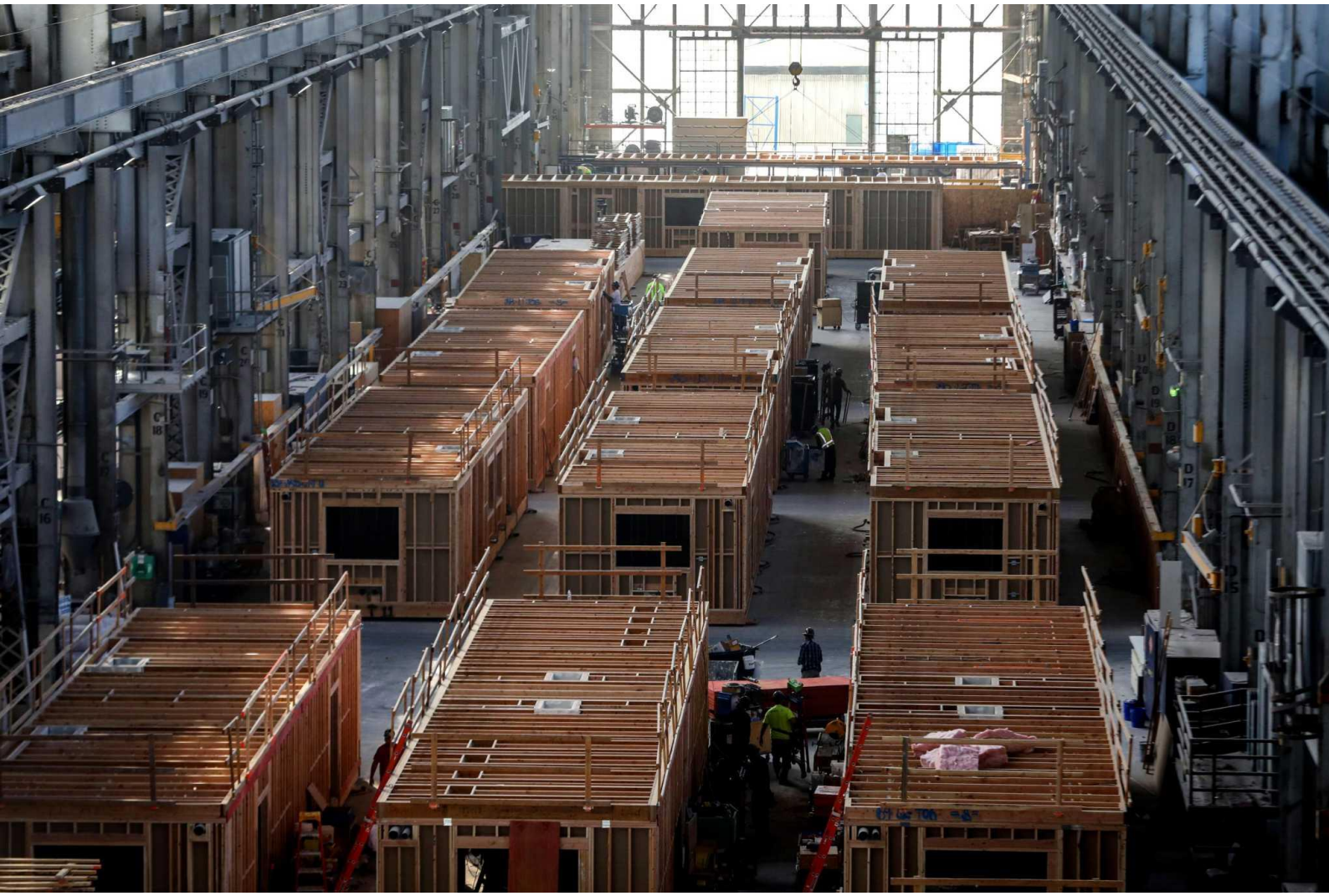
Asymmetrical partnerships in conceptual housing

How start-ups manage to become competitive in the conceptual housing industry



Name: Luca Pieck

Student Number: 4602323

Master Track: Management in the Built Environment

Graduation Lab: Housing Inequality

Mentors: Dr. Harry Boumeester (REM) & Prof.dr.ir. Marja Elsinga (UDM)

Delegate Board of Examiners: Manuela Triggianese

TU Delft

Preface

I am honored to present this thesis, which represents the culmination of more than a year of hard work, research, and dedication. It has been an incredible journey, and I am deeply grateful for the support and guidance I have received from many individuals throughout this process.

Undertaking this research would not have been possible without the encouragement and expertise of my thesis advisors and mentors, Dr. Harry Boumeester and Prof.dr.ir. Marja Elsinga. Their valuable insights and support have been instrumental in shaping this thesis. I am truly thankful for their mentorship.

I also extend my gratitude to the faculty of Architecture, Urbanism and Building Sciences, and other staff of Delft University of Technology for providing the necessary resources and an inspiring environment for academic exploration. My fellow students have also played a significant role in my academic growth, and I am thankful for the discussions and friendships we have shared.

Furthermore, I would like to acknowledge the support of my friends and family. Their encouragement and understanding during the demanding periods of research and writing have been essential in maintaining my enthusiasm and motivation.

This thesis is not just the product of my efforts, but also a reflection of the contributions of those who believed in me and supported me throughout this journey. I hope that the findings presented herein contribute to the field of Management in the Built Environment, inspire further research in this area, and help (aspiring) startups in the concept housing industry to become successful.

Thank you for taking the time to read this thesis and for sharing in this academic endeavor with me.

Luca Massimiliano Pieck

23-10-2023

Executive summary

Introduction
The introduction of the thesis discusses the need for rapid and sustainable housing construction in the Netherlands due to population growth and urbanization. The government has set targets for the construction of affordable dwellings and promotes the use of concept housing. However, the construction industry is considered less innovative compared to other industries. Startups are often associated with innovation and can bring new ideas to the industry. However, entering the housing construction market poses significant barriers for startups, such as high capital requirements and limited risk-spreading capabilities. As a result, startups often form partnerships with incumbent firms to overcome these challenges which stem from their newness and smallness. This thesis aims to explore the benefits and frictions of these partnerships in the conceptual housing industry, what these partnerships mean for innovation in the construction industry, and provides recommendations for improving them. The thesis will analyze the competition in the housing construction industry using Porter's five forces model, examine the role of startups for innovation, and explore the benefits and challenges of strategic alliances between startups and incumbents. The empirical part of the thesis involves interviewing concept housing startups and incumbent firms in different types of partnerships. The research fills a gap in the literature by examining the influence of Porter's five forces on concept housing startups and providing insights into their path to competitiveness. It also has societal relevance by contributing to improved collaboration between startups and partners in the housing industry, leading to more innovative and sustainable housing solutions. The main research question for the thesis is as follows: *How do asymmetric partnerships between concept housing startups and incumbent firms strategically manage innovation to be(come) competitive in the Dutch housing construction industry?*

Literature review
Before gathering empirical data for this research, a literature review was conducted to better understand the housing construction industry. The review also served to formulate sub questions and as inspiration for the questions to be asked during the interviews.

<u>Competition in Dutch housing construction industry</u>
When examining the Dutch housing construction sector, it appears that the potential for new firms entering the market is limited. This is primarily due to the substantial capital requirements and high fixed costs, which make economies of scale crucial. However, startups face challenges in benefiting from economies of scale. Another barrier to entry is the difficulty in accessing clients, as startups often lack credibility and housing providers prefer working with familiar and trusted partners. Nevertheless, the Dutch government's recent initiatives to promote innovation in the industry offer some support to new entrants.

