Mainstreaming climate adaptation into urban development projects in the Netherlands: private sector drivers and municipal policy instruments

Niek ten Brinke\(^a\), Joanne Vinke-de Kruijf\(^b\), Leentje Volker \(^a\) and Nora Prins\(^b\)

\(^a\)Department of Civil Engineering & Management, Faculty of Engineering Technology, University of Twente, Enschede, the Netherlands; \(^b\)APPM Management Consultants, Rotterdam, the Netherlands

**ABSTRACT**

Improving the climate resilience of urban areas critically depends on the integration of climate adaptation measures, i.e. mainstreaming, into regular construction practices. As research has largely focused on public sector adaptation, the mainstreaming of adaptation into private sector projects remains poorly understood. The aims of this study are twofold. First, we examine what drives private developers and investors to mainstream adaptation into large-scale urban development projects. Second, we explore what policy instruments municipalities can employ to stimulate private sector mainstreaming. Our theoretical lens combines insights from the literature on mainstreaming, sustainable building drivers and policy instruments. These concepts are used to guide our analysis of four urban development projects and an interview study in the Netherlands, a densely populated delta country which is rather vulnerable to the impacts of climate change. Our results show that private developers and investors seldom explicitly include adaptation measures into their development projects. An important impediment is the perceived absence of direct monetary benefits. If adaptation measures are implemented, they are often realized as a side-effect of creating a high-quality living environment or because private actors expect other professional benefits, such as corporate image enhancement or development of know-how. To stimulate private sector mainstreaming, Dutch municipalities already use a mix of policy instruments that might be a source of inspiration for other countries. Yet, especially the way in which enforcement and incentives are applied is not always effective.

**Key policy insights:**

- Despite the private sector’s growing awareness about the need for and importance of climate change adaptation in the Netherlands, adaptation is still seldom explicitly included in large-scale urban development projects.
- Municipalities should invest in policy instruments that target consumers. Communication, education and incentives can be used to raise consumer awareness and consequently demand for climate-adaptive properties.
- Municipalities should collaborate with the private sector to develop clear, uniform and feasible adaptation requirements.
- Municipalities should actively participate in urban development projects, i.e. co-developing with the private sector. This way, private sector drivers and policy instruments can strengthen each other to pave the way for future-proof and climate-resilient urban environments.

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1. Introduction

To moderate the adverse impacts of climate change, our urban systems urgently need to be adjusted to the current and future impacts of climate change (IPCC, 2022). The focus of this article is on the Netherlands, a densely populated and highly urbanized delta country where climate change related events are increasingly causing distress (Mees et al., 2018). To keep the Netherlands climate-proof and water-resilient, national, regional and local authorities jointly developed and currently implement a Delta Plan for Spatial Adaptation. This plan requires authorities, amongst other things, to conduct vulnerability assessments, to prepare implementation plans and to adapt legislation. It stresses that authorities cannot achieve climate resilience on their own and that they need to closely collaborate with a wide range of actors, including the private sector (Ministry of Infrastructure and Water Management, 2018). Collaboration with private developers and investors is particularly important as the demand for new houses is high and urgent. In 2021, the housing shortage was already estimated at around 3.5% of the total housing stock (279,000 houses). Government estimates show that by 2030, 900,000 new houses are needed to create a healthy balance between supply and demand (Ministry of the Interior and Kingdom Relations, 2022). Hence, to keep the Netherlands safe, it is important that adaptation measures, such as bioswales, green roofs or underground water storage (Tillie & van der Heijden, 2016) are integrated into urban development projects. Such integration is, however, not self-evident. Over the past decades, the role of municipalities in urban development projects changed from active participant to a regulating authority. This development, in combination with the housing crisis, has created a market where developers and investors have the upper hand (NVM, 2021). This is potentially problematic as adaptation tends to deliver societal benefits rather than direct profits for the private developers and investors (Berkhout, 2005; Goldstein et al., 2019; Tompkins & Eakin, 2012). On top of this comes that climate change adaptation in the Netherlands is very much perceived to be a water issue, which is a domain the general public expects the government to deal with (Wiering et al., 2017). This raises questions about to what extent and why private actors are motivated to integrate adaptation measures into their urban development projects as well as what municipalities can do to stimulate this.

The integration of climate change adaptation into policies, plans or projects is generally referred to as ‘mainstreaming’ (Runhaar et al., 2018). In urban development projects, mainstreaming involves the ‘on-the-ground’ implementation of adaptation measures at the local level (Klein et al., 2017), where the impacts of climate change are felt most (Rauken et al., 2015). To actually achieve climate resilience at the local level, municipalities rely heavily on private sector engagement (Eckersley et al., 2018; Klein et al., 2017; Mees et al., 2018; Rauken et al., 2015; Vogel & Henstra, 2015). Yet, adaptation research has largely focused on public sector adaptation and policy integration (Juhola, 2013; Klein et al., 2018). There are some exceptions, including studies that looked into the role of the private sector in adaptation policy development (Goldstein et al., 2019; Surminski, 2013). However, these studies do not focus on the actual implementation of adaptation measures in the built environment. The very few studies that do consider the implementation of climate adaptation measures by the private sector in the built environment, specifically Klein et al. (2018), take the perspective of the public sector engaging the private sector instead of investigating internal drivers to the private sector itself. As a result, what drives private actors to integrate adaptation measures into urban development projects remains poorly understood (Asplund & Hjerpe, 2020; Eckersley et al., 2018).

