RESHAPING THE PAST, BUILDING THE FUTURE

The role of digitalisation in contributing to ESG performance of real estate developers

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ABSTRACT Considering the increasing demand for sustainable and responsible real estate development, it is becoming more important to include Environmental, Social, and Governance (ESG) principles into real estate operations. In addition, the process of digitalisation is causing transformations in various industries, including the real estate industry. Consequently, the industry is compelled to embrace ESG principles and evaluate the role of digitalisation due to the challenges it has to face. As a result, this research investigates methods to improve environmental, social, and governance (ESG) performance and examines the contribution of digitalisation in this context. This research assesses the performance and values associated with environmental, social, and governance (ESG) values, as well as the role of digitalisation, through investigating a chain perspective with multiple stakeholder perspectives. However, the main target group includes real estate developers who have the responsibility to initiate, decide on, and manage development projects. Hence, the main objective of the research is to formulate propositions that empower real estate developers to efficiently navigate the shifts in ESG performance and the contribution of digitalisation. In the end, the goal is to make a meaningful contribution towards a future that is both environmentally sustainable and able to face challenges.

Keywords: ESG performance, ESG values, digitalisation, digital functions, real estate development.

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1. Introduction

In today's world, technology has become a component of almost everything we do. Furthermore, at a global scale, digital technologies are driving innovation and causing changes in various industries (Wang, 2023). Industries are faced with the challenge of transitioning to a digital future in a way that is both efficient and effective, while technology continues to evolve.

Similarly, the real estate industry encounters identical challenges due to the demands for sustainable developments and the rate of urbanisation. The real estate business is driven to push boundaries and adjust in order to fulfil the evolving market demands as sociological and environmental changes gain momentum. Stakeholders in the real estate industry might want to reconsider their traditional approaches in response to this evolving environment. Due to the pressures indicated and the worldwide significance of the industry for economic stability, it encounters more challenges: its performance on Environmental, Social, and Governance (ESG) principles and the influence of digitalisation.

Although innovation and technology hold considerable promise, the industry is taking time to change, namely in the form of digitalisation, or property technology (PropTech) (Tan & Miller, 2023; Wang, 2023), and to embrace ESG principles into its operations. This reluctance to adapt restricts the advancement towards conforming with the paradigms of Industry 4.0 and 5.0.

Despite the global importance of the real estate industry, which exceeds that of the oil, automotive, and banking industries, this industry is still reliant on traditional methods. This presents a notable opportunity for growth and creative thinking by adopting new approaches and strategies. Such developments could tackle the changing requirements of ESG and digitalisation (Mattarocci & Scimone, 2022; Maarbani, 2017).

1.1 Summary of literature and market research

The real estate industry is currently experiencing digitalisation driven by technical developments, such as PropTech, and intensified by factors like climate change and the COVID-19 pandemic (Tan & Miller, 2023; Wang, 2023; Lee et al., 2024). Consequently, digitalisation is altering the industry in terms of sustainability and commercial viability, going beyond conventional models that emphasise design and system improvements to address performance behaviour (Balogun et al., 2020; Gijzen, 2013; Yalina & Rozas, 2020). However, it matters for the industry to strategically apply technology in order to conform with industry standards. This calls for a shift towards integrated and strategic application of technology, rather than uncontrolled implementation, to improve sustainability and efficiency (Kane et al., 2015; Wang, 2023).

Although there is a strong push to adopt digitalisation, the available literature indicates an opposition that hinders the integration with the economic and environmental developments represented by Industry 4.0 and Marketing 4.0 (Ullah et al., 2018; Dash et al., 2021; Starr et al., 2020). The shift from traditional industrial operations to adaptive, digitally connected processes using AI, robotics, and the Internet of Everything (IoE) is known as the evolution towards Industry 4.0 and 5.0. However, the exact definitions and technologies associated with these terms are still changing and not yet established (De Giovanni, 2023; Kwilinski et al., 2023; Lee et al., 2024; Starr et al., 2020; Wang, 2023; Schwab, 2017; Lu, 2017). So, it remains relatively vague.

Beyond that, the process of digitalisation in the real estate sector represents a shift in redefining conventional methods and enhancing the effectiveness of activities associated to real estate (Lee et al., 2024). Nevertheless, the determination of the real estate workforce to adapt to digital developments and the challenges related to digitalisation require a deeper look (Starr et al., 2020; Tan & Miller, 2023; Latif et al., 2023; Phan & Boge, 2023).

Moreover, there has been an increase in the importance of environmental, social, and governance (ESG) principles within the real estate industry, particularly after the COVID-19 epidemic, and as a result of the United Nations' Sustainable Development Goals (SDGs) for worldwide sustainability (Lee et al., 2024; Saxena et al., 2022). Although advancements in technology have often worsened environmental concerns, there is an increasing consensus on incorporating ESG (Environmental, Social, and Governance) values into business plans (Eichholtz et al., 2010, 2013; Lee et al., 2022; Onishi et al., 2021; Henisz et al., 2019). In addition, Industry 4.0 (and 5.0) provides the possibility to evaluate an organisation's environmental, social, and governance (ESG) metrics. However, the correlation between digitalisation and ESG performance is still poorly utilised (Saxena et al., 2020; 2022).

Given the increasing importance of (global) issues including climate change, social injustice, and ethical governance, it is relevant for businesses, politicians, and investors to learn about the factors that impact ESG performance. According to Khaw et al. (2024), it promotes informed decision-making, ethical corporate conduct, fulfils stakeholder expectations, boosts competitiveness, and helps create a more sustainable future.

Therefore, in order to adapt to this change, it is significant to carry out further research on the abilities and competencies of the workforce, advancements in technology, and the performance of businesses with environmental, social, and governance (ESG) values. The significance of this study is highlighted in the works of KwiliCski et al. (2023), Lee et al. (2024), JLL (2023), Saull et al. (2020), Warren & Myers (2022), and Warren & Myers & Cradduck (2021). The introduction of Environmental, Social, and Governance (ESG) and digitalisation practices pose challenges as well as opportunities for the real estate industry. In order to evolve and remain resilient, the industry might embrace change and foster new ideas in response to emerging trends and concepts in ESG performance and digitalisation, which extend beyond mere business objectives or plans.

1.2 Societal and scientific relevance

The real estate industry's adherence to ESG (environmental, social, and governance) values and to embrace digitalisation is socially and academically significant due to the dynamic character of the industry and its impact on socioeconomic matters. Therefore, the implementation of ESG values and digitalisation practices provides a means to decrease the environmental footprint of the industry, foster equitable society, and attain economic sustainability. These practices also match with the objectives of the United Nations Sustainable Development Goals (UN SDGs). This move is not solely a reaction to technological advances advancement, but rather represents a reassessment of how real estate may play a role in promoting a sustainable and resilient future (Saxena et al., 2022; Lee et al., 2024). Furthermore, the transition to Industry 4.0 and 5.0 offers the sector an opportunity to take the lead in adopting intelligent and adaptive practices. These practices not only promise increased efficiency but also support creating a more sustainable and socially inclusive world (De Giovanni, 2023; Kwilinski et al., 2023; Lee et al., 2024).

1.3 Problem statement

With the increasing global awareness of Environmental, Social, and Governance (ESG) values, the real estate industry is gaining pressure to incorporate these values into its operations. While digitalisation holds promise for improving ESG performance, the industry has somewhat integrated the concepts. Both of the concepts show an interesting opportunity in the industry's strategy for achieving sustainable growth and optimising resource management (Mattarocci & Scimone, 2022; Maarbani, 2017).