The power of suppliers is low compared to other manufacturing sectors, but it is higher in concept housing than in traditional construction. Concept housing suppliers often engage in supply chain integration and establish partnerships with their suppliers, resulting in increased supplier power. On the other hand, buyers, such as housing associations and real estate developers, hold significant power due to the earlier mentioned high fixed costs and the limited number of buyers in the market. Additionally, there are instances of backward integration, which poses a threat to firms in the house building industry. Buyers are also price-sensitive, although price competition is less intense compared to previous decades. Clients now prioritize sustainability and are willing to pay more for an experienced contractor who can minimize additional costs during the construction phase. Both clients as regulators have been known to be of high importance for innovation adoption

and enablement. Competition among firms in the industry is high, with rivalry stemming from high exit barriers, many competitors in the industry and occurring price competition. However, as mentioned earlier, the focus has been shifting away from price competition. Instead, competition revolves around different aspects such as service quality and innovation, which are less detrimental to firms. The threat of substitute products in the house building industry is low, with concept housing even being considered as a substitute for traditionally built homes. The industry analysis through Porter's five forces model makes it clear that the concept housing market is a very competitive, making it difficult for any new entrant to become successful, especially for startups dealing with smallness and newness. It is not impossible, however, and knowing about these dynamics beforehand makes it easier for new entrants to manage them accordingly.

Innovative startups

The construction industry is often regarded as less innovative compared to other industries, with limited high-tech startups emerging. Price-only bidding competition is believed to hinder innovation in the industry, and concerns about failure and legal repercussions lead to caution when adopting new building materials. Strict regulation and limited creative freedom also impact innovation. However, there are various motivations for businesses to innovate, including optimizing internal processes, reducing costs, meeting changing regulations, addressing sustainability and circularity, and improving customer interactions. Startups in conceptual house building have opportunities to succeed by offering unique and value-added products or processes. Competitive advantage can be achieved through innovation, and factors such as technology advancements, shifting consumer preferences, increased market rivalry, and changing corporate environments influence innovation. Sustainable innovation is gaining prominence, aligning with the goals of conceptual builders. Small and large construction firms have different drivers and strategies for innovation, with small businesses being more adaptable to changing contexts and prioritizing resource utilization. Innovation related strategies can be divided in four categories: resources, technological, management and marketing. Economic survival initially drives innovation in startups, which later shifts toward gaining a competitive advantage.

Strategic alliances

Startups in the construction industry face challenges due to their smallness and newness. Limited resources and a lack of industry legitimacy hinder their competitiveness. Partnering with incumbent firms can help startups overcome these liabilities and become competitive. Incumbent firms may be interested in utilizing the startup's technology or innovation and promoting their own innovation efforts. Innovation in the conceptual housing market often involves collaboration between startups and their partners, such as material suppliers and subcontractors, leading to open innovation. However, the asymmetry between partners and challenges in organizational aspects can make partnership selection crucial. Complementary resources, knowledge, technological alignment, strategic alignment, and relational alignment are important factors in choosing an ideal partner. Strategic alliances with smaller startups can be beneficial for growth in the built environment. Knowledge sharing, commitment, trust, reputation, financial stability, and professionalism are criteria for successful collaboration in an open innovation setting. Overcoming liabilities and achieving project success can help startups gain legitimacy and resources, ultimately enhancing their competitiveness.

Methods

The approach for answering the research questions involves qualitative, descriptive and explorative research methods. The reason for choosing qualitative research is based on the complexity of business growth and the decision-making processes of startups.

Data collection for the first exploratory research was conducted through literature studies and interviews with two experts in the field of conceptual housing and entrepreneurship in the built environment. The literature review provided a foundation for the problem statement and helped in understanding key concepts related to concept housing, startups, and strategic management. Relevant literature was gathered using databases like Google Scholar and Scopus, and empirical examples from company websites were cited. The expert interviews with the startups and their partners were semi-structured to gather primary data for the research. The preliminary understanding gained from the literature studies guided the formulation of questions related to innovation strategies associated with asymmetric partnerships in the conceptual housing industry. The semi-structured approach allowed for flexibility to ask follow-up questions and gather a substantial amount of data, considering the complexity of management.

To select interviewees and cases, an inventory was created by searching the internet and utilizing the Network of Conceptual Construction (NCB). Personal connections with startups in the conceptual housing industry were also approached. The selection was aimed towards startups that fit the definition, have different types of partnerships (startup-supplier, startup-architect, startup-client), and having partners who are likely willing to participate in interviews. The interviewees were top managers or individuals closely involved in strategic management of the firms.

Results from practice

Literature (Meng & Brown, 2018) highlighted that knowledge sharing between supply chain partners was not a common innovation strategy in the construction industry. However, in the concept housing industry, startups emphasize collaboration with their suppliers and other partners. Partners play a crucial role in enhancing product quality and sharing practical knowledge about manufacturing homes in a factory setting.

Resource innovation

Smallness, representing a lack of financial resources, is a significant challenge for startups in this industry. Some startups involve their suppliers in the financial aspects of the concept, showing commitment and sharing risk. Financial support, like the need to reserve funds during construction, is a big challenge for startups, especially in large-scale projects. Newness, on the other hand, implies the startups' lack of experience, which can also be decreased by partnering with established firms in the construction industry. These partnerships help improve the legitimacy of the startup and provide essential credibility when working with housing associations and developers.

Partnerships also extend to leveraging the networks of incumbent firms, which can be a valuable strategy for startups to extend knowledge. These partnerships are not just about short-term gains but are seen as a means to ensure long-term business continuity for all parties involved.

Access to the right talent is another essential resource for startups in the concept housing industry. Finding individuals with the capability and enthusiasm for innovative thinking is crucial, especially when aiming to think conceptually and challenge traditional construction methods.

Technological innovation

Technological innovation is an important theme, driven by partnerships and collaboration. Startups benefit from their partners' expertise in specific modules and materials, which enhances the technical capabilities of their concepts. Open innovation practices are prevalent, where startups enter long-term agreements with suppliers to collectively optimize modules and components within the concept of housing.

In addition to tangible product enhancements, startups also innovate in terms of internal processes, including assembly methods and compliance with changing regulations. By adopting innovative technologies and digital tools, such as configurators, startups streamline their processes

and ensure compliance with industry standards. Process innovation also takes place at partnering architecture firms, as they have to essentially design ‘backwards’. They first design the modules, which are the dwellings, and later combine these dwellings into a residential building.

Furthermore, innovation in concept housing isn't confined to the construction industry itself. Startups and their partners sometimes draw inspiration and innovative ideas from other fields and industries, contributing to a diverse and creative approach to problem-solving.

However, it's noted that startups may sometimes have unrealistic ideas about innovation, and this can lead to a learning process as they collaborate with more experienced partners. This dynamic is seen as an opportunity for synergy and growth through smart collaboration.

Managerial innovation

Startups in the conceptual housing industry are driven by innovative strategies shaped by their management. These strategies aim to have an impact on their partner ecosystem, contract agreements, and development processes. This should ultimately lead to enhance operational effectiveness, efficiency, and funding.

Startups prioritize the selection of partners who not only share a commitment to innovation but also embody this mindset throughout their entire organization. Conducting a 'DNA-check' ensures that the willingness to innovate is not limited to top management but is present in all organizational levels. This collaborative approach leads to knowledge sharing and fosters a culture of innovation, resulting in improvements in operational processes and open innovation practices.

Additionally, startups explore innovative contract forms inspired by manufacturing industries, emphasizing payment upon module completion in the factory rather than upon project delivery. This approach aligns better with the needs of the concept housing industry, optimizing financing and production efficiency, and providing continuity for startups and their partners.

Lastly, startup managers advocate for early involvement in projects, stressing the importance of joining the planning process from the initiation phase. This engagement allows them to influence decisions related to plot dimensions, floor plan layouts, and architectural elements, ensuring the effective integration of their concept’s principles and minimizing time and cost losses.

Marketing innovation

Conceptual housing startups employ a range of innovative marketing strategies to thrive in the industry. These marketing strategies empower conceptual housing startups to strategically position themselves, diversify their offerings, build meaningful partnerships, communicate effectively, and plan for growth.

Product diversification, such as the development of a new cage system for sub-modules, positions startups as providers of innovative solutions for an expanding market. This can create new revenue streams and long-term benefits, but requires to be better than existing systems.

Strategic partner selection is crucial. Startups align with firms known for innovation and sustainability to enhance the concept's image and access their extensive networks. For suppliers and architects, partnering with concept providers extends their business fields.

Transparency in marketing is also important. Startups should avoiding claims of being cheaper than traditional builders and instead focusing on the value of their innovative solutions. Clear communication regarding benefits, such as faster construction and fewer errors, is essential.

Setting clear volume goals is a business strategy to ensure the ability to meet customer demand. Startups must decide whether to serve a specific segment or aim for significant growth. When deciding on the latter, a big factory or assembly hall and operational adjustments are necessary to keep in mind.