Considering the importance of mainstreaming as an implementation practice for climate adaptation, an improved understanding of private sector drivers, and how municipalities can purposefully stimulate and facilitate private sector mainstreaming, is urgently required. This article addresses this knowledge gap by answering the following questions: What drives private developers and investors to mainstream adaptation in their urban development projects? Which policy instruments do municipalities currently employ to enhance private mainstreaming, and which instruments can be used in the future? To answer these questions, we focus on relatively large-scale urban development projects in the Netherlands. Our theoretical lens combines two perspectives on mainstreaming: (1) value capture and drivers of sustainable building practices (private sector perspective); and (2) adaptation governance and policy instruments (public sector perspective). We synthesize these literature streams into a theoretical lens that distinguishes between four categories of private sector (internal) drivers and three categories of public sector policy instruments (external drivers). We use these broad categories to
conduct a thematic analysis of qualitative data that were collected through an interview study and four case studies. Based on our analysis, we consider which drivers and policy instruments play a role in practice and formulate policy recommendations.

The remainder of this article is structured as follows. Section two presents our theoretical concepts. Section three explains the research methodology. The results of our analysis are presented in section four. Section five discusses the results and formulates recommendations for policy and practice. The sixth and final section summarizes our main conclusions.

2. Theoretical concepts

This section introduces the key theoretical concepts that guide our empirical analysis. After introducing mainstreaming, we discuss possible drivers that might motivate private actors to integrate adaptation into their projects. Next, we discuss and propose categories of private sector drivers and public sector policy instruments. In the methods section, we further explain how we used these categories to analyse our empirical data.

2.1. Mainstreaming in urban development projects

While adaptation is urgently required, the actual implementation of adaptation measures in the built environment has been slow and insufficient (Ekstrom & Moser, 2014; Runhaar et al., 2012; Uittenbroek et al., 2013). The integration of climate change adaptation into existing policies and practices, i.e. mainstreaming, is widely seen as a promising way of achieving and accelerating climate resilience (European Commission, 2021; OECD, 2010). Mainstreaming by the private sector has several advantages. First, mainstreaming reduces the need for allocating dedicated resources to adaptation and raising (political) commitment (Uittenbroek et al., 2014). Second, private sector participation in adaptation is likely to foster innovation and efficiency (Klein et al., 2018; Mees, 2014). Third, mainstreaming allows for potentially more efficient and effective realisation of adaptation objectives (Runhaar et al., 2018; Uittenbroek et al., 2013; Wamsler, 2015). In highly urbanized countries, mainstreaming may actually be unavoidable. This is, for example, the case in the Netherlands where the majority of land in urban areas (50-70%) is owned by private actors (Bor & Mesters, 2018; Mees, 2014) and budget restrictions imply that urban development (increasingly) depends on private co-funding (Baarveld et al., 2018; Heurkens et al., 2020; Kuitert et al., 2019).

The lack of progress in adaptation is often, at least partly, related to a lack of adaptation action by private actors. In the literature, this is often linked to the absence of direct benefits for the private sector. As adaptation is predominantly a public good (Mees, 2014) it tends to deliver societal benefits rather than direct profits for a private investor (Berkhout, 2005; Goldstein et al., 2019; Tompkins & Eakin, 2012). The benefits of adaptation are often intangible and long-term, while its costs are immediate and short-term (Vogel & Henstra, 2015). Since there is no full return on adaptation investments, let alone profit potential, adaptation is argued to mismatch with the profit-oriented business model of private actors (Berkhout, 2005; Schneider, 2014).

2.2. Drivers for mainstreaming climate adaptation

To better understand what drives private actors to contribute to creating public value, we turn here to building and construction-oriented studies. Previous research into sustainable building practices shows that private organizations are driven by ‘perceived value capture’, i.e. the direct and indirect benefits of building sustainably that motivate these sustainability efforts (Darko et al., 2017; Falkenbach et al., 2010; Olubunmi et al., 2016). Value capture describes the ability of a firm to earn revenue in different ways, including but not limited to monetary value (Lepak et al., 2007). Since value capture lies at the basis of organisational survival, it generally constitutes the rationale for private developers and investors to engage in projects, including urban development activities (Bos-de Vos et al., 2016). This does not mean that private actors only engage in projects to capture direct benefits. Previous research into real estate development shows that developers have an interest in capturing two types of values: exchange value and professional value. Exchange value is the price for which the produced good is exchanged and generally covers the main share of organisational motivation in real estate
development. In addition, companies are driven by professional value, i.e. ‘soft’, non-monetary value, such as experience and reputation (Bos-de Vos et al., 2016). On the basis of these studies, we assert that different types of anticipated value capture are likely to play a role in explaining why private organisations integrate adaptation measures into their urban development practices.

