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Graduation Studio Adapting 20th Century Heritage

Tutors:

Design: Lidy Meijers

Research: Federica Marulo
Rachel Lee

Figure 1 on cover page: *Burwood Brickworks (Melbourne)*, sustainable shopping mall illustration by Right Angle Architects (2019), Retrieved from <https://www.frasersproperty.com/the-library/corporate/2020/november/frasers-property-australia-s-burwood-brickworks-set-to-be-the-wo>

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Introduction

1

“Gone are the days when we can think about a project with our blinkers on, looking at the shiny render or the final product. We need to design spaces that are loose fit, flexible, and give buildings better longevity so they can go through multiple iterations over time.”

~ Harry Cliffe Roberts, studio director and EU repositioning practice area leader for Gensler, world's biggest architecture firm. (Christou, 2021)

Motivation

About a year ago I developed a fascination for climate adaptive design. A teacher from the Building Engineering studios (TU Delft) in 2021/2022 showed me that our individual input is important to help our planet recover step by step from the damages that we have imposed on our forests, water bodies and atmosphere over the past decades. Nowadays, the building sector still uses around 50 percent of the energy and materials that are produced with world resources (Aktas, 2011). I came to a realisation that the role of an architect should be incorporating solutions to create designs that contribute to solving the climate change problems and I believe that the built environment can play a key role in providing a solution to building in the most sustainable way.

New developments in climate adaptive design can enhance our existing architecture, but at the same time, it is essential to preserve our cultural heritage and

traditions. If we as humans value something, which can be on various scales, it can become heritage (Howard, 2003). An architect should take this value (of other people and themselves) into account when making decisions about applying design interventions on an existing site/context (Howard, 2003). This made me realise that a (re-) design on heritage should not only be focused on responding to climate change, but also on other aspects. So, what can be done to develop sustainable plans for existing buildings while respecting the value that the buildings have for the context? This contrast between conservation and progression shapes an interesting research about combining solutions that tackle current and future problems and at the same time retain the value of existing heritage. The obtained knowledge from this research project can be applied to the renovation/conservation of a modern shopping mall.

Introduction to the studio

Modern heritage plays a big role in shaping our cities and societies, since the Modern movement (1925-1950) transformed built environments around the world in an unprecedented way (Tostões et al., 2022). Within this field, the modern shopping mall emerged, first established by the architect Victor Gruen (Marchi, 2017). His idea of combining social and commercial functions in one building was being pushed away because of economic reasons and therefore the non-commercial functions later on disappeared out of the mall (Carretero & Higuera, 2017). However, Aktas (2011) states that today there is a shift again in the function of shopping malls. They are becoming more of a social gathering space and start to lose their function as a place to buy products only. Malls are particularly susceptible to economic fluctuations, demographic shifts, local competition, and trends, leading to continuous adjustments in their internal environments, organizational structures, and technological systems (Mate, 2012).

As a subject to several changes over time, a lot of modern malls in the Netherlands have to contend with vacancy and a state of disrepair and they are required to undergo renovations (Ter Hark, 2022). Problems with the current management system of interior and exterior (which costs a lot of money and materials) ask for design solutions that revitalize the Dutch modern mall. Questions that arise regarding this topic could be: What is the future of the modern mall? How can the modern mall maintain its values for residents and urban life?

Problem statement 2

Problem statement

Shopping centers and malls are familiar with adapting to changes, but they are not always resilient to withstand the impacts. Most adjustments and renovations in shopping malls have been made with the goal of ensuring economic sustainability and survival in the long run (Carretero & Higuera, 2017). After all, economic profitability determines whether shop owners stay in the mall or leave. However, sustainability also encompasses social and environmental aspects and issues regarding those aspects are sometimes ignored (Carretero & Higuera, 2017). As an example, retail expert Anja Overdiek states in an interview with Idalia Dlugosz (2019) that shopping mall “De Bogaard” (Rijswijk) faces vacancy problems and needs to be more than just a shopping center. It used to be a buying machine, but that doesn’t fit anymore in the contemporary demands.

In order to achieve a truly sustainable outcome, three elements of sustainability need to be in balance: Environment, social and economic (Cathi Colla Architects, 2019). Structured frameworks on a holistic approach to sustainable design have been developed in the past, but they have not been applied on modern Dutch shopping malls. So a holistic approach to renovating modern shopping malls in a sustainable way is desired to make the mall more resilient to changes.