Conclusion

In this thesis on the Dutch housing construction industry and the role of concept housing startups, several key findings and insights have emerged. The research has delved into various aspects, including the influences of Porter's Five Forces, the significance of asymmetric partnerships, the dynamics of open innovation, innovation strategies driven by management, innovative marketing strategies, and the adoption of innovative concept housing by clients and regulators. These findings show how concept housing startups strategically manage innovation to become competitive players in the Dutch housing construction industry.

Porter's Five Forces model in the context of the Dutch housing construction industry reveals that the threat of new entrants remains low due to high capital requirements and limited access to clients. Buyers wield high power, which influences product choices and the adoption of innovative practices. Suppliers, on the other hand, act as collaborative partners rather than dominant stakeholders. This is because they have mutual benefits with the startups. Rivalry between competing firms is high, especially between startups. The threat of substitute products is minimal as concept housing itself serves as a substitute for traditional housing.

There are four innovation strategy categories: resource, technological, managerial and marketing. For startups in concept housing, the most obvious category would be resource-related innovation strategies, as partnering with incumbent firms is done due to the lack of resources. Asymmetric partnerships play a crucial role in helping concept housing startups overcome the challenges of smallness and newness. These partnerships provide startups with financial backing, legitimacy, industry knowledge, specialized expertise, and access to their networks. By forming asymmetric partnerships with incumbent firms, startups can effectively address the challenges that stem from their limited resources and industry inexperience.

Open innovation between startups and incumbents is a key driver of technical progress in the concept housing industry. This collaboration between startups and their partners fosters technological advancements, ultimately leading to more sustainable, affordable, and qualitative housing solutions. Innovative design processes which the architects need to implement also require technical innovation, as it is done ‘backwards’ in comparison to traditional design practices. Open innovation occurs through collaborative relationships, knowledge sharing, and sometimes cross-industry collaboration.

Startups in the conceptual housing industry employ various innovation strategies driven by their management. These strategies include selecting partners who are intrinsically motivated to innovate, exploring innovative contract forms with clients, and advocating for early involvement in projects. Such strategies enable startups to drive innovation, optimize efficiency, and deliver on the promise of concept housing solutions while adhering to clients' demands.

Innovative marketing strategies can also be an important aspect of startups' success. These strategies include diversifying product offerings, integrating backward or forward in the industry, strategically selecting partners with established industry images, transparently communicating with clients, and setting clear volume goals for the long term. By employing these innovative marketing tactics, startups can position themselves strategically in the market, expand their business fields, and effectively communicate the value of their concept housing solutions.

However, the adoption of innovations from concept housing startups by clients and enablement by regulators faces challenges due to the conservative and risk-averse nature of the construction industry. This is the reason why clients often prefer more experienced housing providers or contractors, and why municipalities prefer to sell their plots to bigger real estate development firms. Established industry lobbies can also impede the adoption of new, more sustainable innovations. Overcoming these challenges requires startups to invest resources in demonstrating the validity of their concepts and building credibility within the industry.

Nevertheless, there are emerging trends suggesting that larger developers are beginning to recognize the potential of concept housing. This could create opportunities for startups to get their first projects going as they might engage in consortiums with the bigger industry actors.

In conclusion, concept housing startups in the Dutch housing construction industry strategically manage innovation through asymmetric partnerships, open innovation practices, innovation strategies driven by management, and innovative marketing tactics. These strategies enable startups to overcome the challenges of smallness and newness, drive innovation, establish industry presence, and navigate the adoption barriers within the construction industry. While adoption challenges persist, the industry is evolving, and startups are well-positioned to play a significant role in shaping its future through their innovative approaches and partnerships.

Discussion

The research findings revealed several discrepancies with the initial hypothesis. First, the mismatch between startups and incumbent firms in asymmetric partnerships contradicted the hypothesis, possibly due to differences in the founding years of incumbent firms and their perspective. Secondly, there was a higher level of rivalry among startups than expected, driven by the potential supply for concept housing. Third, the study highlighted the importance of suppliers and the role of startups and architects as system integrators. Lastly, the research discovered a deviation from literature regarding knowledge sharing between supply chain members, which was a key strategy for promoting innovation in the concept housing industry.

Regarding the research methodology, a deeper, more in-depth study at a single startup could have provided a different perspective, but the results would be highly dependent on the selected startup, limiting generalizability. Despite the limitations, the current approach provided valuable insights into managing asymmetric partnerships in concept housing, particularly from a startup's perspective.

The research used convenience sampling due to time constraints, reducing external validity. Future research could benefit from stratified sampling and a larger sample size. Ecological validity was maintained through remote interviews. Possibilities for further research include exploring the views of the superstructure to further understand client preferences for startups or established firms, and the unique design process in concept housing which architects are not thought in educational institutions.

Recommendations

This research provides valuable insights for aspiring entrepreneurs in the concept housing industry, as well as suppliers, architects, and clients. Startups in concept housing should establish a clear vision, mission, and target market segments. Specialization is key for market differentiation and marketing success.

Strategic partnerships with incumbent firms should be built on mutual benefits through open innovation practices, leveraging their resources and experience. Defining roles and responsibilities within these partnerships is crucial, creating a collaborative ecosystem that supports innovation. Involving buying firms, such as housing associations or real estate developers, can foster continuity and make project processes more efficient.

Understanding client needs and emphasizing sustainability is essential for product development. Designing modular dwelling solutions that can be combined in various layouts is crucial, as is demonstrating functionality and sustainability through verification or prototyping.

In marketing, startups should highlight the advantages of their solutions, such as faster construction and reduced risks. Transparency about pricing is important, and collaboration with established developers and housing associations can open doors to larger projects.

For clients and regulators in the Dutch built environment, it's essential to adapt to the differences when working with concept providers compared to traditional contractors and architects. Exploring new contract types and adjusting regulations related to permitting and subsidies can streamline the construction process and facilitate innovations in the concept housing industry.

Abstract

In the Netherlands there is currently a high demand for affordable housing (Volkshuisvesting en Ruimtelijke Ordening, 2022). Earlier research indicated modular integrated housing can serve as a repercussion against this problem (Khan et al, 2022). The Dutch government wants to promote innovation in the construction industry to help solve the housing shortage, but this industry has been described as traditional instead of being innovative (Abbot et al., 2006). Startups, though, are often linked with innovation (Colombo & Piva, 2008, De Groote & Backmann, 2020; Spender et al, 2017). However, when analyzing the Dutch housing construction industry and it's challenges through the scope of Porter's five forces (2008), which are the threat of new entrants, power of buyers, power of suppliers, threat of substitute products and rivalry between firms in the industry, it becomes clear that it is a difficult industry for startups to enter and become competitive. This is due to the barriers of entry (e.g. high fixed costs, volatility and access to clients), powerful buyers, and possible retaliation from competitors. Furthermore, innovation and partnerships play a significant role for startups to become competitive in this industry, as partnering with incumbent firms can help the startups overcoming the previously stated challenges linked with the house building industry. These type of partnerships between startups and incumbent firms are initiated because of a startup's innovative capabilities and are a way for the larger firm to gain access to new business models, which is beneficial for the continuity of their own firm. However, due to their asymmetric nature, these partnerships could cause different types of challenges for managers of involved companies. In this research, the innovation strategies employed by the concept housing startups and their partners are analyzed to see how they plan to become competitive. This research is meant to help (future) startups of this industry, and to provide them with guiding principles on collaborating with incumbent firms. These principals are developed after an exploratory literature review and interviews with managers of concept housing startups and their partners already operating in the Dutch house building industry.

Keywords:

Concept housing, startups, innovation management, asymmetrical partnerships, open innovation.