To better understand and categorize drivers, we particularly draw from two reviews of the literature on drivers for sustainable and green building practices. Both reviews distinguish between: (a) drivers from within the sector (internal drivers); and (b) drivers that come from the outside world (external drivers). More specifically, Falkenbach et al. (2010) identify 10 drivers, which they divide into three categories: external drivers, property drivers and corporate drivers. This framework of drivers was updated and expanded by Darko et al. (2017). They extended the list of potentially relevant drivers to 64 and introduced two additional categories of drivers: project level and personal level drivers. In line with Falkenbach et al. (2010) and Darko et al. (2017), we consider four categories of private sector (internal) drivers. With regard to external drivers, we focus on municipal policy instruments only. Both types of drivers are elaborated below.

2.2.1. Private sector drivers

Private sector (internal) drivers refer to actors’ unforced and intrinsic motivation for taking action. They are based on an actor’s own perception of existing and potential benefits of a certain action (Darko et al., 2017; Olubunmi et al., 2016). Drawing from Falkenbach et al. (2010) and Darko et al. (2017) we distinguish between property, corporate, personal and project drivers (see Table 1). Property drivers relate to perceived operational benefits of adaptation during the exploitation phase of real estate projects (e.g. property value increase). Corporate drivers are based on perceived organisational benefits of adaptation (e.g. reputation), exceeding the scope of individual projects. Personal drivers are associated with personal beliefs and commitment (e.g. tradition), which may drive people to adopt sustainable construction practices (Darko et al., 2017). Lastly, project drivers concern the perceived benefits that manifest during the construction phase itself (e.g. construction cost savings). They concern a relatively short timeframe (construction phase) compared to the property level drivers (entire lifetime).

2.2.2. Policy instruments as external drivers

External drivers can take different forms, varying from green building certificates to non-government organisations creating client/consumer demand, or governmental incentives, regulations, and education efforts (Darko et al., 2017; Falkenbach et al., 2010). As we are specifically interested in mainstreaming at the local level, we limit ourselves here to the analysis of policy instruments that governments, most notably municipalities, can use to stimulate private mainstreaming (Olubunmi et al., 2016). Previous research on green building practices shows that policy instruments can be effective and influential for raising awareness and compelling actors to act sustainably (Darko et al., 2017). Along similar lines, adaptation studies suggest that public actors can and perhaps should play an important role in promoting and facilitating adaptation (Henstra, 2016; Mees et al., 2014; Molenveld et al., 2020). In doing so, governments can employ different types of policy instruments. Drawing from Mees et al. (2014) and Henstra (2016), we distinguish between three categories of policy instruments: communication & cooperation; enforcement; and incentives (see Table 2). We assert that each of these instruments or a

| Table 1. Categories of potentially relevant private sector drivers. |
|---------------|-----------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------|
| Driver        | Definition                                                                 | Examples                                      | References                                       |
| Property      | Motivation based on operational benefits during the property's life cycle that result from mainstreaming | Property value, popularity, high-quality environment | Darko et al. (2017), Falkenbach et al. (2010) |
| Corporate     | Motivation based on perceived organisational benefits and professional value capture that result from mainstreaming | Reputation, experience, competitive advantage   | Bos-de Vos et al. (2016), Darko et al. (2017), Falkenbach et al. (2010) |
| Personal      | Motivation based on personal beliefs and commitment to adaptation. | Commitment, moral imperative, tradition       | Darko et al. (2017)                              |
| Project       | Motivation based on perceived benefits during the construction phase that result from mainstreaming | Costs/time savings, risk reduction             | Darko et al. (2017)                              |
combination of these can be employed by municipalities to stimulate, promote or enforce mainstreaming by private actors.

3. Methods

3.1. Research approach and case selection

Given the exploratory character of this research, we adopt a qualitative research approach (Queirós et al., 2017) and combine inductive and deductive approaches for data analysis in a so-called thematic analysis (Preiser et al., 2021). The latter implies that the categories of drivers and policy instruments that we identified in the literature are used to identify both explicitly and implicitly stated patterns in a dataset (Preiser et al., 2021). Our research approach combines qualitative case-oriented research, an interview study and a focus group. Cases are used to understand what drives private actors to integrate adaptation measures and how these drivers are potentially influenced by contextual factors (Stake, 1995). Case-oriented research was complemented by an interview study to identify general patterns that cannot always be observed at the level of individual projects. The interviews also allowed us to explore why private actors might not want to mainstream and which policy instruments are promising with an eye on improving mainstreaming in urban development projects. Lastly, a focus group was organized to validate our findings.