However, there is still a gap in incorporating environmental, social, and governance (ESG) values and the contribution of digitalisation. Therefore, this research seeks to bridge the gap and capitalise on the possibilities offered by the concepts of ESG and digitalisation. Hence, it is significant to look at the ways

and specific ESG values that can be incorporated to improve ESG performance, as well as the ways in which and how digitalisation can specifically contribute to ESG performance in real estate developments. This analysis is particularly important from the perspective of real estate developers, as they are the ones who initiate, can opt, and guide real estate development projects.

2. Conclusion and discussion of literature

Previous studies looked at the process of digitisation in the real estate sector, which has been influenced by the emergence of Industry 4.0 and 5.0. This transformation is also driven by economic, environmental, and social reasons. Previous studies attempted to comprehend the integration of these developments within the broader shift towards Industry 4.0 and 5.0, along with the impacts on Environmental, Social, and Governance (ESG) values in the industry. Thus, a number of insights have been understood:

1. The real estate industry is important for the growth of the world (and regional) economy. It is currently experiencing a transition, that calls for a revaluation of previous methods and practices in light of the COVID-19 pandemic and climate change.
2. Digitalisation offers the potential for more efficient and effective sustainability and costs. However, in order to actualize their potentials, enterprises and key stakeholders, including governmental authorities, require a comprehensive strategy.
3. Despite the claimed benefits of digitalisation, the industry is cautious to adopt these developments, which presents challenges.
4. The real estate industry is affected by the growing concepts of industry 4.0 and 5.0, which highlight the significance of digitalisation, innovation, and adaptation. These principles signify a shift in the business models of industries.
5. The available research on Industry 4.0 and 5.0, digitalisation, and ESG suggests that no significant differences or benefits have been identified so far. However, there are additional problems in the literary works.
6. The real estate industry is changing how operations, transactions, and management practices are conducted. Nevertheless, the willingness of the labour force to adjust to new technologies tends to be an indicator of uncertainty.
7. The increased attention to ESG values in the aftermath of the pandemic suggests a shift towards adopting ethical and sustainable business practices.

In addition, Phan & Boge (2023) have emphasised the significance of recognising digitalisation as an additional component of the current operational procedures of the real estate industry before doing an in-depth research on the subject at hand. The difference between the enhancement of the initial and advanced stages (figure 1) in the real estate development is particularly relevant (Phan & Boge, 2023).

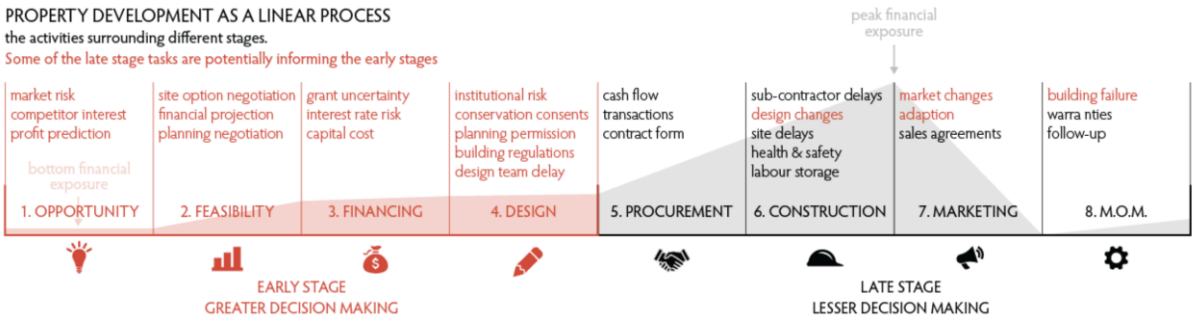

Figure 1. Property development timeline (Phan & Boge, 2023).

2.1 RIBA Plan of Work 2020

As a response to Phan & Boge's (2023) notice, the RIBA Plan of Work 2020 framework provides an approach that deviates the phases of a building project into eight distinct phases (figure 2, see full plan in appendix 1): use, handover, strategic definition, preparation and briefing, concept design, spatial coordination, technical design, manufacturing and construction, and technical design (RIBA, 2020).

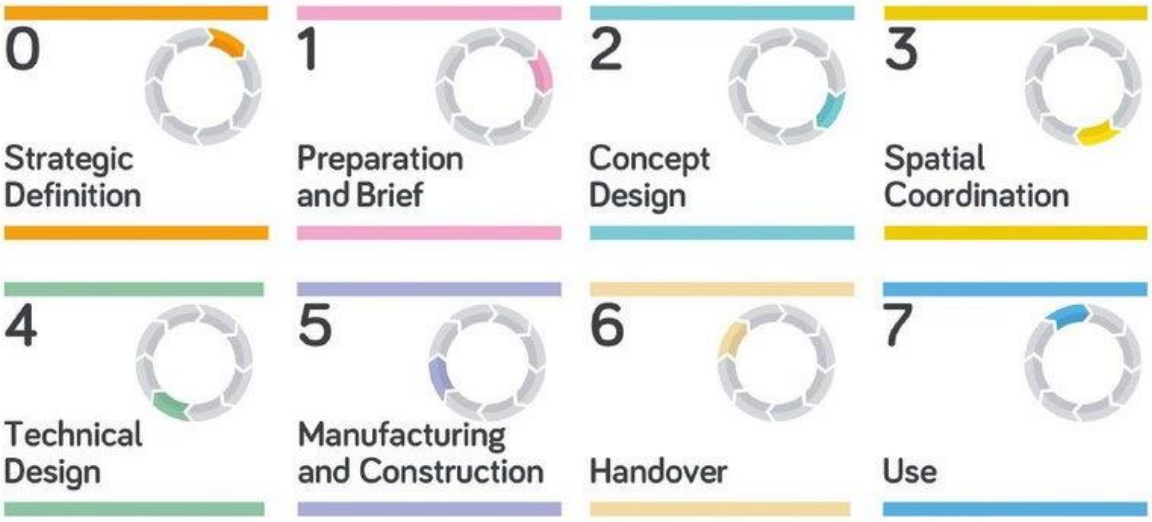

Figure 2. Property development timeline (Wariner, 2023).

The RIBA plan of Work offers coherence and organisation, ensuring that all stakeholders have a mutual comprehension of the project process. The framework outlines the desired results, essential activities, and necessary communication at each stage, ensuring that project goals and expectations are in harmony (RIBA, 2020). From the standpoint of real estate developers, it is important to have precise details on the availability of Environmental, Social, and Governance (ESG) values during these phases.

Furthermore, a notable addition in the most recent version is the incorporation of sustainable strategies at every stage. The focus on achieving sustainable results and demonstrating sustainability is particularly relevant when considering ESG performance.

The RIBA Plan of Work integrates extensive feedback from professionals in the industry over a period of almost seven years, encompassing current methodologies and technological progress. The continuous improvement of this framework ensures its continued relevance and effectiveness in tackling contemporary challenges (RIBA, 2020), such as ESG performance and the impact of digitalisation. Therefore, by incorporating feedback and adhering to industry norms, the framework is able to adjust to the changing requirements of the real estate industry.

The framework encourages cooperation and interaction among stakeholders with an interest or concern in the matter. Consequently, delineating the specific duties and obligations at every phase. This framework implies that all partners are in agreement and working towards the shared objective of each project. The framework also facilitates the utilisation of digital functions and methodologies, such as Building Information Modelling (BIM) and other efforts of digitalisation. This adaptability enables the utilisation of technology to improve overall project outcomes (RIBA, 2020).

Therefore, the RIBA Plan of Work 2020 serves as more than a mere guideline; it serves as a framework for this research. The framework's organised approach, focus on sustainability, integration of industry feedback, and promotion of digitisation contribute significantly to its benefit for this research.