Contents

1. Introduction

1.1 Problem statement

Due to the rising population and urbanization in the Netherlands (Centraal Bureau voor de Statistiek, 2022), housing must be built in quick succession while taking sustainable and ecological factors into account. According to the Dutch ministry of housing, 900.000 dwellings should be constructed between 2022 and 2030, of which 600.000 should be affordable (Volkshuisvesting en Ruimtelijke Ordening, 2022). The government also promotes the development of 15.000 temporary homes each year. One of the methods to do this is by implementing concept housing. To build them, modular integrated construction is often used. Modular buildings are perceived to be an effective means to solve housing shortage, being more affordable, quicker to build, higher quality etc. Khan et al (2022) have found 111 drivers towards using modular integrated construction to realize affordable sustainable housing. Cost, time, productivity, quality, environment, social, policy and demand being the main 8 groups of drivers, of which the social cluster of drivers being the most significant. As there are so many drivers to implement more modular construction, it would be beneficial to keep innovating in this specific branch, possibly to enhance quality, more efficient processes, or lower costs for example. The Dutch ministry of housing also aims to stimulate this by further embedding the construction industry in their mission-driven innovation policies (Volkshuisvesting en Ruimtelijke Ordening, 2022). However, when compared to other industries, the construction industry has been described as being less innovative (such as adopting new technologies or project delivery methods) (Abbot et al., 2006).

Figure 1: 111 Drivers towards modular integrated construction (Khan et al, 2011)

Startups are often linked with innovation (Colombo & Piva, 2008, De Groote & Backmann, 2020; Spender et al, 2017), bringing new ideas to an industry like for example conceptual housing. Conceptual housing is working from repeatable, innovative, integral and flexible building solutions that can respond to the individuality of the residents, the location and the client for each project. The solution has been developed, designed and engineered by the provider of the concept, together with parties from the supply industry (Netwerk Conceptueel Bouwen, n.d.). However, an analysis of the concept housing construction industry shows significant *barriers to entry*. This is due to the high capital requirements and fixed costs of the housing market, among other things, and the limited capabilities in spreading risks in comparison to bigger incumbent firms (ING Economisch Bureau, 2020). This is a problem due to the high volatility associated with the construction industry. Bigger firms can often also build the traditional way, which is less detrimental to put to a halt during a recession for example, while they keep the modular construction factories running. Keeping the factories active is important because of the high fixed costs (ING Economisch Bureau, 2020). Due to these differences, it is difficult for small-scale startups to enter the industry and become competitive with incumbent firms. Furthermore, startups suffer from smallness and newness (Partanen et al, 2014), resulting in a lack of human and financial resources and not yet being perceived as legitimate in the industry. These liabilities are possible to overcome by starting asymmetrical partnerships with incumbent firms, which is often done by startups in the conceptual housing industry.

The lack of resources explains why smaller firms often allocate significant attention to their existing resources and fully leverage them to attain strategic innovation objectives according to Meng & Brown (2018). In their research about innovation strategies followed by construction firms of different sizes, Meng & Brown (2018) found that there are four categories of innovation strategies used in construction: technology, resources, management and marketing. Next to the earlier mentioned focus on resource-related innovation strategies, they found that specifically smaller firms also often use certain managerial innovation strategies like quickly responding to changing contexts, making the right decisions at the right time, using impactful incentive mechanisms, fostering involvement in the innovation process through the whole firm, and actively recognizing and addressing risks and uncertainties. Implementing (some of) these strategies make the smaller construction firm more agile, which differentiates them from middle-sized and large construction firms on the aspect of innovation as those are more focused on long-term benefits. When trying to overcome their smallness and newness, startups can try to engage in partnerships with bigger incumbent firms. To exploit a startup's technology or invention for their own products, established businesses could be willing to enter into a partnership with them (Spender et al, 2017), which could mean that in order to become competitive as a startup in the house building industry, the young venture needs to be innovative in some way. These partnerships would give startups access to resources and lowering barriers to entry, while providing the bigger firm with long-term benefits through the continuality which is associated with the business model of concept housing.

Additionally, not only the partners from the startups should be convinced in the startup's innovation and see it's potential. Wamelink & Heintz (2014) emphasize in their research the importance of the superstructure of the construction industry, which are clients (housing associations, developers) and regulators. According to them, strong and professional clients with a high demand play an important role in diffusing innovations through the construction industry. 'Bouwstromen', which are a collaboration between housing associations, concept providers and municipalities to ensure a certain amount of dwellings are being built through time, are a sign that the superstructure in the Netherlands is taking the innovation of conceptual housing seriously and facilitate this development. Wamelink & Heintz (2014) also found that system integrators, which in the case of concept housing are the concept providers and architects, play a role in innovation diffusion, albeit of less importance. They found that system integrators often start pilot projects,

exchange experiences and create knowledge networks. For the innovation infrastructure, which are the suppliers, no emergent innovation strategies were found which promoted the diffusion of innovations.

1.2 Research questions & objective

This research aims to find the innovation strategies used by startups in concept housing and their partners and the adoption of these innovations by their clients. Why are these strategies chosen and what is their purpose? By finding answers to these questions it is possible to make recommendations towards aspiring startup companies in concept housing and their future partners on how they should collaborate and exchange knowledge through open innovation. This will be done by linking the four innovation categories as described by Meng & Brown (2018) with the actors in the concept housing market as can be seen in 1.3. It can also proof useful for newcomers in the industry to know what they can expect from the other actors and by giving ideas on how to shape their business. This thesis will analyze how startups in the conceptual housing industry and their partners can manage their asymmetric, strategical partnerships in order to become competitive. This will then serve as the main research question for the thesis:

RQ: How do asymmetric partnerships between concept housing startups and incumbent firms strategically manage innovation to be(come) competitive in the Dutch housing construction industry?

Definitions of important terms can be found in the reading guide (1.6). The main research question will be answered by doing in-depth interviews with managers from startups and different types of partners currently active in the Dutch concept housing industry. Before these interviews can be done though, thorough knowledge is needed about the housing construction industry and the competitive forces it entails, as described by Porter (2008), as this will provide a better understanding of the industry and markets. This brings forward the first sub question:

SQ1: How do Porter's five forces of competition (2008) shape the housing construction industry in the Netherlands?

This question will be answered by doing a literary research and doing exploratory interviews with two experts. One expert in the field of conceptual housing and one expert on entrepreneurship in the built environment. Answering this question will help seeing the challenges of the Dutch housing construction industry, and thus explaining why some startups do not become competitive, if they are not able to cope with the industries dynamics. It also explains why many startups in this industry need to get involved in partnerships in the first place.

SQ2: How do asymmetric partnerships help startups in the conceptual housing industry to overcome smallness and newness?

As the importance of partnerships is established after SQ1, SQ2 serves to dive deeper into the actual for asymmetric partnerships in practice, and how these partnerships help startups overcome their smallness and newness. This sub question aims to find what innovation strategies startups use in the 'resource' category.

SQ3: How is open innovation between partners facilitated?

Open innovation takes place when a firm uses another firms innovations for their own commercial objectives. As startups make use of their partners technical innovations, this question is asked to find out how this process goes and what the startup's partners receive in return of sharing their innovations.

SQ4: Which innovation strategies are facilitated by the startups management?
As Meng & Brown (2018) found that there were five managerial innovation strategies used specifically by small construction firms, it would be interesting to see if these strategies are also followed by the concept housing startups. Other relevant managerial innovation strategies might also be discovered when answering this question.

SQ5: Which innovative marketing strategies are implemented by startups?
As the diffusion of innovations in the construction industry is highly dependent on the superstructure (which includes the clients) according to Wamelink & Heintz (2014), it is important for startups to effectively market their product to them. This sub question serves to find out if the startups take this into account and follow innovative marketing strategies.

SQ6: How are the clients and regulators influencing the adoption of innovations from concept housing startups?
Following up on SQ5, the effectiveness of the startups' innovative marketing efforts can be measured when analyzing the willingness of the clients and regulators (the superstructure) to adopt their innovation.

1.3 Scientific relevance

There is a lot of literature on innovation and collaboration in the built environment, however they often mention that it is a project-specific industry, which is true when looking at traditional construction. However, with the rise of industrial housing, the housing construction industry is becoming more product-based like other manufacturing industries, with predefined levels of customization available for the client (Hall et al, 2022).