Figure 2&3 - Rijswijk (NL). “De Bogaard” shopping mall: decrease of value leads to vacant shops, (J. Moens, 2023)

Frame of reference

3

In 1987 the World Commission on Environment and Development launched a report in which sustainability was brought into the picture (Aktas, 2011). This required a lot of research and actions on various environmental, social and economic fields and with this the three pillars of sustainability were shaped (figure 4).

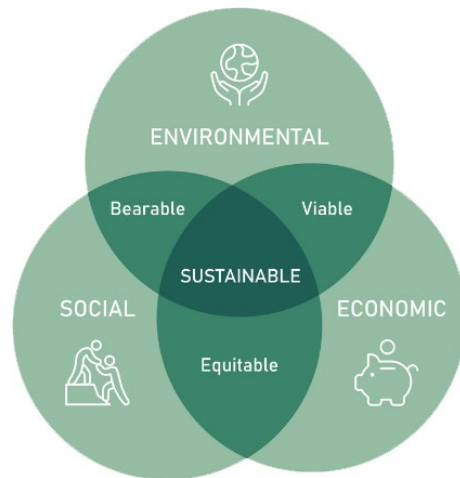


Figure 4 - The 3 pillars of sustainability, by Lavalin (2021). Retrieved from <https://careers.snclavalin.com/blogs/2022-3/three-pillars-of-sustainability-and-the-built-environment>

A definition by Aktas (2011, p.110) is used to understand what a sustainable design means: “Sustainable design stands for a holistic creative process, which seeks to translate and embody global and regional socio-environmental concerns into products and services at a local level. This necessarily demands a system view of design. Sustainable architecture minimizes the negative environmental impact of buildings by enhancing efficiency and moderation in the use of materials, energy and space.”

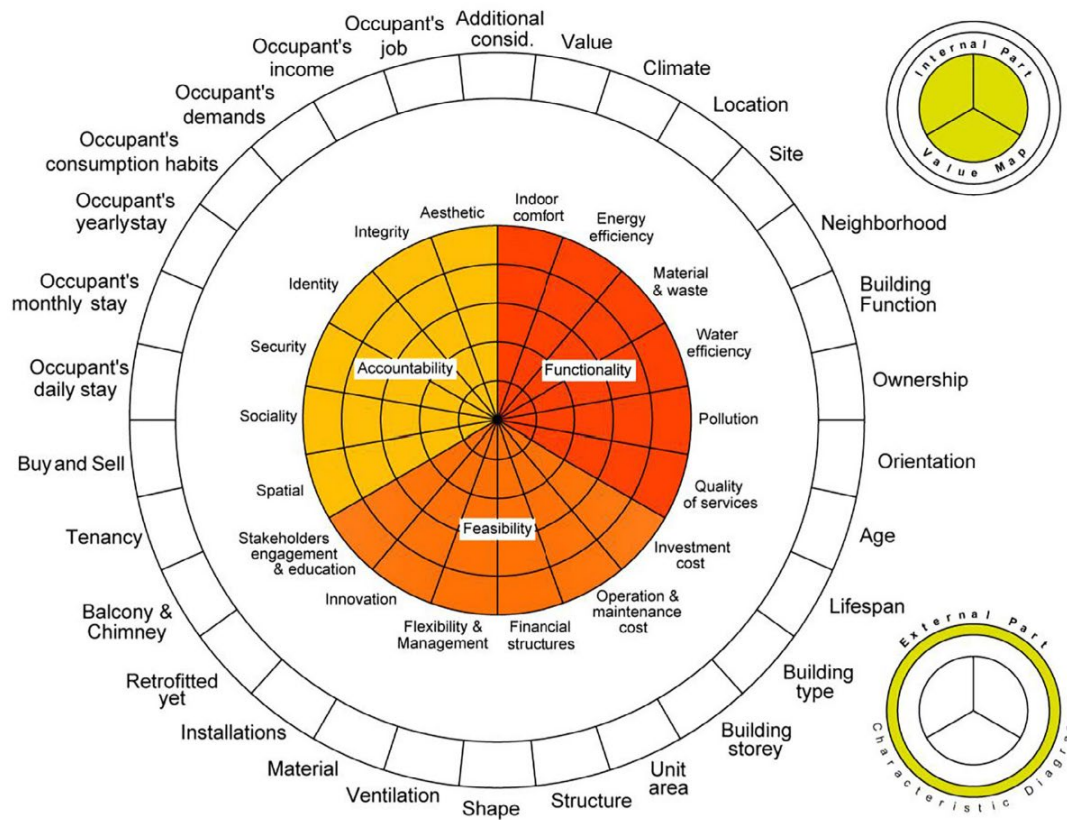
To place this definition in the context of the heritage sector, various academic articles and reports provide methods and techniques of minimizing the environmental impact of interventions in existing architecture (e.g. Arfa et. al. (2022), Cathi Colla Architects (2019), Fatori & Bierbroek (2020) Plevoets & Cleempoel (2019), Puolamäki & Häyrynen (2014)). For each pillar of sustainability there are some guiding design principles following from the literature resources mentioned above:

Environmental sustainability relates to the materials, form and the systems linked to both the construction and its surroundings. Methods of reducing the environmental footprint of existing buildings are: building on a smaller scale, using recycled or recyclable materials, selecting materials carefully, reducing water and soil pollution, reducing air pollution of traffic around the building, making use of passive design, storing energy, utilizing renewable resources, evaluating the existing material stock.

Social sustainability relates to the establishment of communities that are inclusive, secure, and healthy, and are effectively integrated into broader urban systems. Cultural values, norms and traditions are taken into consideration with this. Methods of supporting these communities are: realising reliable access to public transport, co-operation between users/stakeholders, supporting inclusivity, designing in a flexible way, establishing secure and healthy living spaces.

Economic sustainability relates to finding a balance between cost and the value of something for the users/stakeholders/collective (on a bigger scale). Methods of finding a balance between the cost and true value are: considering the scale of the intervention, reducing materials, using local materials, examining longevity of the structure and the materials, designing for the ease of operation, creating structures that require minimal maintenance, creating sustainability-focused learning programs for stakeholders.

The sustainable design principles help to understand the possible reasons of why past interventions in modern shopping malls might have been executed. In order to measure the impact of an intervention in a building or site on the three aspects of sustainability, the wheel of Kamari, Corrao and Kirkegaard (2017) is used in this research (see figure 5 and 6).



This wheel was established by combining several research methods to create a modern sustainability focused decision-making tool for building renovation. It can be used in every stage of the design process: from brainstorming on ideas during the starting phase up to the evaluation of executed designs. In this wheel, the most important sustainability values following from the research are displayed in the internal circle. The three pillars (environmental, social and economic) are respectively translated into objectives: functionality, accountability and feasibility. The external circle shows the collection of required data on the pre-design.

After applying the framework, a building renovation can be seen as successful if the expected level of performance is achieved (Kamari, 2017). “The intent is an optimum of all requirements, not maximization of some.” (Kamari et. al., 2017, p.345). The environmental, social, and economic aspects of renovating modern shopping malls in the Netherlands are interdependent, and it is then assumable to state that sustainable renovations that address all three aspects will be more effective in achieving long-term sustainability goals than those that prioritize one aspect over the others. In this research, the wheel of Kamari will be used to evaluate past interventions on Dutch modern shopping malls.

Relevance

Sustainability is a condition that must be re-examined over time (Butters, 2014). With the ever changing society and advancements in technology, the possibilities for buildings to get a high score on sustainable renovation are growing. From an academic perspective, the critical examination of past design interventions in modern shopping malls and the mapping of their sustainability features is an essential contribution to the field of sustainable design. This research can provide insights into the effectiveness of past sustainability interventions, as well as identify areas for improvement and innovation in future designs. The outcomes of sustainable value assessments are relevant for stakeholders in the decision-making process, and this research can help to clarify and expand the existing knowledge on the sustainability of Dutch shopping malls. By examining holistic sustainable designs for shopping malls, this research can contribute to the advancement of sustainable project development and support the transition towards a more sustainable built environment.

Figure 5 - Holistic sustainability decision-making support framework for building renovation, by Kamari et. al. (2017). Retrieved from <https://www.sciencedirect.com/science/article/pii/S221260901730064X>

Table 5
The sustainability decision-making support framework's performance rating system – e.g. of the indicator: Durability.