3. Research objective

Previous studies indicate that the industry is currently at the forefront of industry changes. The industry's ability to adopt ESG values and leverage digitalisation is becoming more important for achieving sustainable growth and resilience. Although literature presents challenges, especially in terms of convincing the professionals and implementing strategies, the potential benefits are promoted and substantial as well. Further research and practice may focus on developing a understanding of these dynamics. This will help the real estate industry adapt, innovate, and succeed in an industry that is becoming more environmentally, socially, and governance-conscious, with the assistance of digitalisation.

As a result, it is important to carry out research in order to comprehend the intricate dynamics and challenges for a broader implementation and contribution. Hence, the main aim of this study is to provide an extensive investigation of the real estate industry, more specifically from a real estate developers perspective, focusing particularly on a chain perspective that involves multiple stakeholders (e.g. contractors, owners and investors, policy makers, developers, architects, and consultants), namely in the realm of corporate real estate (CREM). Therefore, this study utilises a mixed-method approach to discover the specific patterns and concerns that are relevant in the context of ESG and digitalisation. Hence, this research will be organised based on the main question:

How can digitalisation contribute to ESG performance during RIBA stages?

In order to provide a solid base for the main research question, several sub-questions have been developed. The sub-questions create a foundation for the research's design and offer insights into the areas of focus of the research objective. Consequently, the sub-questions have been brought up:

1. Which EG values (or data) are most critical during RIBA 0?
2. What digital functions are available and suitable during RIBA 0?
3. How can ESG values and digital functions be integrated during RIBA 0?
4. What is the current (as-is) and desired (to-be) scenario?

3.1 Conceptual framework

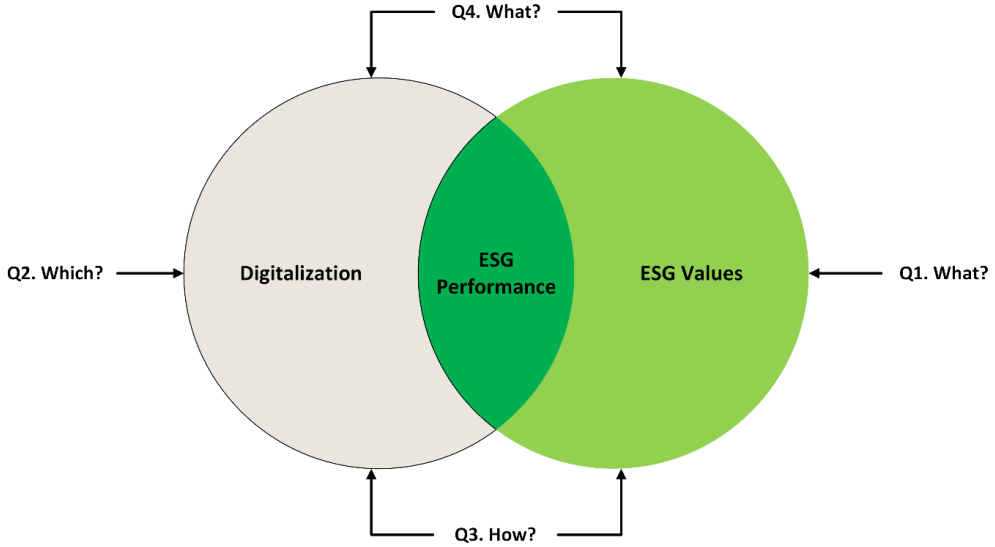

Figure 3. Research framework (Author, 2024).

This research is commenced with a systematic search using a venn diagram to use the concepts of this research and represent the logical relation between the two specific concepts. The diagram seeks to

guide the research in a solid manner and find an answer in between the arising concepts of ESG values and digitalisation during real estate development projects for improved ESG performance.

4. Research questions

Based on previous studies on the aforementioned concepts and context, the previously mentioned research questions have been developed. These will be elaborated further for a greater understanding and exploration of the development of nuanced understandings of dynamics, ensuring that the real estate sector can thrive in an increasingly ESG-conscious industry with the contribution of digitalisation.

Sub-question 1: Which ESG values (or data) are most critical during RIBA Stage 0?

Importance for research objective: It is important to identify the most relevant ESG (Environmental, Social, and Governance) values or data at RIBA Stage 0 since this stage establishes the strategic definition for the whole project. During this stage, the project's objectives are defined. Understanding the most important ESG values enables project developers to give priority to these values from the beginning, guaranteeing their integration into the core aspects of the project. This helps in establishing standards and optimising the project's environmental, social, and governance (ESG) performance from the beginning (RIBA, 2020; Hwang & Ng, 2013).

Sub-question 2: What digital functions are available and suitable during RIBA Stage 0?

Importance for research objective: Investigate the digital functions that are suitable and practical during RIBA Stage 0, since these technologies have the potential to improve or hinder the strategic planning process. Technologies such as Building Information Modelling (BIM), Geographic Information Systems (GIS), and different data analytics platforms or businesses might provide useful data. Developing an in-depth understanding of the digital functions that may be used is beneficial for choosing the most efficient ways to include ESG values into the strategic definition of the project. This guarantees that the project comes with suitable digital functions to enhance ESG performance right from the beginning (Bryde, Broquetas, & Volm, 2013; Volk, Stengel, & Schultmann, 2014).

Sub-question 3: How can ESG values and digital functions be integrated during RIBA Stage 0?

Importance for research objective: Integrating ESG values and digital functions ffrom the initial stage of the RIBA process in order to develop a comprehensive and effective plan for using ESG performance. This integration facilitates the conversion of abstract ESG values into tangible, quantifiable actions. By comprehending the utilisation of digital technologies to contribute to and improve ESG performance, project developers could ensure that project objectives are not only specified but also actively controlled and monitored throughout the project lifetime (Azhar, 2011; Harty, 2005).

Sub-question 4: What is the current (as-is) and desired (to-be) scenario?

Importance for research objective: Analysing current (as-is) and desired (to-be) scenarios provides a comprehension of the existing industry situation and its ambitions or objectives. The gap analysis helps in pinpointing the precise areas that need enhancements and for establishing practical and attainable objectives. Through the process of analysing and evaluating the existing level of digitalisation and ESG performance, project developers may identify areas that need improvement and compare them to the anticipated future state. This allows them to create specific plans to close the gap between the current and desired states. This approach facilitates the alignment of the project with established methods and benchmarks in the industry, guaranteeing ongoing improvement and compliance with environmental, social, and governance principles throughout the project's duration (Project Management Institute, 2013; Schwalbe, 2015).

5. Theoretical underpinning

5.1 ESG Values

The concept of ESG derives from ethical and responsible investment, which opposes a profit-focused business approach. It promotes the integration of environmental, social, and governance factors into investment decisions, while also considering economic benefits (Zhang et al., 2023; Tarmuji et al., 2016)..

Environmental, Social, and Governance (ESG) concepts have gained increasing significance and acknowledgment in recent years among various stakeholders involved (Rau & Yu, 2023; Newell & Marzuki, 2024). These concepts are progressively influencing corporate strategies and performance. Khaw et al. (2024) observed that despite the increasing attention, ESG does not have a distinct academic definition. ESG, or Environmental, Social, and Governance, covers several aspects such as an organization's environmental footprint, social obligations, and the governance structures that support its operations.

The incorporation of Environmental, Social, and Governance (ESG) concepts into business strategies is renowned for its ability to boost corporate reputation (Mur¯ et al., 2020). However, since there are no exact academic definitions available, this research will define ESG concepts as values. Therefore, it is important to provide a clear definition of the term "values". Roe and Ester (1998) define values as hidden concepts that represent how individuals or organisations assess actions or results. Value often refers to the connection between a person assessing something and the thing being assessed. This connection is marked by durability and implications for the person's future activities. Importantly, values are not just held by individuals but also by groups.