3.2. Case-oriented research

For our case-oriented research, we selected four relatively large-scale urban development projects in the Netherlands where climate adaptation has been purposefully integrated. We opted for large-scale projects since this is where, considering the housing crisis in the Netherlands, a real difference can be achieved. We only included projects that were initiated by the private sector (developers or investors) for which the planning phase was completed (i.e. a decision on mainstreaming was reached). To identify relevant projects, we conducted an internet search and asked urban development consultants. While we identified a broad range of small-scale projects (e.g. projects involving space for water storage or green roofs for houses in one or two streets or on one shopping mall), we identified only four large-scale development projects (see Table 3) that met our selection criteria. In the first three cases, mainstreaming occurred as a side-effect of developers and investors striving for a green, healthy living environment as agreed with the municipalities. In the fourth case, the local authorities required private developers and investors to integrate adaptation by putting somewhat more specific conditions in place. For each of the selected projects, we interviewed at least one public and one private actor. In total, we interviewed 10 people: four municipal stakeholders and six project developers. During the interviews, we specifically asked about the extent to which adaptation was integrated and why, about bottlenecks and success factors for integrating adaptation, and about the role (current and potential) that policy instruments played.

3.3. Interview study

We conducted a stakeholder analysis and applied snowball sampling to select the 15 respondents for our interview study. As we aimed to gain a broad perspective on drivers and policy instruments, we conducted interviews with different types of public actors, private actors and general experts. In the category of private

| Policy Instrument          | Definition                                                                 | Examples                | References               |
|---------------------------|---------------------------------------------------------------------------|-------------------------|--------------------------|
| Communication & Cooperation | Using education and communication to inform adaptation behaviour and cooperating with private actors to enhance mainstreaming | Education, information, partnerships | Henstra (2016)           |
| Enforcement               | Using authoritative power to enforce mainstreaming by means of law and regulations | Laws, policies, regulations | Henstra (2016), Mees et al. (2013) |
| Incentives                | Using financial incentives for creating additional benefits that induce mainstreaming | Subsidies, financial support | Henstra (2016), Mees et al. (2013) |
actors, we purposefully differentiated between project developers and investors. The reason for this is that each is likely to have a different business model. Private developers develop real estate and sell it after completion, whereas property investors acquire real estate (often after completion) as an object for long-term investment. We interviewed three persons who occupy strategic positions as private developers and/or investors and nine persons who represent diverse organisations with a role in urban development and adaptation. The latter group consists of three consultants, two insurance experts, two representatives of financial institutions, one professional from the regional water authority, and one urban development designer. We asked all interviewees questions about their involvement in adaptation to climate change, potential benefits of mainstreaming and relevant policy instruments. We supplemented our dataset with two interviews published in online magazines that also answered these questions. Moreover, we organized a group interview that was attended by eight professionals working at a consultancy firm that is very active in climate adaptation and urban development in the Netherlands. During the group interview, we raised similar questions as we did during the individual interviews. We also collected publicly available project documentation, advisory reports and other policy documents on climate adaptation in urban development.

3.4. Data processing, analysis and validation

All data were collected in Dutch and interviews were conducted through Microsoft Teams. Interviews were semi-structured, using pre-defined interview scripts while also allowing us to deviate and probe for additional information when needed. Interview recordings were automatically transcribed using computer software (complemented by manual review). In the Results section, we refer to interviews using parentheses, where the first two letters refer to case-study (CS) or interview study (IS) and the number behind CS refers to the case number in Table 3. The last two letters refer to either private (PR) or public (PU) respondents. A full list of interviewees, including interview code, is provided in the Supplementary Material.

To conduct a thematic analysis of all interview transcripts and documents, we used Atlas.ti software for qualitative data analysis. We used the categories of private sector drivers (Table 1) and policy instruments (Table 2) to analyse the data. For example, sections mentioning ‘reputation’ or ‘image’ were coded as corporate driver. After analysing all transcripts and documents, we synthesized findings per category. This involved, for example, that all pieces of text labelled as corporate driver were extracted from the transcripts. These passages were then examined and combined in case of overlap or similarities.