Durability	Value	Standards	Ratio	Example
	1	Sub-standard	Low	5–10 years
	2	Minimum standard	Reasonable	10–15 years
	3	Good practice	Moderately	15–20 years
	4	Best practice	High	20–25 years
	5	Exemplary	Very high	More than 25 years

Figure 6 - The sustainability decision-making support framework performance rating system - e.g. of the indicator: Durability, by Kamari et. al. (2017). Retrieved from <https://www.sciencedirect.com/science/article/pii/S221260901730064X>

Research questions

4

Research questions

Reviewing and assessing the past renovations of modern malls in terms of sustainability can provide an updated answer to how the modern mall can become more sustainable in the future. In order to set up a research that investigates the sustainability of interventions applied to modern malls in the Netherlands, the following research question and subquestions are formulated:

RQ: *What is the effect of interventions in three Dutch modern shopping malls with different structures [covered, partly covered and open] on the environmental, social and economic aspects of sustainability?*

1. *How are modern shopping malls related to the environmental, social and economic aspects of sustainability?*
2. *What are the past and current design interventions in three Dutch modern shopping malls with different structures?*
3. *What are the environmental, social and economic impacts of these past and current design interventions?*
4. *How can the design interventions in the three Dutch shopping malls be compared in terms of a holistic approach to sustainability?*

Aim

This study aims to investigate the impact of design interventions on the environmental, social, and economic sustainability aspects of three modern shopping malls in the Netherlands with different structural typologies (covered, partly covered, and open). The three case studies of shopping malls are respectively “Westfield mall of the Netherlands” (Leidschendam, 1971), “De Bogaard” (Rijswijk, 1963) and “De Lijnbaan” (Rotterdam, 1953).

The aims of the subquestions are subdivided into:

1. Providing background information about modern mall typologies and give examples how the malls are linked to the three aspects of sustainability;
2. providing a catalogue of developments in three different shopping malls in the Netherlands over the past decades;
3. providing a critical evaluation on past and current interventions in three dutch shopping malls based on the wheel of Kamari (2017);
4. making a comparison based on the wheel of Kamari (2017) that puts the outcome of the evaluation in a broader context.

After answering the fourth subquestion, the comparison strives to reveal common elements of sustainability in the malls that can be used for the renovation of other malls as well. Besides that, the value(s) of existing building parts can be exposed. In figure 7, the aims mentioned above are displayed in a diagram.

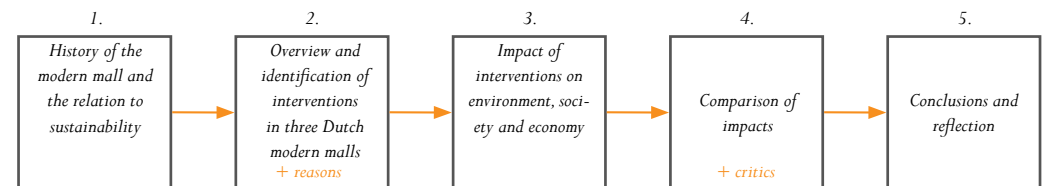


Figure 7 - Chain of analyses, Own creation (J. Moens, 2023)

Methodology

5

Research methods

To answer the research questions, both qualitative and quantitative methods will be used in order to respond to social (qualitative), environmental and economic (quantitative) aspects of sustainability (Kamari, 2017); and intent that buildings in the future will be constructions that also require quality in their environments to foster life in and around them instead of being merely optimized mechanical buildings with intelligent adjustment systems (Gylling, 2011).

The core of this research is built around three case studies and dives into various renovations of modern shopping malls in the Netherlands. The research methods that are needed per research question are described in the following paragraphs. Figure 15 on page 9 shows a diagram in which the relation between the chapters is made visible.

History and theory

In the first chapter of the research project, *literature studies* on holistic sustainable renovation, modern shopping malls and modern heritage can reveal reasons for past and current developments in this sector. This method answers the subquestion: *How are modern shopping malls related to the environmental, social and economic aspects of sustainability?*

Case studies (Main body)

After exploring and clarifying the topic in the first chapter, an in-depth analysis of three case studies of different Dutch modern shopping malls form the base of

the research. The three case studies (De Lijnbaan, De Bogaard and Westfield Mall of the Netherlands as mentioned in the previous chapter) are chosen because of their different typology. “De Lijnbaan” has an open structure without a roof above the public place, “De Bogaard” functions as a hybrid, which has open spaces as well as covered spaces and “Westfield Mall of the Netherlands” is fully covered. In figure 8-13 the typologies of the malls are schematically represented in a section and a photograph.