Due to the expansive and ambiguous nature of ESG in academic literature, characterising ESG as values provides an explanation for comprehending its significance in business strategy and performance. By considering ESG as values, it is recognised that these principles are subjective and evaluative in character. This aligns with Roe and Ester's (1998) understanding of values as underlying constructs that impact both individual and group behaviour.

Integrating ESG values into business operations involves acknowledging the significance of environmental stewardship, social responsibility, and strong governance systems as essential components of long-term corporate prosperity. These values are the driving force behind decision-making processes, they create the culture of the organisation, and they have an impact on relationships with stakeholders. The values of ESG serve as a set of standards for assessing company actions and results, guaranteeing that they are in line with larger societal and environmental objectives.

Therefore, by defining ESG as values, we may gain a deeper understanding of their importance in influencing corporate conduct and promoting long-term sustainability. This method not only benefits in clarifying the concept but also emphasises the significance of incorporating ESG values into the core business.

5.1.1. E

The 'E' in ESG refers to the environmental aspect, which relates to a business's ecological or environmental impact. This includes initiatives to decrease its carbon emissions, properly manage natural resources, and mitigate environmental damage (Senadheera et al., 2021). It also includes efforts focused on sustainability, renewable energy, waste minimization, and other related areas.

The environmental dimension encompasses a range of environmental measures. The objective of such is to reduce negative environmental impacts and foster sustainable development (De Souza Barbosa et al., 2023). Companies can reduce their ecological impact by adopting renewable energy sources, improving energy efficiency, and implementing thorough recycling programmes.

As a result, literature emphasises the significance of incorporating these environmental practices into company plans in order to attain long-term sustainability and enhance corporate reputation. This integration serves the dual purpose of meeting regulatory obligations and satisfying the growing demands of stakeholders that prioritise environmental stewardship (De Souza Barbosa et al., 2023). Furthermore, the execution of these strategies can result in improved financial outcomes by diminishing operational expenses and mitigating the risks linked to environmental rules and potential environmental catastrophes (Taliento et al., 2019).

Ultimately, using the term "values" while discussing the environmental component of ESG serves to emphasise the dedication of businesses to sustainable practices and their contribution to promoting environmental accountability. This method is consistent with the wider concept of ESG as a framework for assessing and directing corporate conduct in order to attain sustainable objectives (Rajesh, 2020; Bourcet, 2020; Khanchel et al., 2023).

5.1.2 S

The social dimension, represented by the 'S' in ESG (Environmental, Social, and Governance), is gaining growing importance in the real estate industry. This dimension relates to a business's dedication to social responsibility, which includes upholding ethical labour standards, actively engaging with the community, advocating for diversity, and meeting the expectations of stakeholders. The key components encompassed in this context are gender parity, cultural variety, employee well-being, community involvement, and the management of the supply chain (Newell & Marzuki, 2024; Baid & Jayaraman, 2022).

The literature suggests that incorporating these social components into real estate processes not only improves corporate reputation but also fulfils the increasing demands of stakeholders for socially responsible developments (Newell, 2023). The emphasis on social values in ESG highlights the importance of ethical behaviour and social responsibility in fostering sustainable development and maintaining a positive corporate image.

Hence, ñvaluesòplay a role in the social dimension of ESG, especially within the real estate sector. They establish principles for ethical behaviour, involvement in the community, inclusivity, the well-being of employees, and the responsible management of the supply chain. By incorporating these principles into their business practices, real estate firms can not only improve their corporate image but also fulfil the increasing demands of stakeholders for socially conscious projects.

5.1.3 G

Governance refers to the systems, standards, and procedures that direct a company's decision-making process and ensure its responsibility. This encompasses the organisational structures for corporate governance, the inclusion of diverse members on the board, the promotion of transparency, and the adherence to ethical business practices (Kouaib et al., 2020; Manita et al., 2018). Responsible governance is the practice of operating a business with integrity, fairness, and accountability. It aims to build trust among stakeholders and improve the organisation's reputation and sustainability.

The importance of governance "values" lies in their role as the ethical underpinning and guiding principles for corporate activity. Values are the fundamental principles and priorities that an organisation holds, which have a significant impact on the decision-making process. The methods by which transparency is upheld and responsibilities are handled. By conceptualising governance in terms of values, organisations highlight their dedication to ethical behaviour and responsibility, both of which are crucial for sustained prosperity and the confidence of stakeholders. This viewpoint emphasises that governance encompasses more than simply adhering to legislation; it also involves cultivating a culture of honesty and accountability within the organisation.

5.2 Digital functions

Digitalisation is a prevalent trend that has a profound impact on individuals and society. As a result, the real estate industry is experiencing a significant increase in digitalisation, which presents opportunities and challenges for innovation (Vigren et al., 2022; Yeow et al., 2018). Organisations can derive benefits from digitalisation by leveraging digital technologies and integrating digital-driven enhancements and innovations (Vigren et al., 2022). Literature discusses the topics of Internet of Things (IoT), Artificial Intelligence (AI), and Buildings Information Modelling (BIM) as examples of digitalisation (Atkin and Bildsten, 2017; Brº chner et al., 2019).

Moreover, recent real estate literature has associated digitisation with advancements in technology, the sharing economy, tenant relationships, and new services and business models (Saarikko et al., 2017; Vigren et al., 2022).

Therefore, digitisation in the real estate industry entails the collaboration of numerous businesses and entities to establish an integrated system. This system is dependent on real estate organisations that owns, develops, and leases property. The process of digitalisation has significant effects on the processes, procedures, and interactions within these systems (Vigren et al., 2022).

To understand the effects of digitalisation, it helps to examine its functions. Hence, comprehending the roles and operations within the context of a system.

5.2.1 functions

Within the context of digitisation, the concept of "functions" relates to the diverse roles, tasks, and processes that digital technologies facilitate or enhance within an organisation or system. These roles can be seen as the specific ways in which digital technologies and processes contribute or hinder to achieve organisational objectives and increasing efficiency, innovation, and collaboration (Betti & Sarens, 2020; Wynn & Lam, 2023; Yeow et al., 2018; Singh et al., 2023).

5.3 Integration

The integration of Environmental, Social and Governance values with digital functions during the early stages of project development, specifically RIBA stage 0 (strategic definition), is important to develop sustainable and resilient projects. The integration between digital functions and ESG supports the alignment of project goals with the aforementioned sustainability objectives, transparency, efficiency, and stakeholder engagement.

5.3.1 ESG and Digitalisation

The linkage between sustainable development goals (SDGs) and digital inclusion is centred on the idea that access to digital technologies and internet play a role in achieving sustainable development (Sadigov, 2022; Trushkina, 2019; Lahouirich et al., 2022), more specifically ESG conscious development.

Moreover, Clark et al. (2022) found that digitalisation promotes transparent and accountable governance, community engagement, and access to justice through digital platforms, enhancing democratic processes. This is coherent with the social and economic effects within ESG performance.

In addition, Kwilinski et al. (2023) found that, it can be inferred that digitalisation has a favourable impact on ESG performance, both directly and through spillover effects. This indicates that as digitalisation increases, it positively influences the ESG performance. However, Kwilinski et al. (2023) highlighted a few potential implications:

- Policymakers should prioritise programmes that reduce the digital gaps and provide affordable access to digital services and technologies. This requires inexpensive internet and technological education.
- Governments should strengthen digital infrastructure. This includes high-speed internet, reliable data networks, and cutting-edge technologies. By investing in key drivers, governments may facilitate digital innovation, business, and long-term economic development, improving ESG performance.
- Organisations should prioritise digital public services for consumers and businesses. This includes electronic government services, online company registration, electronic tax filing, and digital healthcare and education.
- Organisations should promote ESG performance by exchanging knowledge, technology, and environmentally friendly practices.