| Table 3. Selected large-scale urban development projects. |
|----------------------------------------------------------|
| **Case name** (**project name, location**) | **Project scope** | **Developing actors** |
| 1. Industrial area transformation (Merwedekanaalzone Deelgebied 5, Utrecht) | Transformation of a former industrial area into a lively, green, and sustainable city district consisting of 6,000 residential units, creative spaces, and hospitality. Adaptation plays a key role in the jointly developed vision. | Area transformation by municipality and seven private developers and investors. Vision for redevelopment established in close collaboration between public and private actors. |
| 2. Office area transformation (Schalkwijk Midden, Haarlem) | Transformation of a former office area into residential area consisting of 2,000 residential units and 1,400 job spaces with a ‘city between the trees’ identity. Rules require that each development integrates measures for reducing flooding and heat stress. | Area transformation by three private developers and developing investors. Rules for redevelopment were established by municipality in close consultation with these private actors. |
| 3. Inner-city redevelopment (ZOHO, Rotterdam) | Transformation of a quarter in the heart of Rotterdam into a green, liveable and climate-resilient urban area consisting of 550 residential units and creative companies (already in the area). Adaptation was an important element of tender requirements. | Initiative of a housing corporation and municipality. Tender was won by a consortium of two private developers and developing investors. |
| 4. Business park (Schiphol Trade Park, Hoofddorp) | Development of two logistics facilities as part of a new 306ha business park with high ambitions in terms of sustainability, circularity, and adaptation. | Two projects of a construction company with its own investment branch. Development took place within the boundaries (in terms of climate adaptation requirements) set by SADC, a publicly owned company acting in the role of the municipality. |
To validate our results and policy insights, we organized a focus group session that was attended by four persons: two consultants, one with expertise in adaptation and one with expertise in urban development (not interviewed before), along with a strategic project manager of a municipality and a senior project manager of a private developer (interviewed before). On the basis of this session, we refined our results and conclusions. One of the session results was, for example, that we merged overlapping drivers.

4. Results

4.1. Private sector drivers for mainstreaming

On the basis of our thematic analysis, we identified drivers in all four categories, 14 in total. Most of these drivers are property drivers or corporate drivers (see Table 4). Our results indicate that private developers and investors in the Netherlands increasingly perceive mainstreaming as a means to capture two types of value: exchange value and professional value. Actors are increasingly aware that adaptation can bring value, perhaps not always tangible and direct/short-term but definitely in the long term. Mainstreaming is currently primarily associated with qualitative (non-monetary) benefits (professional value capture) and less with direct, monetary benefits (exchange value capture). Our analysis further reveals that adaptation measures seldom translate into higher property value and that personal drivers and project drivers hardly play a role. The remainder of this subsection provides more detailed information about our results for our four categories of private sector drivers: property, corporate, personal and project drivers.

4.1.1. Property drivers

Property drivers are generally linked to the perceived capture of exchange value. At the same time, several respondents also put increased property value forward as a driver. The property driver that was mentioned most often relates to achieving a high(er) quality living environment. This implies that green space is created either as a result of, or through, the implementation of adaptation measures. For example, in the office area transformation case, private developers went beyond the municipality’s adaptation demands when they invented and branded the ‘living between the trees’ identity of their urban development. The majority of private developers indicated that they perceive adaptation as an instrument for creating comfortable, liveable, and high-quality properties and environments. Other property drivers that were brought forward relatively often are an expected decrease in time to sell and an increased tenant retention rate. Both drivers result from the perceived distinctiveness and popularity of properties that feature adaptation measures. Increased longevity, reduced operational costs and increased property quality and comfort were also mentioned by several interviewees.

Currently, the majority of private actors do not expect that mainstreaming has significant quantifiable and monetarized benefits. For most respondents, adaptation is not a goal but rather a means to create a high-quality living environment. Urban developers said, for example, ‘we don’t do climate adaptive urban development, we do integral urban development, and climate adaptation is part of that’ [IS-PR2]. In the inner-city redevelopment case, for example, private developers set high living-quality standards to make their development highly attractive for potential buyers and tenants. Apart from increased property value, all other property

| Table 4. Overview of private sector drivers for mainstreaming. Most prevalent drivers are in bold. |
|-----------------------------------------------|
| **Category**       | **Drivers**                                                                 |
| Property           | (1) Achieve high-quality living environment; (2) reduced time to sell (popularity); (3) increased property longevity (robustness); (4) increased property value; (5) operational costs reduction; (6) achieve high quality; (7) comfortable property. |
| Corporate          | (8) Corporate image enhancement; (9) knowledge development possibilities; (10) corporate social responsibility; (11) competitive advantage; (12) impressing regulators. |
| Personal           | (13) Personal commitment                                                 |
| Project            | (14) Construction costs savings (not agreed upon by interviewees)          |
drivers that were mentioned represent only an indirect increase in exchange value: indirect, since respondents expect that integrating adaptation measures creates a higher quality living environment, which might lead to a higher popularity and therefore a higher demand. This may eventually lead to a higher exchange value. Only two respondents, both representing large urban development corporations, already mentioned a direct increase in property (exchange) value as a driver for mainstreaming. For investors who have more time to receive a return on investment, the business case of mainstreaming and, hence, the drivers are slightly different. As they ‘are in there for the long run’ [IS-PR1], mainstreaming is also driven by investment robustness. To summarize, despite acknowledgement of property drivers, the majority of the private actors indicated they are still searching for a balance between the costs versus the benefits of adaptation, and state that benefits are often difficult to quantify and unbalanced compared to the costs.