Figure 8 - Simplified section of “De Lijnbaan” showing the typology (open) (J. Moens, 2023)



Figure 9 - Rotterdam (NL). “De Lijnbaan” shopping mall (J. Moens, 2023)

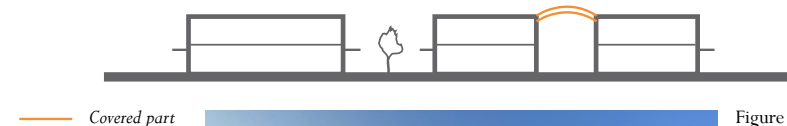


Figure 10 - Rijswijk (NL). “De Bogaard” shopping mall (J. Moens, 2023)



Figure 11 - Simplified section of “De Bogaard” showing the typology (partly covered) (J. Moens, 2023)

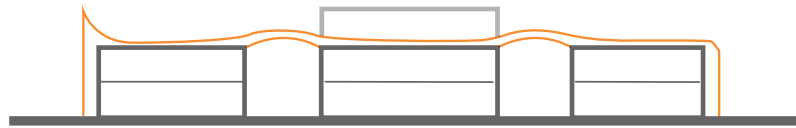


Figure 12 - Simplified section of "Westfield Mall of the Netherlands" showing the typology (covered) (J. Moens, 2023)

Figure 13 - Leidschendam (NL). "Westfield mall of the Netherlands" shopping mall by MSVA architects (2020). Retrieved from <https://architectenweb.nl/nieuws/artikel.aspx?ID=48999>



— Covered part

Catalogue

These alterations in typologies might have had different impacts on the environmental, social and economic aspects of sustainability and are therefore interesting to investigate. Research on case study analysis will be conducted in several ways:

- (Archival) research:* Used to document the past sustainable interventions.
- Interviews with architects:* Used to retrieve information on recent interventions.
- Observations:* Used to analyse current design features (subjective).

All the analyses of the shopping malls should be treated equally and be conducted in an objective way in order to provide useful information. These methods will provide an answer to the subquestion: *What are the past and current design interventions in three Dutch modern shopping malls with different structures?*

Evaluation

In this chapter the internal part from the wheel of Kamari (2017) will be used to evaluate the past and current interventions of the three shopping malls. As shown in figure 14, different values are measured in the three sections of the wheel. Some evaluations need qualitative methods (accountability) and some need quantitative methods (functionality and feasibility). Therefore, *interviews with users and reading*

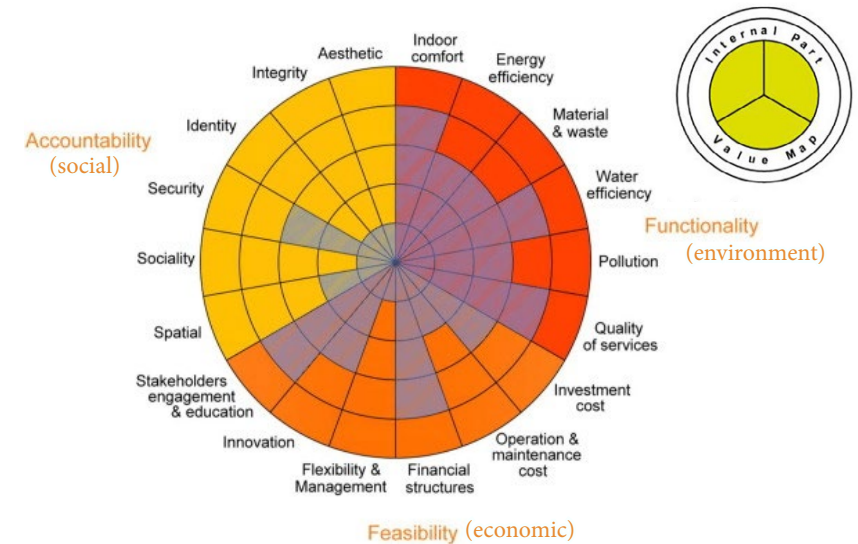


Figure 14 - Internal part of the holistic sustainability decision-making support framework, by Kamari et. al. (2017). Retrieved from <https://www.sciencedirect.com/science/article/pii/S221260901730064X> (Edit by author)

(old) newspapers are used as qualitative methods and *data analysis, literature studies on functionality and feasibility and analysis of information retrieved from the catalogue* are used as quantitative methods.

