have a data privacy officer, an application to track sensitive data, a privacy-by-design framework, and a DPIA (Data Protection Impact Assessment) framework.*

We compile the discussions with eight participants with the identified governance mechanisms from the literature to propose a governance framework for DPE in the construction sector as illustrated in table 2.

Table 2: A governance framework for DPEs in the construction industry.

Governance structure	
Ownership	Decision rights
Accessibility and control	
Input control	Informal control
Output control	Entry rules
Trust and values	
Trust building	Shared values
Incentives	
Pricing mechanisms	Non-monetary rewards
Boundary resources	
Software tools	Documentation
Data governance	
Data decision domains	Procedural mechanisms
Structural mechanisms	Relational mechanisms

5 DISCUSSION AND CONCLUSION

In this section, we first discuss the main findings of this study and then conclude with limitations and suggestions for future studies.

In the introduction section of the interviews, the participants were asked to name the governance mechanisms prior to discussing the theoretical list. They suggested six governance mechanisms: *security and privacy, data ownership, data access, API connection, open standards,* and *legal consideration for the protection of personal data*. Although most of these suggestions could easily be placed into the initial list of governance mechanisms, they provide further confirmation of the relevance of these mechanisms besides their corroboration in the second part of the interviews.

In the confirmatory part of the interviews, the initial list of governance mechanisms was used explicitly. All but one (i.e., clan-control) mechanisms were recognized at least by six interviewees as relevant mechanisms for governing their DPE.

In the closing part of the interview, we asked the participants if a subject was missing in the governance framework. While six participants think it is complete, the other two participants missed an aspect related to the human side, the culture within the ecosystem, and the soft side of governance. This is subject to further investigation in future research. In the closing part, we also asked about the usefulness of this governance framework to be used in the planning phase of the DPE development. Six interviews concluded that this governance framework is useful in the planning of a DPE, because *"The framework provides us with a list we usually do not think about explicitly. If we want a good and safe platform, this is very important." (Int#3).* The participants also noted that it will help thinking broader than the current business case. *"It gives you the opportunity to do a holistic analysis, to not only focus on the business case"* (Int#1), and *"It will help to design the data platform ecosystem in a good way, in accordance with laws and regulations"* (Int#8).

As a concluding question, we asked if the participants are going to use this governance framework in their own DPE. Four participants stated they are going to use it. Six of our eight participants were asked to receive the proposed governance framework, to help them and their partners to enhance the design and outline the governance for their DPE. This gives an indication of the usefulness of the proposed governance framework.

As the focus of most prior studies is on other types of platform ecosystems, the data governance mechanisms have not been introduced by those studies as a distinct aspect of platform governance (Hein et al., 2016; Mukhopadhyay & Bouwman, 2019), while in some other studies their focus is solely on data governance aspect of platform ecosystems (Lee et al., 2018; Lis & Otto, 2020; Nokkala et al., 2019). This paper is a first step towards closing this research gap by developing a theoretically founded and practically relevant governance framework for DPEs. To this end, by conducting SLR, we identify a set of governance mechanisms. We then provide empirical evidence on the relevance as well as the reasoning for the relevancy of almost all governance mechanisms by performing 8 interviews of a single data platform ecosystem in a housing construction sector.

The proposed governance framework for DPEs in the construction industry contains six dimensions— governance structure, accessibility and control, trust and values, incentives, boundary resources, and data governance— and their associated governance mechanisms. Compared to the existing governance frameworks of platform ecosystems, our proposed framework provides a more comprehensive and integrative view of the governance of data platform ecosystems. We contribute to the platform literature by developing a theoretically grounded and practically relevant governance framework for DPEs in the construction industry. We also add to the existing knowledge by providing empirical insights into the governance mechanisms that are relevant for the early stage of DPEs in the construction industry.

The results of this study provide first insights into governance mechanisms that practitioners in the construction industry need to consider especially during the early stage of the DPEs development (i.e., the planning process). The proposed governance framework can be used by decision-makers of DPEs in the construction industry to make more-informed governance decisions as well as to evaluate and improve the governance mechanisms of their DPEs.

Despite the contributions of this study, it is constrained by limitations. The first limitation is that while we have followed a systematic review process to identify governance mechanisms of DPEs, due to potential bias in the coverage of the literature, we do not claim that the set of identified governance mechanisms is complete or exhaustive. Future research may identify further governance mechanisms and thus can improve our proposed governance framework. For instance, the human side was mentioned by multiple participants as a missing element; this is a subject to future research for further validation. Second, we executed a single case study on the ecosystem level in a housing construction sector. Therefore, the generalizability of the results is limited to other similar DPEs in the same sector. Future studies could examine this governance framework in other contexts to improve the

generalizability of the results. Third, the case study shows different opinions about the relevance of clan control, as most of the participants see it as not relevant. But before we can decide on the relevance, and its inclusion in the framework, further research into clan control is necessary. The fourth limitation is that we evaluated the relevance of the identified governance mechanisms in the planning phase of a DPE in the selected case. The proposed governance framework can serve as a starting point for future empirical work on the governance aspect of DPEs in the construction industry as they mature. To examine how governance mechanisms might evolve over time further research should examine the proposed governance framework in the other phases of DPEs development by conducting a longitudinal study.

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