With this in mind, analyzing the influence of Porter's five forces (2008) on the Dutch house building industry through the lens of a concept housing startup might give new insights on the industry, as no research has done this yet. Furthermore, there is not much literature to be found where the concepts of innovative startups, conceptual housing and strategic alliances come together. Hall et al (2022) researched new business models associated with industry 4.0 in construction, of which one was concept housing. However, their case study was based around BoKlok, a residential housing concept developed jointly by Skanska and IKEA, which are two large, global companies. As this cannot be defined as a startup, it still leaves the question on how a young, small company can achieve a competitive position in the housing construction industry, as they are known to bring innovation into any industry (Colombo & Piva, 2008, De Groote & Backmann, 2020; Spender et al, 2017). This is often done through partnerships with larger incumbent firms. This research will add knowledge and give a modern perspective on this aspect in the Dutch context.

1.4 Societal relevance

As social drivers are observed to be the most significant and the Dutch government promotes innovation in construction, it is beneficial for society that these startups can co-exist with incumbent firms and new companies can keep entering the industry of modular construction. Some social drivers for modular integrated construction stated by Khan et al (2022) include: substitute for rising housing demands, enhanced urban regeneration, better employment opportunities, and a high acceptance towards innovation. Through this research, I hope to contribute to improving the collaboration between startups and their partners in the housing industry, which can ultimately lead to more innovative and sustainable solutions for housing construction.

1.5 Reading guide & definitions

In this paragraph, the most important concepts and definitions of this research are explained. These concepts will be used throughout the entire thesis. After the glossary, a reading guide follows, indicating what will be covered in each chapter.

Concept housing: Working from repeatable, innovative, integral and flexible building solutions that can respond to the individuality of the residents, the location and the client for each project. The solution has been developed, designed and engineered by the provider of the concept, together with parties from the supply industry (Netwerk Conceptueel Bouwen, n.d.). Concept housing is often done through modular integrated construction, which can be defined as the process of organizing, designing, producing, fabricating, and preassembling a variety of building elements, components, and modules in a controlled setting (commonly referred to as a factory production), prior to their installation on site to quickly construct a structure (Goodier & Gibb, 2007).

Strategic management & competitiveness: A firms strategic management process is the full set of actions, decisions and commitments the company makes to be strategically competitive and earn above-average returns (Volberda et al, 2011). Strategically competitiveness is when a company successfully formulates and implements a value creating strategy (Volberda et al, 2011) Strategic actions are market-based moves that involves a significant commitment of organizational resources and are difficult to implement and reverse.

Startup*:* An "innovative startup" is typically referred to as a small company started by its founders who have fresh concepts to address issues with considerable business potential and significance (Startup Commons, 2021). Startups are frequently associated with innovation, and introduce new ideas to an industry (Colombo & Piva, 2008; De Groote & Backmann, 2020; Spender et al, 2017). Behind the celebrated success of a select few businesses, various failures have taken place as other innovators have fought for survival. This is explained by Phillips and Kirchhoff's (1989) statement that a startup's early growth stage is crucial to its survival. For this research, a startup has been defined as a firm which is founded less than 5 years ago, and employs less than 30 people.

Innovation: In his innovation theory published in 1934, Schumpeter proposed the concept of innovation as an evolutionary process, where each step builds on the development that came before it and sets up the next stage. Technological innovation can lead to changes in the business's commercial and operational processes, and as a result, new business models can be developed (Amit and Zott, 2015). However, innovation does not have to be technological per definition. This thesis uses Dosi's (1988) definition: `innovation concerns the search for, and the discovery, experimentation, development, imitation, and adoption of new products, new production processes and new organizational set-ups'.

Strategic alliance: a strategic alliance is a cooperative strategy in which firms combine some of their resources and capabilities to create a competitive advantage (Volberda et al, 2011). These are often called partnerships as well.

Reading guide:

In the following chapter, *Chapter 2: Literature Review*, the theories of the research will be further elaborated. This analysis will show how the industry works, and what kind of external dynamics are playing a role on house building firms. This will be done by applying the theories behind Porter's (2008) model of the five forces which shape any industry: The threat of new entrants, the power of

suppliers, the power of buyers, the threat of substitute products or services and the rivalry among competitors. This model was designed to give strategic managers of companies a way to analyze competition in any industry, so they could assess whether entering the industry was worth the investments or not. It should give a general impression on what the challenges are when operating in the particular industry, and why many startups choose to start partnerships to overcome these challenges. In Chapter 2.1, these influences of the five forces on the Dutch housing construction industry will be analyzed. This will give an insight on how competition between housing construction companies works and the results will serve as a basis of knowledge on the remainder of this research.

Furthermore, it is important to know what role innovation has for startups in the process of becoming competitive (Chapter 2.2). Being inventive alone won't make a company competitive in its industry. Like stated earlier, smallness and newness are common challenges for startups (Partanen et al, 2014). Smallness suggests a lack of resources, such as financial or human ones (Hoang & Antoncic, 2003), whilst newness suggests a lack of legitimacy within an industry (Stuart, 2000). A startup must address both of these liabilities in order to compete (Ahlstrom and Bruton, 2001) which can be done through innovation.

Lastly, in the literature review the benefits and challenges of strategic alliances is explored (Chapter 2.3). When analyzing startups in the conceptual housing market, it is quickly noted that many of them are engaged in partnerships with other firms. This is because startups deal with a lack of resources and legitimacy an incumbent firm does have, which both are especially important in the world of real estate. The flexibility and specialized knowledge of a startup may make incumbent companies willing to partner with them to use their technology or innovation for their own goods and to advance their own innovation initiatives (Spender et al., 2017; Hogenhuis et al., 2016). Choosing the right partner is crucial because, despite the potential benefits for both parties, their disparities in significant organizational factors such as learning processes and organizational compatibility (Das & He, 2006) can present challenges in the partnership.

In chapter 2.4, conclusions on the literature are presented. Porter's forces will be shown in a table, and their impact on startups in the concept housing will be visualized through color coding. After this conclusion follows the last paragraph of chapter 2. In paragraph 2.5, the conceptual model of this research will be presented, which shows all relevant actors and innovation categories to be considered during the research design.

Next comes the third chapter, *Chapter 3: Research Design & Methods*, in which the strategy for answering the research questions and the type of data used will be described. Additionally, the research's purpose, the type of study conducted, participant selection criteria, and the methods of data generation and analysis will be outlined.

In chapter 4, *Results from* practice, the results will be presented, and the empirical data will be analyzed in a manner similar to that described in chapter 2. Quotes from the interviews will be included in this chapter, and the observed aspects of the four categories of innovation strategies will be described here.

In Chapter 5, the concluding chapter, the content from chapter 2 & 4 will serve to answer all the research questions. First all sub questions will be answered, which will lead to eventually answering the main research question on how asymmetric partnerships between concept housing startups and incumbent firms strategically manage innovation to be(come) competitive in the Dutch housing construction industry. This chapter will also include a discussion about this research, how it could have been done differently, what researchers who follow-up on this thesis might consider, and what challenges were noticed during the research. In this chapter, recommendations for industry actors will be given as well. These are aimed for startups in the conceptual housing industry to gain insight on how the industry functions, how they should collaborate with partners, and especially how

they could implement different innovation strategies. The recommendations section can also prove useful for the partners, as they should get a clearer view on the role of a startup in this industry.

2. Literature review

A literature review was done to find out about Porter's (2008) five forces, the function of strategic alliances and innovation from a strategic management perspective. Figure 2 has been made to show these industry dynamics of the Dutch housing market, the position of startups and incumbent firms, and their relation to each other. To clarify figure 2: both startups and incumbent firms are present in the house building industry, of which a part is the concept housing market and another part is traditional (these are not visualized in actual proportions). Incumbent firms exist for a longer time and have proven to be competitive, while startups have just been founded and have to strategically manage to become competitive. This can be done by implementing innovation strategies and by starting asymmetrical partnerships with incumbent firms, thus forming asymmetrical partnerships. This will get explained further in the remainder of chapter 2.