These methods will provide an answer to the subquestion: *What are the environmental, social and economic impacts of these past and current design interventions?*

Comparison

To compare the three case studies on sustainability a *cross-case analysis* will be used that involves comparing and contrasting the findings from the different case studies to identify patterns, similarities, and differences. Conclusions can be drawn on options to renovate modern malls in a holistic sustainable way. This methods will provide an answer to the subquestion: *How can the design interventions in the three Dutch shopping malls be compared in terms of a holistic approach to sustainability?*

The reflection of the research is illustrated by a **framework**, which speculates on a holistic approach to sustainability for modern shopping malls by placing the conclusion of the comparison in a broader context. It relates the sustainability of past interventions to what is needed in the present and the future. This completes the cycle in the methodology chart (figure 15).

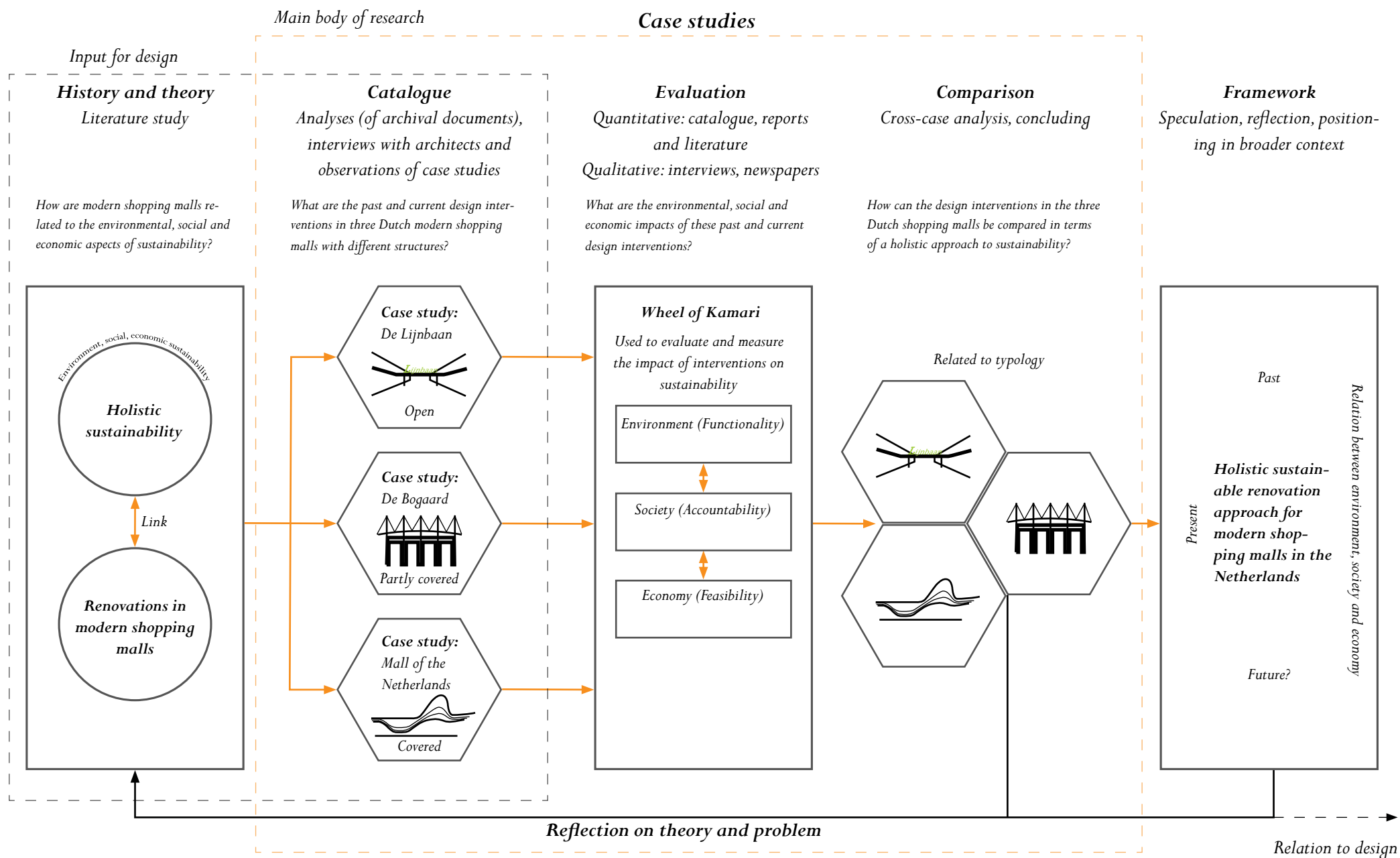


Figure 15 - Methodology chart, Own creation (2023)

Expected outcome

6

Possible outcome of comparing the three case studies