4.1.2. Corporate drivers
Our results show that corporate drivers are closely connected to perceived professional value capture. Out of the five corporate drivers that we identified as drivers for mainstreaming, a two-third majority of the interviewed private developers and investors mentioned corporate image enhancement. Most respondents were aware of the growing need for mainstreaming adaptation into urban development projects. Considering this need, they expect that contributing to adaptation enhances their corporate image and therefore has a positive impact on future business opportunities. Considering the industrial area transformation case, some developers indicated that they partly justify their adaptation investments in terms of corporate benefits. Because of this focus, they can put less emphasis on having a sound business case for each and every climate adaptation measures they implement in their projects. Moreover, considering the expected need for adaptation, private developers in particular mentioned that the development of relevant know-how and skills is an important driver. Other drivers that we identified are corporate social responsibility, competitive advantage, and making an impression on regulators. The latter two are in fact very similar and are related to corporate image enhancement as well. Overall, our results indicate that developers and investors are generally well aware that integrating adaptation creates professional value. Moreover, respondents agree upon the need for integrating adaptation into urban development. This perception plays an important role in the mainstreaming intent of both developers and investors.

4.1.3. Personal and project drivers
Relatively few respondents mentioned that personal or project drivers have an influence on private sector decisions to mainstream adaptation. Only one respondent, a private project manager who also enjoys bird watching, explicitly mentioned that personal drivers played a role. Stressing the importance of biodiversity in urban development, this project manager considers green, adaptation and biodiversity-enhancing measures as important [IS-PR9]. Other respondents indicated that personal commitment could create additional opportunities for increased attention towards adaptation. Nevertheless, none of the interviewees argued that personal drivers have an influential or decisive role in mainstreaming. With respect to project level drivers, two out of six developers expect that mainstreaming can have construction benefits. Yet, none of the respondents could provide actual examples of this being true. Three of the six interviewed developers explicitly denied that mainstreaming could have project-related benefits. One of them, for example, argued that ‘adaptation just adds complexity and costs, rather than delivering benefits’ [IS-PR7]. To conclude, in our study, personal drivers seldom played a role in private sector decisions to mainstream. We also found no evidence that project drivers influence private sector mainstreaming decisions.

4.2. Policy instruments towards mainstreaming
4.2.1. Current use of policy instruments
All three categories of policy instruments – communication & cooperation, enforcement and incentives – are currently employed to enhance private sector mainstreaming in the Netherlands. Yet, the actual use and combination of different policy instruments differs across municipalities. Generally speaking, communication & cooperation instruments are preferred by all respondents and tend to prevail. How they are used differs
across projects. For example, in the industrial area transformation case, the municipality (as a key landowner) actively participated in a consortium of private developers and investors whereas in the other cases, the municipality was less actively involved. In the Netherlands, enforcement instruments are predominantly available and applied at the local level with each municipality imposing different demands and regulations. One of those locally applied instruments is the water assessment. This instrument demands that for each urban development project the impact on the local water system is investigated. The effectiveness and feasibility of local requirements and policy demands were questioned by some of the interviewed developers. They perceived them as difficult to implement especially since municipalities also tend to put a high number of demands in other policy fields. With regard to the use of incentives, they are seldom used to enhance private sector mainstreaming according to our respondents. Most incentives are targeted towards civilians/citizens rather than private organisations. If subsidies are available to developers and investors, they are often rather small compared to the project costs or they require too much accounting [CS1-PR2].

4.2.2. Furthering mainstreaming through communication and cooperation

Our results show that more intense cooperation between municipalities on the one hand, and developers and investors on the other, can play an important role in furthering mainstreaming. Several respondents argued that municipalities tend to act as ‘many-headed beasts’ [CS1-PU, CS1-PR3, CS3-PR]. They explained that municipalities tend to create policies and to impose new demands in a rather sectoral way – for adaptation as well as other challenges – without properly considering feasibility and effectiveness. Considering this lack of an integrated approach to policymaking, adaptation objectives often compete with other policy goals. For example, in the industrial area transformation case, green roofs (adaptation measure) competed with the installation of solar panels (energy transition measure). According to interviewed developers and investors, improving this situation requires that municipalities take a more collaborative rather than regulatory role, and talk with, instead of about, private actors. In addition, they argue that municipalities tend to impose unilateral demands on the private sector. They argue that mainstreaming would benefit instead from joint development and clear communication of expectations and objectives. Mutual trust and transparency play an important role in achieving this. According to the respondents, co-developing provides municipalities with additional means to guide mainstreaming from a cooperative instead of a legislative perspective. Next to cooperation, improved communication is also argued to have a positive impact on mainstreaming. Communication can play a key role in raising general awareness about adaptation among consumers, which could drive bottom-up demand for climate adaptive buildings and living environments. This is crucial for creating payback potential for climate adaptation investments, therefore promoting property drivers. Moreover, communication efforts could be used to inspire, inform and educate developers and investors about the need and possibilities for adaptation.