Nevertheless, the majority of literature indicates that ESG and digitalisation have common elements and enhance their respective processes and purposes.

5.4 Desired vs. current scenario

Currently, the real estate industry encounters aforementioned challenges related to ESG and digitalisation. Within this scenario, real estate developers are pressured to adjust to these changes. However, the current scenario tends to be chaotic, requiring a more desirable future scenario with regards to ESG and digitalisation.

The current state of real estate developments demonstrates multiple challenges. The incorporation of ESG tends to be fragmented, sometimes regarded as an extra rather than essential to project development. This leads to inconsistent implementation and less than desirable outcomes (Khaw et al., 2024). In addition, the utilisation of digital functions is constrained by unsuitable strategic development, which hinders the realisation of potential benefits (Latif et al., 2023).

Furthermore, there is a lack of connection between stakeholders, which obstructs communication and agreement on ESG and digital operations (Clark et al., 2022). The industry also encounters deficiencies in monitoring and evaluating ESG performance, which presents difficulties in evaluating progress and implementing enhancements (Fatemi et al., 2018).

Nevertheless, as stated by Fatemi et al. (2018), companies that implement environmental, social, and governance (ESG) measures can improve their market value and gain a competitive edge. Furthermore, digital functions have the potential to enhance data accuracy, optimise workflows, and streamline decision-making processes (Latif et al., 2023). According to Wang (2023), digitalisation has the potential to improve transparency, efficiency, and stakeholder engagement, leading to positive outcomes in terms of ESG performance.

Thus, the desired situation may entail a smoother incorporation of ESG values with the contribution of digitalisation. This scenario seeks strategies to improve environmental, social, and governance (ESG) performance and the implementation of digital functions. Moving from the current scenario to the desired scenario.

6. Research method

6.1 Type of study (explorative, qualitative, quantitative etc.)

To explore the intricacies of ESG performance within the real estate industry and the contribution of digitalisation, this research will employ a mixed-methods approach. The research methodology,

designed to address the values and performance of ESG and the intersection of digitalisation as identified in the literature, aims to shed light on the research questions through sequential qualitative and quantitative methods. The methodological steps are shaped to the research's contemporary focus, leveraging insights from the latest advances within the real estate industry.

The contemporary focus is based on the emergence of these new concepts and befit previous studies only dating from 2015. Furthermore, this ensures that the insights are aligned with the most recent discussions and technological advancements. The search strategy was inclusive of terms like "digital transformation," ñdigitalisation,ò "real estate," ñESGò and "Industry 4.0 and 5.0," with the intention of gathering a broad spectrum of contemporary research findings.

6.2 Research framework

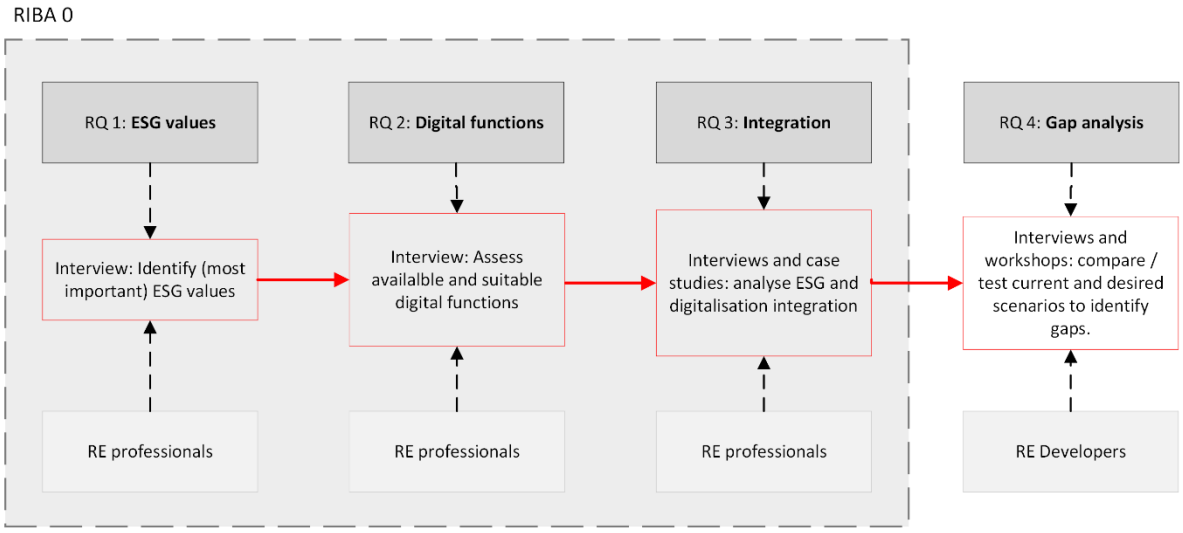

Figure 4. Research framework (Author, 2024).

6.3 Methods and techniques to be used (case studies, experiments, surveys etc.)

A mixed-method approach combines qualitative and quantitative methods to provide an in depth understanding of the matter being researched. At first, interviews will provide an in-depth look of the real estate industry from many opinions, experiences, and perspectives. Interviews are the approach for gathering extensive information and acquiring profound insights into the situations within the real estate chain (Creswell, 2008).

In addition, *instrumental* case studies (approx. 2-3) (Blaikie & Priest, 2019) will be included as reference projects and examples to collect both qualitative and quantitative data, ensuring that the research may be compared to real-life situations.

Moreover, a workshop upon research design (specifically, research via design) will be initiated. This will enable the incorporation of both qualitative and quantitative elements. Design workshops often include collaborative activities, group debates, and novel problem-solving objectives that may provide significant qualitative data. Furthermore, workshops may include structured activities or assessments that provide quantitative data (Stappers & Giaccardi, 2017). The methods offer several benefits to this:

A comprehensive grasp may be attained by combining qualitative and quantitative approaches (Blaikie & Priest, 2019)., allowing for the examination of many aspects of the issue under investigation and leading to a more holistic knowledge.

Triangulation refers to the use of many approaches to test and validate findings, hence enhancing the reliability and validity of the results (Tashakkori & Teddlie, 2010; Blaikie & Priest, 2019).

Adaptability: Mixed-methods research is well-suited for complex themes like digitalisation and ESG performance in the real estate industry, since it can address a wide range of study queries and scenarios.

6.4 Data collecting and analysis (interviews, questionnaires, archival research, Internet metrics etc.)

This research focuses on professionals within the real estate industry, with a particular emphasis on the project developer's position. They play an important role in initiating, managing and opting real estate developments. To gain a comprehensive understanding of the industry's current standings, the study will adopt a chain perspective . This approach allows for a broader analysis and deeper comprehension of the various perspectives (e.g. contractors, owners and investors, policy makers, developers, architects, and consultants) and contexts in real estate development.

6.4.1 In-depth interviews

To generate original propositions or explanations regarding Environmental, Social, and Governance (ESG) performance and behind the role of digitalisation to contribute to Environmental, Social, and Governance (ESG) performance in the real estate industry, this research will predominantly rely on interviews to gather and generate qualitative data. The target audience will consist primarily of project developers and with a broader view on real estate professionals (e.g. contractors, owners and investors, policy makers, developers, architects, and consultants), as they have impact on the developers strategies and business approaches. These professionals play a role in identifying and resolving potential challenges, as well as simulating and evaluating a range of variables that impact ESG.

Hence, to investigate the appropriate target audience, it is necessary to first identify organisations and professionals who have an impact on ESG performance and digitalisation.