A possible outcome from the research could be a value map (see figure 16 and 17) in which design interventions of the case studies are placed. It could show the relations between the three aspects of sustainability applied to renovation strategies over time and it is expected that interventions from a specific time period will be placed around the same area of the map, since the understanding of sustainability has changed over time (Gylling et. al, 2011) and certain values could have been prioritized per time period because of trends.

The shopping mall nowadays is becoming more of a social gathering space (Aktas, 2011), so it would be an assumption that the social impact plays a bigger role for malls and should be reconsidered more thoroughly when planning to re-design in a sustainable way in the future.

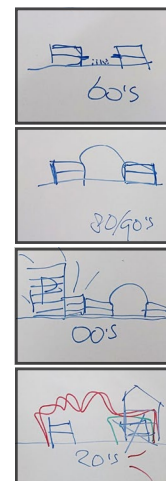
From the what to the how: relation to the design question

To conclude, the outcome of the research paper helps to understand what has been done and what can be done to renovate Dutch modern malls in a sustainable way and how that is related to the structure of the mall. Tracking down the most important sustainable values in the three case studies might reveal what architectural elements should be considered as heritage. Applying the retrieved knowledge to a redesign of shopping mall “De Bogaard” leads to the following design question:

How can modern shopping mall “De Bogaard” (Rijswijk) be renovated to promote environmental, social and economic sustainability?

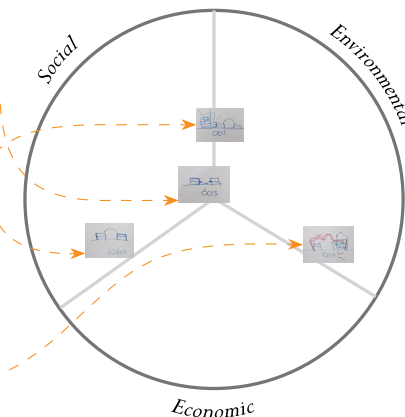
Input

Type of intervention
(simplified for now)



