Towards a Framework for Architectural Design Enhancing Social Sustainability in Dense Housing Projects

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Abstract
Density strategies are generally perceived as a powerful leverage for sustainable urban environments. Reality unveils however a more nuanced appreciation, especially in housing projects. While the 'Planet' and 'Prosperity' pillar of sustainable development is mostly covered, dense projects tend to lack addressing 'People' aspects. As long as the social dimension is not taken into account, a dragging legacy is created which could mortgage the recognition of the embedded sustainability value and benefits that dense projects can offer.

To counter this legacy this paper explores the content and scope of, and architectural design measures towards, social sustainability for Dense Housing Projects. The methodology adopts a 'real-life' perspective by conducting a multiple case study research. A low-complexity framework is compiled which is organized around eight components that are crucial for obtaining social sustainability from an architectural point of view. Each component is uploaded with Framing Principles (guiding principles) with associated illustrative Core Ideations (practical design measures).

Keywords: Social Sustainability, Dense Housing Projects, Architectural Design, Framework

1. Introduction

As the world is heading towards a 66% urban-rural population ratio by 2050 (United Nations, 2015), humankind has entered a new 'urban era'. An era in which sustainable urban development will even more become a strong source of influence for the growth and transition of existing cities, and for the design and realization of new cities, for both 'here and now' and 'later and elsewhere' matters.

Density strategies are generally perceived as a powerful leverage for sustainable urban environments. Conventions and targets such as The Brundtland Report (1987), The earth Summit at Rio de Janeiro (1992) and The Green Paper on the Urban Environment (1990) collectively agree. Earlier, the French architect Le Corbusier and urban theorist Jane Jacobs both defended density as a positive attribute for urban life. Le Corbusier based his arguments on functional grounds, while Jacobs presented a more social approach with her vision of people interacting in streets.

Reality unveils however a more nuanced appreciation, especially in housing projects, even when they are designed for 'sustainability'. While the 'Planet' pillar (flow management in view of the environment) and 'Prosperity' pillar (economic and societal profits) of sustainable development in the latter projects is mostly covered, dense city parts and wholes (e.g. buildings, building blocks, neighbourhoods, districts) tend to lack addressing the 'People' pillar (focused on liveability). The social dimension of sustainability is often neglected, likely leading to a quality deficit on the micro level and ultimately to conflicts. As social sustainability is strongly dependent on the cultural context (Woodcraft, Bacon,

Caistor-Arendar and Hackett, 2012) and density is besides a matter of figures also and maybe more important a matter of perception, the degree and range of this deficit is not absolute.
This deficit is often very tangible in Dense Housing Projects (DHPs). DHPs are defined as a grouped set of individual houses or individual housing units simultaneously designed and built as a highly coherent - conceptual, architectural, urban, social and organizational – assemblage with a significantly higher than average density. Despite social sustainability is sometimes explicitly aimed for in these projects, successes are difficult and therefore rare. The progressive design of the Pruitt Igoe buildings in Saint Louis by Leinweber, Yamasaki and Hellmuth's (Bristol, 1991) is a good example of this difficulty. Even though its design was praised in the early stages as it was developed to encourage social interaction, the project became a main example of the failure of modern architecture, of the density strategy. The case of the Pruitt Igoe buildings is only the tip of the iceberg. Day by day, popular media report about problems in DHPs related to a deficit regarding social sustainability.
As long as 'People' aspects are not taken into account in the architectural design, a dragging legacy is created which could mortgage the recognition of the embedded sustainability value and benefits that dense projects can offer. Projects will tend to fail which has an even higher environmental impact. Breheny (1995) warns that the gains of density may be trivial relative to the pains.

In an era characterized by urban density and human communication by social media, architectural design enhancing social sustainability, and the social function of built works of architecture and urbanism, gains importance. In response, and to counter above stated legacy, this paper explores the content and scope of, and architectural design measures towards, social sustainability for Northern and Central European DHPs. The methodology adopts a 'real-life' perspective by conducting a multiple case study research. Drawing on the experience of a quick-observational scan of the cases, an explicit low-complexity framework is compiled. The framework is organized around eight components which are uploaded with Framing Principles (guiding principles) with associated illustrative Core Ideations (practical design measures). This framework fits the aim of Sustainability Design Supporting Tools ([S]DSTs) as it aims to act as an interface between theory and practice in order to address and/or resolve the intricacy of design quests, facilitating the design process of architect-designers and ultimately sustainability successes.