A purposive sample and discussion with Boelens de Gruyter will be employed from the aforementioned principles to select appropriate participants. The inclusion of professionals involved in digitalisation and ESG is essential for gaining insights by focusing on a specific group of individuals. Following the initial sample, professionals who possess knowledge of pertinent and information-rich material can be identified using a purposive snowball sampling technique, where one participant provides a reference for another. This approach will help ascertain the correlation between digitalisation and ESG performance. The determination of the interview sample size will be dependent upon the research project's scope and time constraints (Bryman, 2016). The number of interviews will depend on the response rate, with an intended sample size of approximately 5-10 qualitative interviews selected from four to five focus groups.

6.4.2 Research design workshop

Workshops serve to evaluate the ESG values, performance, and impact of digitalisation in real estate developments. The workshop promotes a cooperative atmosphere, allowing various stakeholders to participate in a meaningful discussions, which promotes a thorough understanding. Workshops aim to encourage active engagement and prompt feedback, which in turn facilitates the development of new concepts and the appropriate improvement of approaches. In addition, workshops facilitate the gathering of both qualitative and quantitative data. Group discussions and activities generate valuable qualitative data, while structured tasks and assessments produce quantitative data, allowing for a comprehensive perspective (Blaikie & Priest, 2019; Creswell, 2008).

Ultimately, workshops foster consensus and dedication among stakeholders, meaning that the proposed ideas are both practical and appealing.

6.5 Data analysis

The data analysis plan specifies how the obtained data will be analysed during the research process. The mixed-methods approach aims to provide insight on the research's questions and objectives. Thus, two sorts of data are gathered: qualitative and quantitative. The qualitative data is gathered through in-depth interviews, workshops, and a few case studies. In contrast, case studies and workshops provide quantitative information. However, qualitative data will remain the primary focus because quantitative data will be scarce given the study methods that will be used (Blaikie & Priest, 2019). The quantitative data will be largely utilised to validate hypotheses or insights and enhance claims.

6.6.1 Data analysis steps

Steps	Actions	Objective
1. Data preparation	Transcribe all qualitative data from interviews and workshops to ensure accuracy.	Verify and clean quantitative data for inconsistencies or missing values.
2. Qualitative data analysis	Use open coding to identify key themes and patterns, focusing on ESG values and digitalisation.	Organize codes into values related to core research questions.
3. Quantitative data analysis	Apply tests to explore relationships and differences between variables. Use specific software or AI tools for these analyses.	Calculate means, medians, and standard deviations to confirm qualitative data.
4. Mixed-method analysis	Compare and integrate findings from both qualitative and quantitative analyses to enhance validity.	Identify correlations between qualitative- and quantitative data to provide a comprehensive understanding.
5. Interpretation and reporting	Create charts, graphs, and tables to illustrate key findings. Compile the analysis into a coherent report, offering practical propositions for real estate developers.	Interpret results in the context of research objectives, focusing on how digitalisation can enhance ESG performance.

Table 1. Data analysis steps (Author, 2024).

6.6 Data plan (what happens with the data during and after the project with respect to the FAIR guiding principles - doi:10.1038/sdata.2016.18)

6.6.1 Data collection

The data collection methods used in our research will encompass both qualitative and quantitative approaches, providing the gathering of extensive and reliable data. The proposed methodology encompasses several key components, namely conducting interviews with professionals employed within the real estate industry, test propositions through workshop(s), and analysing refence projects. The data that will be gathered will have direct relevance to the research inquiries, as it is essential for the attainment of the research goals, and will be appropriately scaled in terms of its extent.

6.6.2 Data storage and security

The digital data collected during the research will be stored securely on servers (SURFdrive and Project Storage at TU Delft) that utilise encryption techniques, thereby guaranteeing the highest level of confidentiality. The digital information will be subject to stringent restrictions, ensuring that only authorised research professionals are granted access. All tangible data, including printed consent forms

and notes, will be stored in cabinets that are securely locked. Our organisation will strictly adhere to the data security regulations and rules set forth by TU Delft. Furthermore, our procedures will be completely compliant with the rigorous criteria outlined in the General Data Protection Regulation (GDPR).

6.6.3 Data processing and analysis

The data processing phase will be executed utilising advanced software solutions that are most appropriate for our study requirements. The qualitative data acquired from interviews will be transcribed and subjected to theme analysis. Statistical analysis will be employed to analyse the quantitative data collected through survey. During the stages of data processing and analysis, every care will be taken to ensure the preservation of data integrity and authenticity.

6.6.4 Data sharing and accessibility

In alignment with the principles of open science, we aim to make our research data publicly available in a recognized and accessible repository. Our main goal is to guarantee the discoverability, availability, compatibility, and reusability of the data, as per the FAIR principles. Appropriate steps will be implemented to ensure the anonymization or aggregation of sensitive data, thereby safeguarding the confidentiality and privacy of our research participants.

6.6.5 Data retention and destruction

In accordance with the data retention policies of TU Delft, the study data will be stored for a specified duration. Following the specified time frame of 10 years, we shall proceed with a meticulously controlled procedure of secure destruction. The process of eradicating digital data will be executed with the highest level of accuracy across all servers, while any physical data will be effectively eliminated through the implementation of shredding techniques.

6.6.6 Ethical and legal compliance

Ethical and legal compliance shall be thoroughly maintained throughout the whole data management process, encompassing all stages ranging from data collection to data disposal. This encompasses many legislation pertaining to data protection, privacy, and participant consent, among other related matters.

6.7 Ethical considerations

6.7.1 Ethics: obligations towards research stakeholders

Through the implementation of this comprehensive data management plan, our objective is to guarantee the ethical handling, security, and adherence to institutional norms and legal obligations throughout the whole data lifecycle.

6.7.2 Protection of participants

The primary ethical obligation is to ensure the protection of research participants from any possible harm. This encompasses several forms of harm, including physical, psychological, and informational dimensions. In order to guarantee this, careful efforts will be made to gain informed consent from all participants, explicitly delineating the research's objectives, the processes entailed, and any potential threats. The preservation of participant data and personal information will be strictly upheld through the

maintenance of confidentiality and anonymity. Participants will also receive information of their right to discontinue their involvement in the research at any point without facing any negative consequences. The aforementioned procedures are consistent with the ethical principles delineated in the Belmont Report and adhere to the norms explained by Blaikie and Priest (2019).

6.7.3 Ensuring Research Validity and Standards

The preservation of research validity and integrity will be ensured by the careful formulation of research inquiries and procedures that are both thorough and suitable for the study. A thorough examination of the existing body of literature will be undertaken in order to encompass every relevant aspect and perspectives, so providing an appropriate foundation for the research. The careful selection of research subjects will be undertaken in order to ensure diversity and representativeness, hence augmenting the generality of the findings. These measures are crucial in meeting the high standards of the scientific community, as emphasized by Blaikie and Priest (2019).

6.7.4 Researcher position and objectivity

As a researcher, it is crucial to uphold objectivity as a fundamental principle. Acknowledging potential biases constitutes the initial stage in effectively resolving them. In this study, many strategies will be utilised to minimise personal biases and promote objectivity, including the implementation of

procedures such as peer review, triangulation, and the maintenance of a reflexive journal. The implementation of reflexive practise, as proposed by Blaikie and Priest (2019), serves to maintain the ongoing process of self-evaluation and adaptation of the researcher's standpoint, hence keeping the integrity of the research outcomes.

6.7.5 Beneficiaries of research and societal contribution

The main goal of this research is to offer significant perspectives on ESG performance and the additional contribution of digitalisation. The results of this study will provide valuable insights for professionals in the industry, offering recommendations and propositions. Additionally, these findings will make a significant contribution to the existing academic knowledge within the field. At a societal level, the research aims to provide assistance for sustainable development and safety in the construction industry, in line with the overarching objectives of improving sustainability and efficiency in the built environment.