4.2.3. Furthering mainstreaming through enforcement

Developers and investors, but also general adaptation experts, indicated that mainstreaming would benefit from the development of new guiding frameworks and regulations: ‘give us something to work with’ [CS2-PU]. Enforcement instruments can be used to set boundaries, which can guide private mainstreaming. According to developers, without regulations, adaptation measures easily disappear from a plan because of time pressure or financial constraints. They further argue that clear municipal objectives can help private actors to better integrate adaptation in the early stages of their projects. Previous research supports this idea: especially for smaller urban developers, who generally lack the resources and expertise to invest in adaptation knowledge, practical guidelines can play an important role in mainstreaming adaptation (Wal & Kampert, 2020). Not all respondents are equally positive about enforcement. One developer, for example, stated that ‘we already have enough laws and regulations’ [CS2-PR4]. Nonetheless, all other respondents explicitly welcomed law and regulations, also as a means to guide private adaptation efforts and create an equal level playing field. The private developer that was active in the business park case, for example, appreciated that they were ‘nudged in the right direction’. It showed the developers that they are actually well capable of integrating adaptation successfully in their projects. With regard to the development of new rules and regulations, most respondents stressed the importance of a collaborative approach. They should be developed in close collaboration between municipalities, private developers and investors to avoid negative side-effects, such as over-regulation.
or the development of unclear or unrealistic demands, or competing policy objectives. One point for attention raised by respondents concerns safeguarding the design freedom of private developers: municipalities should specify policy objectives and not the means to achieve them. Another point for attention they raised is that respondents prefer uniform policies and warn against the emergence of all kinds of locally imposed rules and regulations.

4.2.4. Furthering mainstreaming through incentives

Developers and investors consider that incentives are useful. Municipal experts, on the other hand, do not specifically prefer them. According to our interviewees, incentives that target developers and investors are especially valuable when they are used to make them familiar with adaptation. They can, for example, be used to take away financial risks that are associated with adaptation from private actors and help to overcome risk-averse behaviour. The provision of subsidies for citizen initiatives was also perceived to be very useful, since they could help increase awareness among consumers. Consultants and general experts, however, warned that incentives such as subsidies are too often perceived as a panacea. Because incentives are often relatively small and temporal, they are not always appealing and can be used only in very specific cases. Hence, incentives appear to be especially effective for raising awareness among consumers and citizens, rather than offering (relatively small) subsidies to private organisations.

5. Discussion

5.1. Mainstreaming and private sector drivers

Private actors generally play an important role in the (re)development of urban areas. Hence, to achieve climate-resilient urban areas, government authorities highly depend on private actors’ willingness to integrate adaptation into their urban development projects (Mees, 2014). Our findings show that private actors in the Netherlands are increasingly aware of the need for and importance of adaptation. At the same time, our extensive search for relevant cases shows that adaptation is seldom explicitly included into large-scale urban development projects. In that sense, our selected cases are clear exceptions compared to the status quo. While adaptation was mainstreamed in the selected cases, we also observe that adaptation was still a side-effect of the realisation of a green living environment (industrial area transformation and office area transformation cases) or the result of municipal requirements (inner-city redevelopment and business park cases). In other words, also in these projects mainstreaming was for project developers and investors not a goal in itself.

Our study confirms and reiterates that private actors are primarily motivated by financial property drivers, to a lesser extent by corporate drivers and that personal and project drivers play a far less important role (Darko et al., 2017; Falkenbach et al., 2010). In fact, mainstreaming drivers appear to be highly similar to sustainable building drivers. Of the fourteen drivers that were raised by our interviewees, almost all overlap with sustainable building drivers (Darko et al., 2017; Falkenbach et al., 2010). The exception is ‘achieving a high-quality living environment’. This driver was often raised by our interviewees but has not been discussed in literature before. We believe this is because literature has mostly focussed on buildings. Nonetheless, adaptation can only be achieved partly by adapting a building. Oftentimes, the creation of a green landscape is at least equally, if not more, important to reducing the negative impacts of climate change, such as heat stress or urban flooding.

In line with previous adaptation studies, we find that absence of private sector mainstreaming is associated with the public nature of adaptation and the absence of direct monetary benefits which primarily drives the private sector (Berkhout, 2005; Schneider, 2014; Tompkins & Eakin, 2012). At the same time, our study reiterates the importance of professional, non-monetary values (Bos-de Vos et al., 2016). In fact, non-monetary drivers (e.g. corporate image enhancement) currently play an important role in private sector decisions to mainstream. If they integrate adaptation, they generally do so because they expect intangible benefits, such as enhanced reputation, development of know-how and competitive advantage.