This paper, which is based on the doctoral dissertation of the first author (Janssens, 2015), adds to the knowledge of density strategies, housing projects, social sustainability, and more in specific of sustainable DHPs.

2. Methodology

This section discusses both the adapted model of the framework and the methodology used to determine the substantive.

Janssens (2015) reasons the approach of Design Supporting Tools (DSTs) regarding a sustainable development within the built environment in view of architect-designers, and sets up a generic outline for a future Sustainability Design Supporting Tool (SDST) tailored to architect-designers. Supplementary to and strengthening the generic outline developed, Janssens (2015) compiled a substantive implementation of the outline for DHPs. The model adopted and substantive for aimed framework in this paper are based on this research, and is discussed in this section.

2.1 Adopted model for the framework

2.1.1 Framing within Sustainability Design Supporting Tools

Janssens (2015) argues that an efficient and effective SDST tailored to architect-designers constitutes a Generative tool for early design phases. These kind of tools link sustainability to decisions in a direct way, enabling the generation of support preceding any kind of design, in whole or in part, in general or in detail. They include knowledge on and insights into appropriate and integrated design measures, and

also facilitate their implementation, thus promoting a conceptual approach and, most importantly, comprehensive architectural solutions.

2.1.2 General approach

The outline developed combines promissory outcomes with, and encourages, a 'guiding-into-action' method which reduces epistemic uncertainty and enhances designable outcomes without removing discretionary freedom from the architect-designer. This 'guiding-into-action' tool has a heuristic methodical nature for limiting the problem and solution space, benefiting from a lattice-like network of 'primary generators' or 'concepts' as its substantive strategy. The availability of different kinds of 'concepts' constituting its substantive structure (see 2.2.3), supports a generative Design Process system-thinking perspective in which criteria (within components of the 'People' and 'Planet' pillar) and feasible measures are linked.

2.2.3 Substantive structure

Different kinds of concepts constitute the substantive structure, identified by the acronym FoCuS: Framing Principles, Core Ideations and Situational Configurations. These parts, and any sub-parts, are the hosts for the different kinds of 'primary generators', of 'concepts'.

Framing Principles
Framing Principles underlie both Core Ideations and Situational Configurations, as they define the desired and realistic targets. They can be used as theses for pre-design considerations for problem and solution framing, and as criteria for intermediate-design and post-design verification. These overarching 'first principles' or 'guiding principles' identify all tangible aspects of sustainable building and open them to discussion.

Core Ideations
A measure is a deliberate and distinct decision to fulfil a certain requirement. Core Ideations steer towards the practical operationalization of the Framing Principles. A wide range of physical-spatial measures are identified which can be used for problem and solution scoping, or as inspirational start-offs for the actual design. The identification is supplemented with knowledge and insights. As the Ideations are non-situated, objective truth resides in these 'concepts'. They need to be connected to a particular context, situation or experience in order to be fully understood. This understanding is supported by linking the Core Ideations to the Situational Configurations.

Core Ideations are structured in hierarchical parts and wholes. Individual measures are the foundations of solutions. Combined measures are several promising individual measures into one successful package to address a larger range of targeted criteria/objectives, to strengthen the whole, to reconcile certain measures with other/the design, or to reduce/eliminate eventual weaknesses/drawbacks of certain (individual) measures. Integral and integrated measures are combined and cohesive individual and/or combined measures which are inextricably linked with the overall architectural design. They address a conceptual approach, the highest hierarchical level of the Core Ideations, and can easily be interpreted within a specific project/context.

Situational Configurations
Situational Configurations illustrate and reflect both Framing Principles and Core Ideations in situated real-life references. These references or real-life projects can be used as design start-offs for problem and solution scoping.

2.2 Determination of the substantive of the framework

2.2.1 Research approach

Theory on sustainability is rich and readily available. However, this study can also benefit from practical experience. Several authors emphasize the importance of practice in theory development and the hidden knowledge in objects. Cross (2007) states that:

> "There is a great wealth of knowledge carried in the objects of our material culture. If you want to know how an object should be designed – e.g. what shapes and sizes it should have, what material it should be made from – go and look at existing examples of that kind of object, and simply copy (i.e. learn!) from the past."