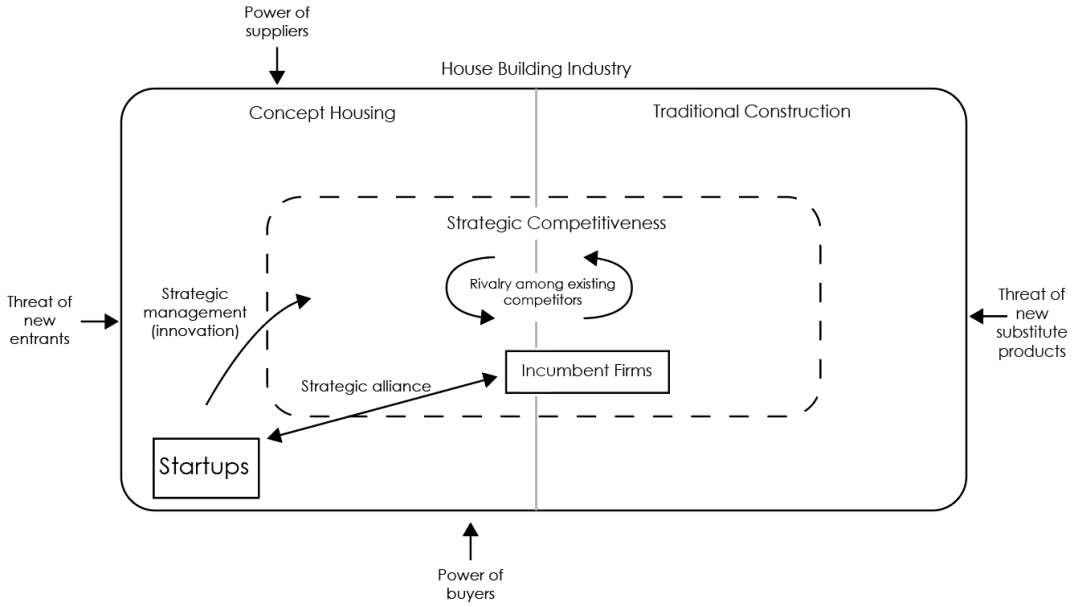


Figure 2: Dynamics of competition in the Dutch housing industry (Own image, 2023)

2.1 Competition in Dutch housing construction industry

To have an idea on how competition works in the housing construction industry, an analysis can be made by linking the industries characteristics with Michael Porter's five forces of competition model as shown in figure 3. These five forces are: the threat of new entrants, the power of suppliers, the power of buyers, the threat of substitute products or services and the rivalry among competitors. By doing this analysis, a new firm in the industry should gain a better understanding on what the challenges are to become competitive. The fundamentals of an industry's current profitability are revealed when the competitive forces are understood, and doing so also provides a framework for foreseeing and influencing competition (and profitability) throughout time (Porter, 2008). The most important competitive force or forces control an industry's profitability and constitute key factors in the company's business strategy.

Figure 3: Porter's five forces of competition (2008)

2.1.1 Threat of new entrants

New entrants are a threat because additional competitors exert pressure on selling prices, expenses, and the pace of investment required to compete by bringing additional capacity to the industry and their ambition to increase their share of the market (Porter, 2008). How more difficult it is to enter this industry, how lower the threat of new entrants is. There are multiple reasons why it might be difficult for a new firm to start in an industry, which are called *barriers to entry*. These might be: capital requirements, economies of scale, product differentiation, switching costs, access to distribution channels, cost disadvantages independent of scale, and government policies (Volberda et al, 2011). Adding up to those barriers, a new firm should also anticipate on retaliation from incumbent firms. In this paragraph, these barriers to entry and expected retaliation from existing construction companies will be linked with the housing industry.

Capital Requirements

When a company wants to start in an industry, they need to make capital investments. Like most manufacturing firms, a modular housing company needs to invest a lot in comparison to for example a service focused firm. A concept housing manufacturer with a standardized product needs a factory, which can cost between 25 and 50 million euro's according to ING Economisch Bureau (2020). Not only physical facilities are needed however, as inventories, marketing activities and other critical business factors like employment costs also require capital (Volberda et al, 2020). This is also the reason why the fixed costs of modular housing construction companies are usually higher than traditional builders, as they do not need to invest in factories, a manufacturing line and/or robots.

Economies of scale

Economies of scale is a positive effect which in particularly manufacturing companies experience as they start making more products in a certain period of time, as the costs per unit are getting lower because the fixed costs are spread between all products. In the case of the housing industry, and especially in modular housing where fixed costs are relatively high (ING Economisch Bureau, 2020), this means that a substantial amount of units should be made to gain this benefit. Achieving some kind of economies of scale is very relevant to modular housing constructors, as they have to invest in a factory and might also own expensive robots which are constructing the modules in the factory. Porter (2008) mentions there are two ways a new entrant can deal with this challenge: either by entering on a small scale and deal with the costs disadvantages, or by entering on a large scale and taking a risk of competitive retaliation. Startups most likely do not have the resources to enter on a large scale (Hoang & Antoncic, 2003) so they are most likely forced to deal with cost disadvantages.

A drawback from economics of scale is that you need to make the same product many times to become incrementally become more efficient and gain a cost advantage, which in housing is not ideal as this would mean that there would be a very limited amount of housing types and housing preferences of future residents can only be implemented to a limited extent. However, due to technological innovations, there are ways reduce this problem in manufacturing industries like modular housing construction. Flexible manufacturing systems, which are made possible by the robots mentioned earlier (ING Economisch Bureau, 2020), offer the possibility of mass customization. This offers the advantage of economies of scale while also adding the possibility to offer the customers a product catered to them specifically. Franke et al (2010) state that this "I designed it myself" effect makes customers wanting to pay more. Mass customization has become more popular in an increasing number of manufacturing industries (Rungtusanatham & Salvador, 2008) and is also believed to hold a lot of potential for industrial housing construction (Larsen et al, 2019).

Product differentiation

Product differentiation is what makes a customer willing to pay more for a certain product than for a comparable product from a different firm. In many industries this is an effect which follows from a firm's services to their clients, marketing techniques, quality of the product, or being the first to bring a product onto the market (Volberda et al, 2011). The uniqueness of a product tends to make customers more loyal, which is a problem for new entrants in an industry. New entrants need their product to align better with the customers preferences than an incumbent firm's product, or have a better price offer while offering enough quality.

In the case of the housing industry, this barrier could be examined in two ways. Either the residents or a housing association or real estate developer can be conceived as customer. Residents are not necessarily loyal to the constructor who built their house. They are either willing to move house or not, due to personal reasons. Next to that, the actual quality of a house is only one of the drivers of its price. The current economic circumstances and the location of the home have a significant impact on the price of the house, for example (Galati et al, 2011). These are aspects on which the modular housing company often has no impact on. Taking this in consideration, product differentiation has little impact on future residents. However, a client like a housing association could care a lot about the modular housing concept differentiations as this could imply different (sustainable) qualities like circularity or lower constructions costs. The aspects a customer cares about is depended on the customers preferences. Furthermore, customers who value the uniqueness of a product tend to be more loyal to the product and the supplying company (Volberda et al, 2011), which is another reason that product differentiation is a threat for new entrants. They need their product to align better with the customers preferences than the incumbent firms product, or have a significant better price offer.

Switching Costs for users

Switching costs are the costs a customer makes to switch from one product to another. Needlessly to say, when looking at residents who want to buy a home, this will be the most expensive switching costs for most people in their lifetime. Not only financially, but also the actual activity of moving to a different place is something which implies certain costs: people might experience stress because they could social ties with others (Munton, 1990), and moving furniture and other belongings should be considered as physical costs. This means that for residents, the switching costs of housing can be considered as extremely high in comparison to practically any other product, and Porter states that how higher the switching costs, how more difficult it is for new entrants to find customers (2008). Additionally, according to Lauridsen et al (2009), switching costs are higher for homeowners than for tenants. If switching costs are high, a new entrant needs to offer their product at a substantially lower price than their competitors, or have a much better product quality-wise. This means that switching costs can be seen as a very considerable barrier for new entrants in the housing industry. However, offering a product at a lower price could also be seen as an opportunity by concept housing companies, as urban housing affordability is a global issue (Wetzstein, 2017).

Access to distribution channels

Any firm which makes a product needs a method to distributing its goods to customers. Distributors often have built a relationship with incumbent firms, which creates switching costs for the distributor when they would work with new firms. In the case of the housing industry, the 'distributor' would be the housing provider, like housing associations or real estate developers. Real estate development is a risky endeavor as the process is rooted in uncertainties (Byrne, 2002), so the housing provider likely prefers working with contractors they already worked with before and trust (Latham, 1994 and Egan, 1998). Furthermore, since alternative procurement methods like early contractor involvement have become more standard, housing associations and contractors started to find trusting relationships to be even more important (Dewick & Miozzo, 2004). When a new firm enters the industry, they need to convince the distributor to carry their products instead or next to the products they already are distributing. Firms often do this by implementing price breaks for big orders, which again means a lower profit potential for the new entrant (Volberda et al, 2011). However, achieving a big order from a housing association or developer would mean the concept housing supplier has a reason to keep his factory running, increasing the benefits from economies of scale.