Research outcome

Edited value map of Kamari



Design

Current and future challenges
for sustainable renovation

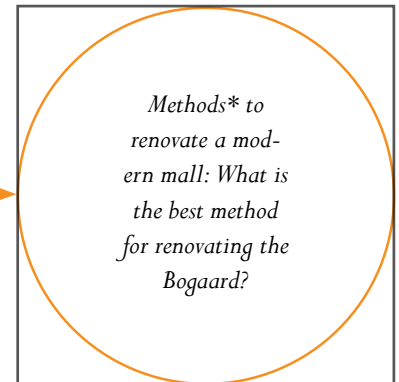
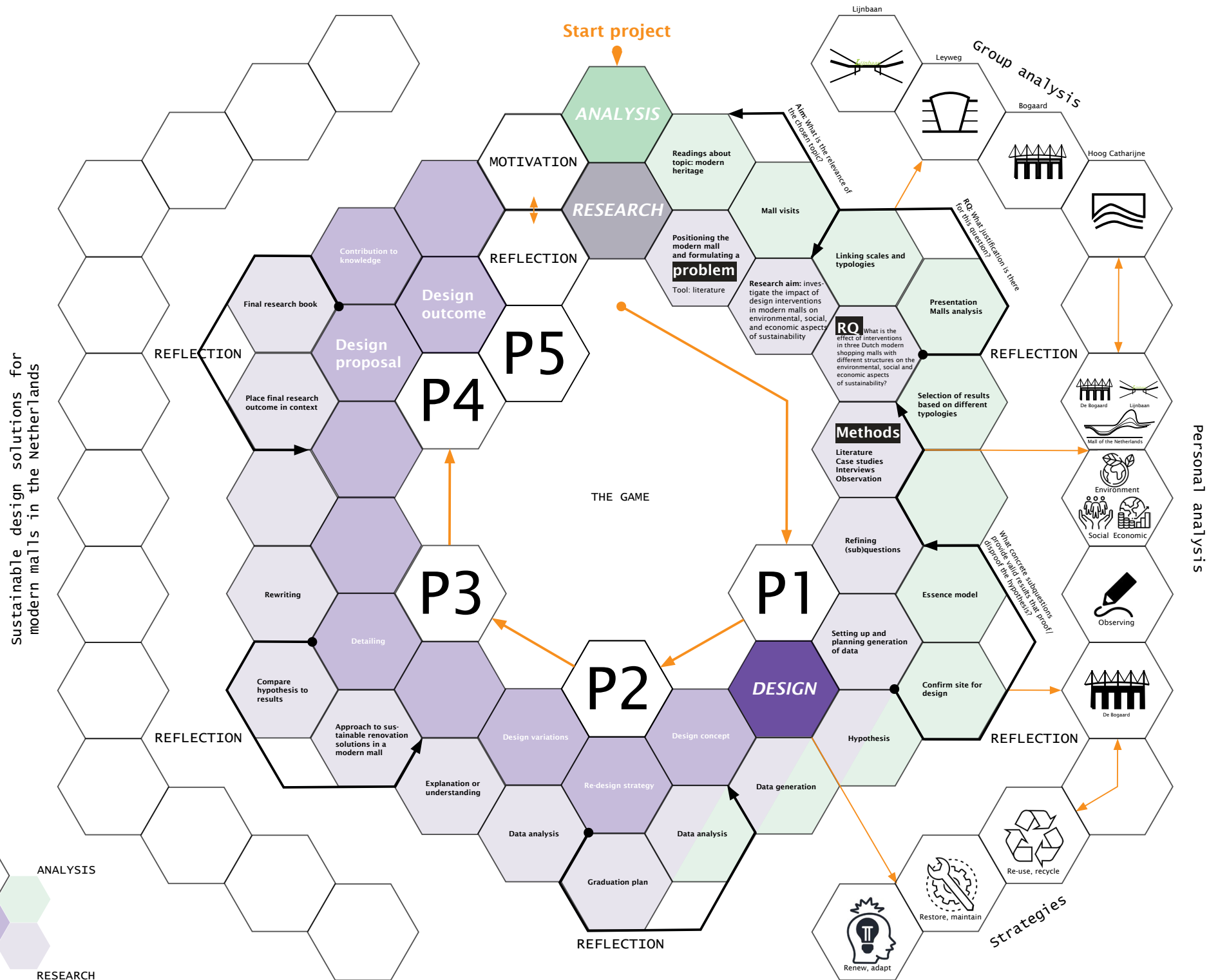


Figure 16 - Examples of renovations in modern malls, by Meijers & Marulo (2023). Retrieved from HA_Joint Meeting Research Plan_20230327 presentation slides

Figure 17 - Visualisation of possible outcome in relation to design, Own creation (J.Moens, 2023)

* There are several ways to deal with renovations of buildings in a sustainable way. Some guiding principles of these methods are addressed in the chapter 3: Frame of reference.

A diagram consisting of four overlapping hexagons arranged in a 2x2 grid. The top-left hexagon is white with a black outline and is labeled 'RESULTS' to its upper left. The top-right hexagon is light green and labeled 'ANALYSIS' to its upper right. The bottom-left hexagon is purple and labeled 'DESIGN' to its lower left. The bottom-right hexagon is light purple and labeled 'RESEARCH' to its lower right. The hexagons overlap such that the top-right and bottom-left hexagons are partially covered by the others.



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List of figures

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- [Figure 14] Internal part of the holistic sustainability decision-making support framework, by Kamari et. al. (2017). Retrieved from <https://www.sciencedirect.com/science/article/pii/S221260901730064X> (Edit by author)

[Figure 15] Methodology chart diagram by author (2023)

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[Figure 17] Expected outcome diagram by author (2023)