Cross (2007) and Douglas and Isherwood (1979) speak of "knowledge that resides in objects". Pye (1978) concludes that "invention comes before theory" and that "the world of 'doing and making' is usually ahead of the world of understanding – technology leads to science, not vice versa as is often believed". Pye's point of view is partly shared, as the author believes that movement occurs in both directions, from theory to practice and from practice to theory, and both directions are relevant. On the one hand, theoretical insights enrich practice, on the other hand, validating and generalizing solutions obtained from real-life experiences are important, thus providing input for theory.

To serve both theory and practice and create a support base, knowledge and insights from both perspectives are considered in this research. The determination of the substantive of the framework is practice-oriented, supported by theory.

2.2.2 Methods

In addition to a literature study, the research implements two design-based methods: design by research and design research / case study research. The combination of methods enables the development of multidisciplinary knowledge and insights which are needed to ensure the theory-practice bridging capacity of aimed framework.

Design by research
The first method is strongly linked to the daily practice of the architect-designer. This method is thus used to a limited extent in the research. Here, research by the designer serves a specific design assignment that has a brief and a context: a focused, isolated question. This 'design by research', where the focus is on the actual design, is a means for making choices and considering options than actually producing new generic knowledge.

Design research / case study research
Design research, or case study research, a form of empirical research, describes and analyses existing designs, of which the context is known, often through comparative research. It primarily entails an evaluative study of what is designed or constructed. As a basis for theory building, this method is appropriate to the aims of this research because it is a bottom-up approach that maintains that specific data can produce theoretical generalizations (Eisenhardt, 1989). The intricate and contextual nature of an architectural project can be understood through the study of actual cases. Case study methodology is appropriate for investigating contemporary phenomena (Yin, 1994), including sustainable building. In order to increase reliability, multiple cases are considered.

2.2.3 Application of the methods

The substantive is the result of an experimental determination conducted in collaboration with architecture students. The determination was based on reflecting a compiled synoptic table of sustainability measures and decisions in 40 Northern and Central European demonstration and best-practices on sustainable DHPs, backed by gained insights from project visits, literature review, and design by research (test-case research). During a cyclical 'trial & error' process, a possible substantive infill was verified and if needed adjusted in view of the philosophy of the framework.

3. The framework

Within the scope and objective of this paper, three aspects limit the presentation of the framework. First, only a selection of outcomes of the extensive research of Janssens (2015) is provided. It is stressed that incorporated substantive implementation is tentative, preliminary and non-exhaustive. Second, the focus lies on a condensed listing of a substantive, as further research is needed regarding the actual knowledge representation (in 'specification sheets' as proposed by Janssens, 2015). Third, a substantive is only given for the Framing Principles and the Core Ideations, on the background of the determined components of the 'People' Pillar.

3.1 Components

Table 1 provides components within the 'People' pillar of sustainable building.

Component		Issues
IDI	Identity & Identification	recognition; cultural embedding; …
SIA	Social Interactions	privacy regulation; social contact; social control; …
SCO	Social Cohesion	amenities; involvement; …
SEC	Security	physical; psychological; …
HEC	Health & Comfort	requirements; basic needs; …
FLE	Flexibility	adaptability; expandability; …
AVA	Availability & Accessibility	usability; functional differentiation; …
ATT	Attractiveness	dearness; recreation; cultural embedding; …

*The compilation of the components is influenced by the work of DSP groep (2012).

Table 1: Components of the 'People' pillar of sustainable building, supplemented with addressing issues.

3.2 Framing Principles

Table 2 provides framing principles within the components.