7. Research output

7.1 Goals and objectives

The main objective of this research is to investigate how to enhance ESG performance from a real estate developers perspective. Secondly, how digitalisation can contribute to the performance. In order to understand all of this research will be done using a chain perspective for the real estate developer(s). Therefore, the research goals and objectives are outlined as follows:

1. Identify ESG values: determine which ESG values are most relevant during RIBA stage 0 (strategic definition) for real estate developers in order to make informed decisions and ensure consistent and effective ESG performance during development projects.
2. Evaluate digital functions: assess the availability and suitability of digital functions that can be used during RIBA stage 0 and gather relevant data/information from previous/reference projects during the RIBA stage 6 (Handover) and 7 (Use).

3. Integrate ESG values and digital functions: develop strategies for integrating ESG values and optimizing ESG performance. In addition, find ways to integrate digitalisation for improved ESG decision making and data monitoring.
4. Analyse current and desired scenarios: conduct a gap analysis to understand the current state of ESG performance and digitalisation and the desired improvements from the real estate chain perspective.

7.2 Deliverables

1. Research report: a report detailing the findings of the study, including literature studies, data collection, data sets, data analysis, propositions, and conclusion.
2. Data sets: compiled data sets from interviews, design workshop(s), and case studies with industry professionals regarding the integration of digital functions and ESG values.
3. Proposition for integration: a proposed framework for improved ESG performance and contributions of digital functions.
4. Case studies: documented case studies and organisations showcasing successful examples of ESG performance and digitalisation of real life projects.

7.3 Dissemination and audiences

The research aims to develop valuable insights for a broad array of professionals within the real estate industry. However, in specific the real estate developers and Boelens de Gruyter. As previously mentioned the research will be conducted using a chain perspective in order to understand the multitude of perspectives towards the real estate development. Additionally, the following audiences and dissemination may be considered:

1. Academic publications: the research findings will be submitted to peer-reviewed journals.
2. Company publication/briefs: all results and practical applications will be made available for the real estate development- and research organisation: Boelens de Gruyter
3. Workshops: hosting workshops for the real estate development- and research organisation: Boelens de Gruyter. In order to share insights, test propositions, and practical applications of the research findings and kick-start a dialogue about the topic.
4. Online publication: disseminations through publication platforms like ResearchGate, TU Delft Repository, and Academia.edu.

By achieving these goals and disseminating these findings through various channels, this research aims to contribute to the advancement of ESG performance in the real estate industry.

8. Personal study targets

Based on the current understandings and contributions to the field of ESG and digitalisation within the real estate sector, and my personal development in terms of studies and professional career, here are some personal targets that support my research objective:

1. Develop expertise in ESG and digitalisation: gain knowledge on the impact of digital transformation, focusing on sustainable practices and innovations. Also become proficient in the latest solutions and ESG considerations.

2. Acquire in-depth knowledge on Industry 4.0 and 5.0: understand the fundamentals of industry 4.0 and 5.0 as they relate to the real estate development and management.

3. Enhance research and analytical skills: learn advanced methods to interpret datasets and extract meaningful insights. Furthermore, refine qualitative and quantitative research methods.

4. Strengthen stakeholder insights: through a value chain perspective, develop the ability to learn about the diverse perspectives in advancing technologies and ESG objectives.

5. Strategic thinking for business transformation: gain insights and knowledge into strategic planning and change management within the context of innovation. Also learn how companies formulate and execute strategies into practicalities.

6. Contribute to academic and industry discussion: aim to publish findings and present to contribute to the contemporary academic discourse of PropTech and ESG.

7. Pursue continuous learning and professional development: network with industry stakeholders, academics, and professionals to expand professional horizons and opportunities.

9. Research plan

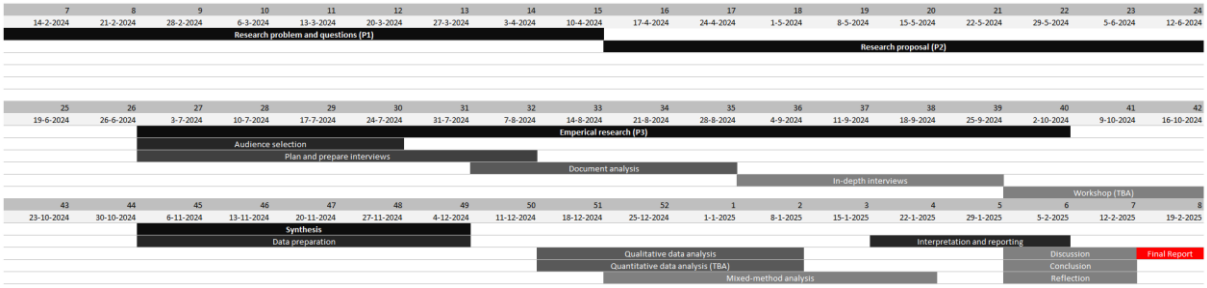

Table 2. Research plan (Author, 2024).

Full plan in the appendix

10. Reflection

My experience during the AR3MBE100 course was both tough and pleasing. The process has significantly enhanced my understanding of doing research and the principles of ESG and digitisation in the real estate industry.

Initially, I encountered plenty of confusion and difficulty in narrowing or scoping down my research topic and questions. The extent of the matter made it difficult, as we would say in Dutch "door de bomen het bos niet meer zien". However, the helpful guidance provided at the theme 5 meetings, as well as personal meetings with Herman and Paul, helped in overcoming these difficulties. Also, both were willing to make time for me and address quick/short questions. Their views and suggestions helped me fine-tune my topic, resulting in a more focused and relevant research scope. In addition, my job/research company, 'Boelens de Gruyter', provided valuable insights and input to help me develop my topic and make it a useful subject to apply in practice and, ideally, implement in actual organisational processes.

The ongoing refinement entailed a lot of re-reading documents, discarding initial concepts, and making necessary modifications. This iterative method was important in developing a coherent and meaningful research proposal.

Overall, AR3MBE100 was a developing experience. It has improved my understanding of research, given me a better sense of direction, and provided me with the tools I need to perform significant research in the built environment. I'm looking forward to conducting research and developing meaningful propositions. Lastly, I am appreciative for the constructive input and assistance provided during AR3MBE100, which have been fundamental for my research.

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12. Appendices

12.1 Appendix 1

RIBA Plan of Work 2020

RIBA Plan of Work 2020

The RIBA Plan of Work organises the process of briefing, designing, delivering, maintaining, operating and using a building into eight stages. It is a framework for all disciplines on construction projects and should be used solely as guidance for the preparation of detailed professional services and building contracts.

Stage Boundaries:

Stages 0-4 will generally be undertaken one after the other.

Stages 4 and 5 will overlap in the **Project Programme** for most projects.

Stage 5 commences when the contractor takes possession of the site and finishes at **Practical Completion**.

Stage 6 starts with the handover of the building to the client immediately after **Practical Completion** and finishes at the end of the **Defects Liability Period**.

Stage 7 starts concurrently with Stage 6 and lasts for the life of the building.

Planning Note:

Planning Applications are generally submitted at the end of Stage 3 and should only be submitted earlier when the threshold of information required has been met. If a **Planning Application** is made during Stage 3, a mid-stage gateway should be determined and it should be clear to the project team which tasks and deliverables will be required.
See *Overview* guidance.