Another possible option to overcome this barrier, as Porter stated (2008), is that new entrants bypass the whole distribution process. An example would be low-budget flight companies who let the consumer book their own flight instead of booking it through a travel agent, who prefers to work with more expensive airlines. This might also be an opportunity for new entrants in the housing construction industry, who could sell directly to residents. However, this does not seem like a viable business plan on its own due to the need of regular orders to keep the manufacturing line running.

Cost disadvantages independent of scale

Sometimes incumbent firms have advantages which new competitors cannot imitate. Think of brand identity, proprietary technologies, location of facilities, and an established access to the supply chain. To compete successfully, a new entrant needs to minimalize the effects of these advantages. "Modular construction" and "modular housing" respectively give 29.595 and 4.050 hits in the European patent register (European Patent Office, n.d.), which indicates that proprietary technologies are used to gain a competitive advantage. Coeurderoy & Durand (2004) found that proprietary technologies are often used to grow market share. They also found that owning proprietary technologies increases the market share benefits of early entry, which is what a company gains when it is relatively quick to take an action to build or defend its market position or gain

competitive advantages. This concept has been influenced by Schumpeter (1934), who stated that companies gain competitive advantage by taking innovative actions. Small businesses are typically more prone than large businesses to begin competitive actions, and they frequently do so faster than bigger companies (Volberda et al, 2011). Smaller businesses are therefore seen as agile and adaptable rivals who rely on speed and surprise to maintain their competitive advantages or create new ones when engaged in competitive rivalry, particularly with big businesses, to achieve a competitive advantage in the market (Pil & Holweg, 2003). This means implementing proprietary technologies in the business strategy could be seen as an opportunity for startups towards a competitive advantage.

Government policies

Governments can use policies to either increase or decrease barriers for new entrants. Increasing the barriers can be done through licensing requirements, permits and restrictions on foreign investments for example. On the other hand, government policies can help an industry and its new entrants by implementing subsidies or funding research and making the new knowledge publicly available (Porter, 2008). Of course, government policies are very specific to the country a firm operates in. In the case of the Netherlands, the ministry of housing (Volkshuisvesting en Ruimtelijke Ordening, 2022) set the goal to build 900.000 homes between 2022 and 2030. To guide the development of these homes, the government implemented 35 'Woondeals', which are agreements of regional governments and municipalities about the amount of dwellings, the locations, the amount of affordable and social housing, and the attention groups (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2023). The government also made subsidies available to set up 'Aanjaagteams', which are small teams consisting of experts on housing which support municipalities with their expertise on planning and permits to quicken the development of the housing projects.

Furthermore, the government also canceled the landlord levy, a policy which made it harder for housing associations to fulfill their purpose. Subsidies are made available for sustainable and circular housing projects. Performance agreements are made with housing associations and municipalities to ensure 250.000 social houses and 50.000 middle-income houses are built. These types of goals, policy changes and agreements should (indirectly) help new firms to enter the housing construction industry, as a certain amount of demand is established. Adding to that, the Dutch government seeks to promote innovation in the construction sector (Volkshuisvesting en Ruimtelijke Ordening, 2022), which could also be beneficial for startups, as that is considered a common strength among them (Colombo & Piva, 2008, De Groote & Backmann, 2020; Spender et al, 2017).

Expected retaliation

The amount of expected retaliation from incumbent firms can also be an barrier for entry in an industry. If heavy retaliation is expected, a firm is less likely to enter the market (Porter, 2008). Chances of rigorous retaliation increase when incumbent firms have high stakes in the industry. For example, they might own many assets which have little use outside of the particular industry, which is the case in house manufacturing. Newcomers could also expect retaliation if incumbent firms have shown retaliation before, have access to financial resources to fight back, have the ability to cut prices while fixed costs are high in an industry, or the industry growth is slow. If the industry grows slowly, the only way for newcomers to gain customers is to take the market share away from incumbent firms (Porter, 2008). A way for new firms to overcome entry barriers is to look for market niches which are not yet being served by the incumbent firms. Smaller startups are often well suited to finding these niches and serving them (Volberda et al, 2011).

According to these mentioned aspects of the house building industry, the threat of newcomers in the industry can be considered remarkably low, especially due to the high capital requirements, the

importance of achieving economics of scale, and the access to distribution channels like housing associations and developers. While this is good for the competing firms who already active in the industry, it is a negative characteristic of the industry for any startup, which are per definition newcomers. A way to partially deal with these challenges as a newcomer is to (temporarily) offer their goods for a lower price than their competitors. This is difficult, however, due to the high costs involved in the concept housing industry. Some governmental interventions could diminish these barriers to entry, through subsidies or guiding the market through earlier mentioned 'Woondeals'.

2.1.2 Power of suppliers

The power of suppliers is important to measure competition in an industry, as their potential price increasements or quality reductions can have a big impact on the margins in the industry. Suppliers are powerful when (Porter, 2008):

- They are more concentrated than the industry to which they sell their products. With less choice for buyers, there is more power for the suppliers. In case of construction, this is factor is material and context specific. However, in construction the suppliers generally are more concentrated than the buyers.
- The suppliers are not heavily depended on the industry to ensure profits to be made. If the industry is the main source of income for the suppliers however, they will try to keep the prices reasonable. Suppliers of, e.g., concrete, cross laminated timber , and plumbing systems do not have other big industries they can profit from, thus decreasing their power over the construction industry.
- When the firms in the industry have high switching costs when they replace their supplier, for example if they built their manufacturing site close to a certain supplier. As collaboration between contractors and suppliers in standard construction is project-based (Dubois & Gadde, 2000), the switching costs to order concrete from a different supplier should be low. However, in modular construction this might be a bit different. Supply chain integration, according to Doran and Giannakis (2011), is essential for modular building solutions to compete with conventional on-site construction. Some of the suppliers can be further integrated than others, as can be seen in figure 4.
- When the supplier offers differentiated products. This does not seem very relevant in the construction industry initially. However, innovations in building materials are continually being made to make them more sustainable, easier to use circularly, or add other qualities (De Luca et al., 2017) like self-restoring concrete or a wood foam which can serve as biodegradable insulation. These type of materials are not used on a wide scale though, as architects tend to only use materials they have experience with (Emitt, 2006), so one could state that the differentiation of house-manufacturing suppliers is slight.
- When there is no substitute product than the one the suppliers are offering. Homes can be built from multiple materials like wood, concrete, and steel. They all have specific characteristics which cannot easily be replaced by a totally different material. However, new innovative materials like those as described by De Luca et al (2017) might become substitute products eventually.
- When the suppliers have possibilities to integrate forward into the industry, thus taking market share from the buyers.

Supply chain integration

An important difference between traditional contractors and concept housing manufacturers is the amount of integration of the supply chain. Like explained earlier, traditional contractors often work with suppliers on a project-based term (Dubois & Gadde, 2000). Concept housing manufacturers, however, often integrate the supply-chain via partnerships. This makes supply chain management easier, which Wuni & Shen (2020) found to be one of the critical success factors of a modular integrated construction project. However, not every supplier needs to be fully integrated in the manufacturing process. The degree a supplier is integrated also implies the power this supplier has, due to switching costs. For example, a part of the manufacturing process might be designed around a certain prefab core with 'wet' rooms like a toilet and bathroom from a certain supplier. If the supplier of that core raises its price, the switching costs for the manufacturer of the homes might be too high to order from a different supplier. This is something which is business specific, and cannot be generalized over the whole modular housing segment.

Some suppliers have a strategic relationship with the modular manufacturer and are involved in the decision-making process, which makes them more integrated than a supplier with an operation relationship and no involvement in making decisions. The relationship/supplier integration matrix developed by Doran & Giannakis (2011) could be used to measure the amount of integration and thus power of suppliers, as the suppliers who are placed in the top-right corner of figure 4 are also more likely to integrate forward into the industry than the suppliers placed in the bottom-left corner.