Component		Framing Principle	
IDI	Identity & Identification	**ID**	Include **individual design** within a whole
		OP	Provide **opportunities for personalization** of dwellings by residents
SIA	Social Interactions	**PR**	Provide privacy and/or consider measures for **privacy regulation** by residents
		CCC	Design circulation spaces which enable a free **choice for communication/contact**
		RQP	Include **residential quality in collective/public places** of the accommodation
		SR	Be aware for **sensorial relationships** between places & spaces
		CL	Stimulate **communicative living**

SCO	Social Cohesion	**FD**	Include **functional diversity**
		SD	Include **social diversity**
		EPI	**Elicitate participation & involvement** of residents and users
SEC	Security	**PSS**	Consider intrusion & vandalism prevention and provide **physical security & safety**
		SSS	Provide a **sense of social safety**
		TS	Include **transport safety**
HEC	Health & Comfort	**VC**	Design & detail for **visual comfort**
		TC	Design & detail for **thermal comfort**
		HC	Design & detail for **hygric comfort**
		AC	Design & detail for **acoustic comfort**
		AWC	Design & detail for **air/wind comfort**
		SC	Design & detail for **spatial comfort**
		UC	Design & detail for **usage comfort**
FLE	Flexibility	**ISF**	Consider **internal spatial flexibility** in view of future proofing the building
		SE	Consider **spatial extendibility** in view of future proofing the building
AVA	Availability & Accessibility	**MU**	Provide spaces and places for **multifunctional usability**
		UD	Include principles of **universal design**
		IER	Consider **inclusiveness & exclusiveness regulation**
		ESR	Consider **empowerment / self-reliance** of residents and users
ATT	Attractiveness	**PR**	Incorporate **possibilities for recreation**
		CE	Respect aspects for **cultural embedding**
		BAI	**Balancing authenticity & innovation**
		HS	Compose in view of a **human scale**

Table 2: Framing Principles within the components of the 'People' pillar of sustainable building: key words in bold.

3.3 Core Ideations

Table 3 lists some tentative examples of individual measures, combined measures and integral and integrated measures, while table 4 provides an illustration of the 'People' benefits of some (combined) measures.

Individual measure	**Combined measures**	**Integral and integrated measures**
{colours} {materials} {sun-protection louvres} {sun-protection greenery} {glazed balcony}	{low greenery – medium greenery – high greenery – pond – canal – constructed wetland} {green roof – green wall – roof-top allotment – kitchen garden}	{microclimatic street} {microclimatic gallery} {microclimatic staircase} {branched corridor} {microclimatic terrace}

{glazed parapet} {greenery} {microclimatic space} {plinth} {limited load-bearing structure} {clustered techniques} {demountable wall/floor/ceiling} {movable inner wall} {pond} {canal} {wadi} {constructed wetland} {roof-top allotments} {inner windows} {floor level difference} {public-/collective-oriented window} {top light} {kitchen gardens} {storage facility and recycling station} …	{public-/collective-oriented large window – movable panels} {low greenery – multiple pathways – lighting appliances – ramp – accommodation place} {glazed balcony – greenery – movable inner/outer skin} {balcony - greenery parapet} {public-/collective-oriented large window – pond/canal} {low greenery – multiple pathways – lighting appliances – ramp – accommodation place} {canal – pond – wadi – greenery – boulders/pebbles} {limited load-bearing structure – clustered techniques – demountable wall/floor/ceiling – movable inner wall} …	{activated street} {reconciling outside buffer} {microclimatic plaza} {car-park-roofed courtyard} {rooftop-glazed atrium} {green-blue fingers} {open plan} {thin plan} {durable envelope} {communicative skin} …

Table 3: Individual measures, combined measures and integral and integrated measures as Core Ideations.

Core Ideations: measure (combined, in bold)	**Addressing component(s) / issue(s):** initial and additional (in bold)
{colour} - {material}	IDI: recognition ATT: cultural embedding, dearness
{greenery}	SIA: privacy regulation ATT: recreation SIA/SCO: social contact/cohesion
{glazed balcony} {microclimatic space} **> strengthened by** **+ {greenery}**	SIA: social contact/control, privacy regulation IDI: recognition FLE: flexibility/expandability ATT: recreation **+ SIA: privacy regulation** **+ ATT: dearness**
{public-/collective-oriented window} **> drawback: privacy** **> counteract by + {pond} / …**	SIA : social contact/control IDI : recognition **+ SIA: privacy regulation** **+ ATT: recreation, dearness** **+ SCO: social cohesion**
{sun-protection louvres}	SIA: privacy regulation IDI: recognition

	ATT: dearness SEC: physical / psychological safety
{pond} - {canal} - {wadi}	ATT: recreation ATT: dearness SIA/SCO: social contact/cohesion
…	

Table 4: Illustration of the 'People' benefits of some (combined) measures.