Procurement:

The RIBA Plan of Work is procurement neutral – See *Overview* guidance for a detailed description of how each stage might be adjusted to accommodate the requirements of the **Procurement Strategy.**

ER Employer's Requirements

CP Contractor's Proposals

RIBA Architecture.com

	0 Strategic Definition	1 Preparation and Briefing	2 Concept Design	3 Spatial Coordination	4 Technical Design	5 Manufacturing and Construction	6 Handover	7 Use
	← Projects span from Stage 1 to Stage 6; the outcome of Stage 0 may be the decision to initiate a project and Stage 7 covers the ongoing use of the building. →							
Stage Outcome at the end of the stage	The best means of achieving the **Client Requirements** confirmed If the outcome determines that a building is the best means of achieving the **Client Requirements**, the client proceeds to Stage 1	**Project Brief** approved by the client and confirmed that it can be accommodated on the site	**Architectural Concept** approved by the client and aligned to the **Project Brief** The brief remains "live" during Stage 2 and is derogated in response to the **Architectural Concept**	Architectural and engineering information **Spatially Coordinated**	All design information required to manufacture and construct the project completed Stage 4 will overlap with Stage 5 on most projects	Manufacturing, construction and **Commissioning** completed There is no design work in Stage 5 other than responding to **Site Queries**	Building handed over, **Aftercare** initiated and **Building Contract** concluded	Building used, operated and maintained efficiently Stage 7 starts concurrently with Stage 6 and lasts for the life of the building
Core Tasks during the stage **Project Strategies** might include: – **Conservation** (if applicable) – **Cost** – **Fire Safety** – **Health and Safety** – **Inclusive Design** – **Planning** – **Plan for Use** – **Procurement** – **Sustainability** See *RIBA Plan of Work 2020 Overview* for detailed guidance on **Project Strategies**	Prepare **Client Requirements** Develop **Business Case** for feasible options including review of **Project Risks** and **Project Budget** Ratify option that best delivers **Client Requirements** Review **Feedback** from previous projects Undertake **Site Appraisals** No design team required for Stages 0 and 1. Client advisers may be appointed to the client team to provide strategic advice and design thinking before Stage 2 commences.	Prepare **Project Brief** including **Project Outcomes** and **Sustainability Outcomes**, **Quality Aspirations** and **Spatial Requirements** Undertake **Feasibility Studies** Agree **Project Budget** Source **Site Information** including **Site Surveys** Prepare **Project Programme** Prepare **Project Execution Plan**	Prepare **Architectural Concept** incorporating **Strategic Engineering** requirements and aligned to **Cost Plan**, **Project Strategies** and **Outline Specification** Agree **Project Brief Derogations** Undertake **Design Reviews** with client and **Project Stakeholders** Prepare stage **Design Programme**	Undertake **Design Studies**, **Engineering Analysis** and **Cost Exercises** to test **Architectural Concept** resulting in **Spatially Coordinated** design aligned to updated **Cost Plan**, **Project Strategies** and **Outline Specification** Initiate **Change Control Procedures** Prepare stage **Design Programme**	Develop architectural and engineering technical design Prepare and coordinate design team **Building Systems** information Prepare and integrate specialist subcontractor **Building Systems** information Prepare stage **Design Programme** Specialist subcontractor designs are prepared and reviewed during Stage 4	Finalise **Site Logistics** Manufacture **Building Systems** and construct building Monitor progress against **Construction Programme** Inspect **Construction Quality** Resolve **Site Queries** as required Undertake **Commissioning** of building Prepare **Building Manual** Building handover tasks bridge Stages 5 and 6 as set out in the **Plan for Use Strategy**	Hand over building in line with **Plan for Use Strategy** Undertake review of **Project Performance** Undertake seasonal **Commissioning** Rectify defects Complete initial **Aftercare** tasks including light touch **Post Occupancy Evaluation**	Implement **Facilities Management** and **Asset Management** Undertake **Post Occupancy Evaluation** of building performance in use Verify **Project Outcomes** including **Sustainability Outcomes** Adaptation of a building (at the end of its useful life) triggers a new Stage 0
Core Statutory Processes during the stage: Planning Building Regulations Health and Safety (CDM)	Strategic appraisal of **Planning** considerations	Source pre-application **Planning Advice** Initiate collation of health and safety **Pre-construction Information**	Obtain pre-application **Planning Advice** Agree route to **Building Regulations** compliance Option: submit outline **Planning Application**	Review design against **Building Regulations** Prepare and submit **Planning Application** See ***Planning Note*** for guidance on submitting a **Planning Application** earlier than at end of Stage 3	Submit **Building Regulations Application** Discharge pre-commencement **Planning Conditions** Prepare **Construction Phase Plan** Submit form F10 to HSE if applicable	Carry out **Construction Phase Plan** Comply with **Planning Conditions** related to construction	Comply with **Planning Conditions** as required	Comply with **Planning Conditions** as required
Procurement Route Traditional Design & Build 1 Stage Design & Build 2 Stage Management Contract Construction Management Contractor-led	Appoint client team	Appoint design team	Appoint contractor (Management Contract / Construction Management) ER (Contractor-led)	ER (Design & Build 2 Stage) Pre-contract services agreement (Design & Build 2 Stage) Preferred bidder (Contractor-led)	Tender / Appoint contractor (Traditional) ER / CP / Appoint contractor (Design & Build 1 Stage) CP / Appoint contractor (Design & Build 2 Stage) CP / Appoint contractor (Contractor-led)			Appoint **Facilities Management** and **Asset Management** teams, and strategic advisers as needed
Information Exchanges at the end of the stage	**Client Requirements** **Business Case**	**Project Brief** **Feasibility Studies** **Site Information** **Project Budget** **Project Programme** **Procurement Strategy** **Responsibility Matrix** **Information Requirements**	**Project Brief Derogations** Signed off **Stage Report** **Project Strategies** **Outline Specification** **Cost Plan**	Signed off **Stage Report** **Project Strategies** Updated **Outline Specification** Updated **Cost Plan** **Planning Application**	**Manufacturing Information** **Construction Information** **Final Specifications** Residual **Project Strategies** **Building Regulations Application**	**Building Manual** including **Health and Safety File** and **Fire Safety Information** **Practical Completion** certificate including **Defects List** **Asset Information** If **Verified Construction Information** is required, verification tasks must be defined	**Feedback** on **Project Performance** **Final Certificate** **Feedback** from light touch **Post Occupancy Evaluation**	**Feedback** from **Post Occupancy Evaluation** Updated **Building Manual** including **Health and Safety File** and **Fire Safety Information** as necessary

Core RIBA Plan of Work terms are defined in the *RIBA Plan of Work 2020 Overview* glossary and set in **Bold Type**.

Further guidance and detailed stage descriptions are included in the *RIBA Plan of Work 2020 Overview.*

12.1 Appendix 2

Research planning

Getal	Begindatum	Einddatum	Taak
1	14-2-2024	12-4-2024	Research problem and questions (P1)
2	12-4-2024	14-6-2024	Research proposal (P2)
3	5-7-2024	31-10-2024	Emperical research (P3)
4	5-7-2024	26-7-2024	Audience selection
5	26-7-2024	5-8-2024	Plan and prepare interviews
6	5-8-2024	31-8-2024	Document analysis
7	5-9-2024	26-9-2024	In-depth interviews
8	1-10-2024	1-11-2024	Workshop (TBA)
9	2-11-2024	3-12-2024	Synthesis
10	2-12-2024	16-12-2024	Data preparation
11	16-12-2024	8-1-2025	Qualitative data analysis
12	16-12-2024	8-1-2025	Quantitative data analysis (TBA)
13	30-12-2024	22-1-2025	Mixed-method analysis
14	13-1-2025	5-2-2025	Interpretation and reporting
15	8-2-2025	11-2-2025	Discussion
16	14-2-2025	17-2-2025	Conclusion
17	18-2-2025	18-2-2025	Reflection
18	19-2-2025	19-2-2025	Final Report