Another key finding is the growing recognition and importance of co-benefits. Private developers and investors increasingly acknowledge that a high-quality living environment or a comfortable property can, and
perhaps should, have a positive impact on the value of a property. However, our respondents generally still perceive that these monetary benefits are much more intangible and long-term than the costs. While the perception that adaptation measures come with additional costs seems to be widespread, a CEO of one of the largest construction companies in the Netherlands recently argued that adaptation measures (e.g. permeable pavements) are relatively cheap and can be even cheaper than conventional solutions such as street tiles (Harms, 2021). Yet, our results show that especially commercial developers, who need to capture exchange value directly after completion of the building, continue to expect that they cannot capture the added value of adaptation since a climate adaptive – or more sustainable – building and living environment does not yet translate into a higher value and appreciation amongst consumers. Consumer demand thus appears to be lacking, although it plays an important role in making the development of sustainable buildings financially more attractive (Darko et al., 2017). For real estate investors, the business case is slightly different as adaptation might also have operational benefits, such as an extended lifetime, allowing for more direct return-on-investment through their long-term involvement. This is also reflected in their responses: they are more likely to expect adaptation to have a positive impact on property value.

5.2. Policy instruments

The policy instruments that Dutch municipalities currently employ are mostly based on communication & cooperation, as well as local rules and regulations. Incentives hardly play a role in supporting private sector mainstreaming; if they are in place, they are seldom effective. We, therefore, concur with others that mainstreaming would benefit from more intense cooperation between public and private actors in combination with other policy instruments (Molenveld et al., 2020). As consumer demand for more sustainable and climate adaptive buildings and living environments is lagging behind (Häkkinen & Belloni, 2011; Tran et al., 2020), we generally expect a mix of policy instruments that target consumers – instead of private actors – to be particularly promising, not only in the Netherlands but also elsewhere. The underlying rationale is that if consumers are more aware of the need for, and benefits of, mainstreaming, this could boost consumer demand for climate adaptive buildings and living environments. The resulting increase in property value makes mainstreaming much more attractive for the private sector. Incentives for consumers and communication and education instruments can play an important role in raising consumer awareness and furthering knowledge development (Darko et al., 2017). Public and private actors can complement each other to achieve this (BPD, 2019). Municipal subsidies can help make citizens more familiar with adaptation. Project developers and investors can take the lead in marketing adaptation by translating adaptation measures into values that matter to the consumers, such as aesthetics or living comfort.

Literature repeatedly suggests that private organisations are able to develop solutions that are smarter, cheaper and better than authorities can perhaps prescribe (Klein et al., 2018; Leemkolk et al., 2020; Wal & Kampert, 2020). Yet, according to a recent study, Dutch municipalities currently use their legal instruments only to a minimum extent (Handgraaf & Dekker, 2019). Hence, we expect that – especially in the Netherlands – a combination of cooperation and enforcement can play an important role in stimulating mainstreaming on the condition that municipal objectives, demands and regulations are clearly communicated and leave sufficient design freedom to the market.

6. Conclusions

While private sector engagement is widely acknowledged to play a crucial role in achieving climate resilience, research into the role of the private sector and what drives them remains limited. To address this knowledge gap, we examined private sector drivers and policy instruments for integrating adaptation measures into large-scale urban development projects. Our empirical focus was on the Netherlands where, like in many other countries, the need to adapt to climate change is increasingly recognized and yet seldom explicitly taken into account in large-scale urban development projects. Our study confirms that, like elsewhere, private developers and investors in the Netherlands are primarily driven by direct financial benefits. They expect that mainstreaming does not have such direct financial benefits. Our study thus shows that the perceived absence of
short-term, financial benefits – specifically a higher property value – continues to be a key explanatory factor behind the relatively limited involvement of the private sector in mainstreaming. Yet, we found that private actors in the Netherlands are also driven by other values. In their projects, they increasingly often aim for a green living environment to create additional exchange value. In such projects, adaptation can be achieved as a side-effect. Moreover, private actors are also driven by professional value. Corporate image enhancement and closely related drivers, such as competitive advantage or making an impression on regulators, are also important reasons for mainstreaming. In summary, when private developers and investors currently mainstream adaptation into their projects, they often do so because they want to create a high-quality living environment and/or expect professional value capture. These findings are likely to also apply to private actors in other free market countries where the impacts of climate change are increasingly felt. Yet, in other countries, climate change is perhaps less often seen as the prime responsibility of the government only. Further research would be needed to verify this hypothesis.

In the Netherlands, municipalities already use different types of policy instruments to promote private sector mainstreaming. Instruments like the water assessment as well as building requirements may yield important insights for other countries. At the same time, we conclude that municipalities could become more effective in promoting climate adaptation mainstreaming by focusing specifically on raising consumer awareness and demand for climate-adaptive properties. Moreover, municipalities should consider actively participating in urban development projects and co-developing climate adaptation requirements with the private sector. This way, private sector drivers and policy instruments can strengthen each other to pave the way for comfortable and climate-resilient urban environments.

**ORCID**

Leentje Volker [http://orcid.org/0000-0003-2766-3763](http://orcid.org/0000-0003-2766-3763)

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