4. Optimization and discussed illustrations

4.1 Link-up with environmental sustainability ('Planet' pillar)

As mentioned in sub-section 2.2.3, measures are deliberate and distinct decisions intended to fulfil specific requirements and to achieve desired features. Each measure implies a weighting between costs and benefits. Measures that serve several requirements can increase efficiency and effectiveness both regarding the design process and the design outcome. They can diminish (or even eliminate) objections for implementation and reduce the risk of postponement and/or expiration. Applied to sustainability, these 'Beneficial Pattern Measures' (Janssens, 2015) aim to satisfy both the 'People' (social sustainability) and the 'Planet' (environmental sustainability) pillar. By selecting and implementing these measures, sustainable building is addressed in a holistic way, optimal processes and outcomes are achieved, and a sustainability decay during and/or after the design process is less likely as measures are integral and integrated. This 'Beneficial Pattern Approach' matches the view of Tjallingii (1996) who states that the practice of finding 'promising combinations' the common ground is for both sustainability transition and sustainability design.

Based on these ideas, the framework outlined in this paper could be linked-up with environmental sustainability. Specification sheets of listed measures should therefore be supplemented with the benefits for 'Planet' aspects. Table 5 illustrates the benefits of (combined) measures listed in table 4 for both 'People' and 'Planet' aspects. Mentioned addressed components / issues are non-exhaustive and non-absolute (project-specific and context-specific dependent).

Core Ideations: measure (combined, in bold)	**Addressing pillar**	**Addressing component(s) / issue(s):** initial and additional (in bold)
{colour} - {material}	People	IDI: recognition ATT: cultural embedding, dearness
	Planet	*(natural) heating/cooling/ventilation/lighting, …*
{greenery}	People	SIA: privacy regulation ATT: recreation SIA/SCO: social contact/cohesion
	Planet	*(natural) cooling (evapotranspiration), lighting control, wind control, wildlife, …*
{glazed balcony} {microclimatic space}	People	SIA: social contact/control, privacy regulation IDI: recognition FLE: flexibility/expandability ATT: recreation

> strengthened by **+ {greenery}**		**+ SIA: privacy regulation** **+ ATT: dearness**
	Planet	*(natural) heating/cooling/ventilation/lighting, …* ***+ air purification, humidification, cooling by evapotranspiration, …***
{public-/collective-oriented window} **> drawback: privacy** **> counteract by + {pond} / …**	People	SIA : social contact/control IDI : recognition **+ SIA: privacy regulation** **+ ATT: recreation, dearness** **+ SCO: social cohesion**
	Planet	***+ water management (purification, drainage, buffering, …), humidification, cooling/ventilation, …***
{sun-protection louvres}	People	SIA: privacy regulation IDI: recognition ATT: dearness SEC: physical / psychological safety
+ ***{greenery}***	*Planet*	*thermal control, lighting control, wind control, …* ***+ heating/cooling (evapotranspiration, …), wildlife, …***
{pond} - {canal} - {wadi}	People	ATT: recreation ATT: dearness SIA/SCO: social contact/cohesion
	Planet	*water management (purification, drainage, buffering, …), humidification, cooling/ventilation, …*
+ {greenery} ***+ boulders/pebbles***		***+ cooling (evapotranspiration), wildlife, …*** ***+ purification, …***
…		

Table 5: Illustration of the benefits of some (combined) measures regarding 'People' and 'Planet' aspects. ('Planet' benefits in italic)

4.2 Real-life examples of built works of architecture

Case study research unveils some common Core Ideations in Northern and Central European demonstration and best-practice projects for DHPs. Table 5 lists the beneficial aspects of some mainstream sustainability measures, but not always recognized as such by project teams. This sub-section discussed some of these Core Ideations.

Figure 1: Pictures of some listed individual measures: {glazed balcony} (left, 'BO-01' in Malmö, Sweden), {microclimatic space} (middle, 'Eco-Viikki' in Helsinki, Finland), and {sun-protection louvres} (right, 'GMV II', London, UK). (photo by Bart Janssens, 2012)

Figure 2: Pictures of some listed combined measures: {microclimatic space + greenery} (left and middle, 'EVA-Lanxmeer' / 'Serrewoningen' in Culemborg, The Netherlands), {sun-protection louvres + greenery} (right, 'Kronsberg' / 'Wohnanlage' in Hannover, Germany).
(left and right: photo by Bart Janssens, 2012; middle: photo by Graphic alert)

When oriented to public/collective areas {glazed balcony} and {microclimatic space} (figures 1 and 2) enhance social contact and social control as these spaces provide possibilities for recreation. In addition, they act as potential spaces for identification and expansion, enable flexibility (usage, expandability), and regulate privacy as they are a transitional zone between public and private spaces. With regard to the 'Planet' aspects - after all they are seen by many as predominantly environmental actions - both measures can be implemented in view of the heating, cooling/ventilation and/or lighting design (by accumulation, thermal flows, reflection, etc.).

{Sun-protection louvres} (figures 1 and 2) control solar access. Besides its primary goal of controlling the thermal comfort of the building, this measure serves other 'Planet' aspects, such as lighting and wind control. Instead of sun-protection fabric, this kind of sun protection has important effects on social aspects, the liveability, such as privacy regulation. In most projects sun protection is used as an important part of the transitional zone between the public and private part. The prominent presence of sun-protection systems have a big influence on the appearance of the building and thus can be used to achieve sociocultural embedding, dearness, etc.

Figure 2 illustrates the individual measures {microclimatic space} and {sun-protection louvres} supplemented with the individual measure {greenery}. This way, a promising combined measure is achieved addressing strengthened / additional 'People' issues like privacy regulation and dearness, and additional 'Planet' issues like air purification, humidification, cooling by evapotranspiration, wildlife, …

5. An agenda-setting outlook

The research of Janssens (2015) identified several topics which are eligible for further research. Topics for future research cover contributions both to science, that is, the body of knowledge regarding generic aspects of SDSTs and the framework's model, and to the realm of practice, in particular to the practical implementation of the framework in view of the actual design tasks of architect-designers.

5.1 Deploy the framework as a versatile and agile design tool

For early designs, architect-designers can use the framework as a versatile and agile design tool. It can be used as a generative tool and/or as an assessment tool. The Framing Principles, with Core Ideations as indicators, are especially suitable to enhance and/or verify the architectural design in view of social sustainability. Research must verify this assumed ability by deploying the substantiated framework in education and practice.

Experiments with architecture students of the Faculty of Architecture and Arts at Hasselt University (Belgium) are ongoing. Within a design assignment, students have to use the framework developed as a guiding tool for the 'People' and 'Planet' sustainability concept development. Outcomes are illustrated in figure 3.

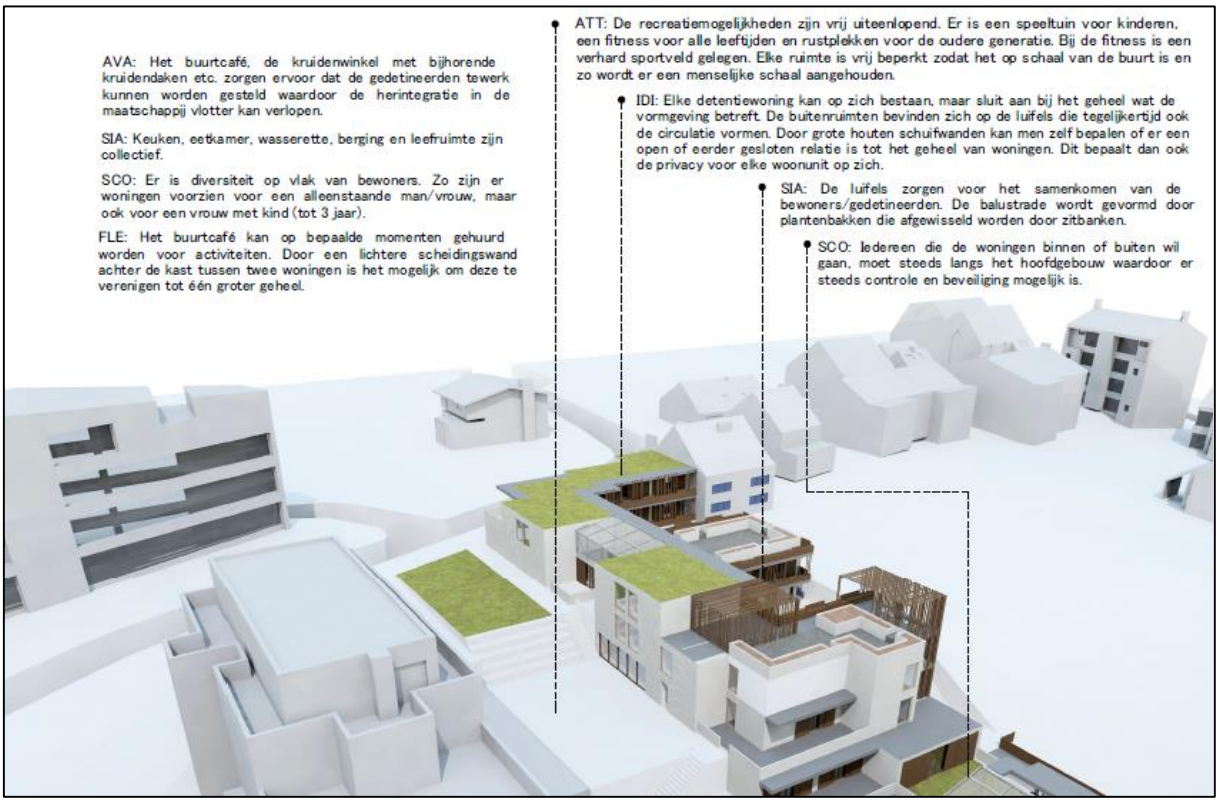

Figure 3: Snap shot of the outcomes of experiments by architecture students using the framework developed as a guiding tool in a design assignment.

5.2 Review the adopted model of the framework

As the framework's model has only been preliminary verified (by insights in literature), a full verification by its targeted users – practising architect-designers – is needed. This 'reality-check' helps to obtain actors' perception and to explore various viewpoints. Above all, it will deliver points of attention for the further optimization and development of an actor-supported operational framework.

5.3 Verify, adjust and supplement the substantive

A feasibility study must verify, adjust and supplement the proposed substantive by test-case research on real-life DHPs. Such an intense research is required to assure the efficiency and effectiveness of the framework. Such research must both be in-breadth and in-depth: in-breadth regarding the scope and number of components, framing principles, and core ideations; in-depth regarding the information given in specification sheets for each component, Framing Principle, and Core Ideation.

This research might also benefit from literature review specifically addressing the aspect of social sustainability (e.g. Woodcraft, Bacon, Caistor-Arendar and Hackett, 2012). This combination of methods enables the development of multidisciplinary knowledge and insights which are needed to ensure the theory-practice bridging capacity of the framework as a DST.

6. Conclusion

This paper outlines a framework which is helpful to architect-designers for enhancing social sustainability from an architectural point of view in DHPs. As long as SDSTs lack 'People' aspects, as they predominantly adopt an environmental approach (Janssens, 2015), the framework can be used as a mobilization tool. Project developers, architect-designers / architecture students, and researchers can address and promote social aspects in architectural design as the framework acts as a knowledge map to respectively incentivize the urge and relevance, guide design decisions from the early design stages, and position research and development.

Supplementary to the framework developed, the paper advocates a holistic approach to sustainability. It argues that preferably those architectural design measures must be selected and implemented which have benefits for both 'People' and 'Planet' aspects. This approach enhances efficiency and effectiveness of the design process and of the design outcomes. In order to facilitate this design approach, this way of decision making, the future final framework should link-up with environmental sustainability by highlighting the benefits of its substantive structure, Framing Principles and Core Ideations, for 'Planet' aspects. The paper illustrated the potential of this approach by real-life examples of built works of architecture.

The framework developed for enhancing social sustainability in DHPs from an architectural point of view is useful but tentative. The underlying objective of the paper is a further discussion on, and potential set up of a joint international innovative research. A research in which e.g.: the outcomes of current explorative study are validated and if needed adjusted, in/for different cases (architectural context, profiles of residents, new built and renovation, etc.); indicators of social sustainability are developed; etc. The outcome of such research, a validated and extensive practical framework, would enable to enrich current and future SDSTs, and could ultimately lead to codes/standards regarding social sustainability. This would facilitate a sustainable development of cities, in its full scope.

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