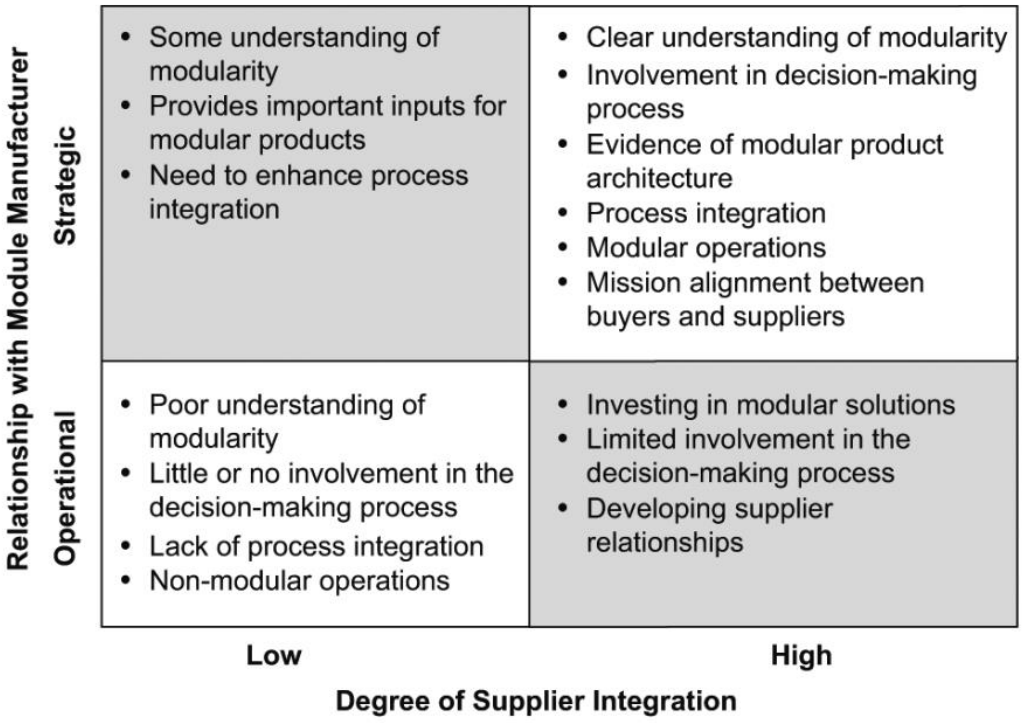


Figure 4: Relationship/supplier integration matrix (Dorian & Giannakis, 2011)

2.1.3 Power of buyers

A firm tries to sell its product for a maximum possible price to increase their margins. However, a buyer of the product wants to pay the lowest possible price at which the firms earns the lowest acceptable returns. Buyers are strong if they have negotiation power over other market players,

especially if they are sensitive to price increases, and can use their influence largely to force price reductions (Porter, 2008). For this research, the two most common customer groups for modular housing companies are taken into account: housing associations (HA's) and real estate developers. Customer groups are able to negotiate if (Porter, 2008):

- There are not many buyers, or buyers acquire large volumes of products. Large volume customers are especially powerful when there are high fixed-costs in the industry. Like stated before, fixed costs are high in modular housing due to the costs related to the factory. Adding to that, there are only a limited amount of developers and HA's in the Netherlands, so there are not many clients.
- If the products in the industry are not differentiated, so the customers have the feeling they can easily find a different supplier. At the moment of writing, there are 40 different concept suppliers connected to the NCB *(Netwerk Conceptueel Bouwen*, Network of Conceptual Construction), and there are more concepts which are not part of this network. Every concept is different in qualities and services. Setiawan et al (2015) also mentions being different than other contractors is a key factor towards a competitive advantage. This makes lack off differentiation not a big factor the power of buyers over the Dutch modular housing market.
- Buyers do not have high switching costs when choosing to order from a different supplier. This is relevant in the construction industry due to trust and reliability, which is written about in chapter 2.1.1.
- Buyers have possibilities to integrate backwards. This would mean that housing associations or real estate developers started to produce their own dwellings. This is not impossible, as there are housing associations with their own construction department like Clúid Housing (2022) in Ireland, but it does not occur commonly. Swan Housing Association in the UK tried to integrate backwards into modular housing, and operated their own factories (Swan, 2021). However, they had to close the factories by the end of 2022 because of occurring losses (Clark, 2022). It is also possible for real estate developers to do this, but what occurs more often is that they start partnerships with other firms to develop their own concept, like 'VORM 6D Wonen' (VORM 6D Wonen, n.d.).

Price sensitivity

Customer groups are price sensitive if (Porter, 2008):

- The costs are a major part of the total expenditures of the buyers. For both developers and HA's the amount of costs for construction are important, but especially for HA's. Housing associations in the Netherlands do not have to pay the commercial price for land in the Netherlands, thus lowering the amount spend on land and making construction more significant in their total expenditure.
- The quality of the buyers products or services are not highly depended on the industries product. In housing, bot developers and HA's care a lot about the quality of the dwellings they acquire, as this will increase the price when they decide to sell the properties, among other reasons.
- The industries product does not have a big impact on the buyers other costs. The product of a modular home builder has impact on other costs of the housing associations, as a high-quality, sustainable product will reduce maintenance costs for them. Lower lifecycle costs is also one of the drivers mentioned by Khan et al (2011) towards modular integrated

construction. This will make them less reluctant to pay more for a higher quality housing units, next to the added benefits for the tenants.

Research states that price is an important factor during tenders to choose a contractor, especially when a client decides to procure a contractor through low-bid methods (Lines et al, 2022). Despite the fact that many owners are dissatisfied with the method's functioning, owners have continued to use the low-bid procurement method due to the convenience with which the lowest bidder may be found (Awwad & Ammoury, 2019). Poor construction performance can result from low-bid procurement because bidders are less likely to properly comprehend the owner's needs (Luu et al., 2005). Earlier research suggest that when final costs are considered, the lowest bid may not always be the best one (Perrenoud et al., 2017; Wong et al., 2010). More and more project owners are choosing to hire contractors using multi-criteria procurement approaches, which take into account factors more than just price (Wong et al., 2001). Due to the poor performance of low-bid contractors, the complexity of building designs, the shortening of the procurement phase, rising construction prices, and litigation, owners are choosing to employ alternative procurement methods (Lines et al, 2022). Clients are willing to pay more during procurement for a legit, trusted contractor who is less likely to add 'unforeseen' costs during the construction phase. This shows that clients in the housing industry are becoming less price sensitive during the procurement phase, as long as the contractor or housing supplier is able to deliver accordingly. This is beneficial for conceptual builders, as they are not necessarily cheaper than traditional construction, but often the quality is higher and there are less risks associated with the construction of conceptually built projects (ING Economisch Bureau, 2020).

When looking at the previous statements, we can conclude that the power of buyers is high in the house building industry, because there are a limited number of buyers, the fixed costs for the house builders are high, there are cases of backwards integration, and they are sensitive to price increases. They also have an important role to play, as they have to facilitate the concept housing market for it to develop. This gets confirmed by Wamelink & Heintz (2014), who stated that clients and regulators, the superstructure, needs to play a strong role for innovations like supply chain integration to be adopted. They govern the industry's innovation environment, as they specify their demands and regulate the market and building performances.

2.1.4 Threat of substitute products

Substitutes to housing are difficult to find. One can think of hotels, boats, mobile homes and caravans, but relative to regular housing, these four products are negligible in the market of 'dwelling'. However, one should keep in mind that housing and construction has been changing through the history of humanity. For example, skyscrapers started rising only at the end of the 19th century, and are currently quite common in major cities all over the world. What is then noticeable, is that not necessarily the product itself is changing by that much: a house is defined as a building where people live in and an apartment as a set of rooms for living in (Cambridge Dictionary, 2023). However, the way these products are realized and the technologies behind it is changing. Innovations like modular construction and prefabricated homes can cause the traditional construction market to shrink, and different innovations could do the same to modular housing construction. When analyzing this force of competitiveness in the housing industry, conceptual housing can be seen as a substitute product of traditional housing. More examples of these newer ways of realizing homes, and being substitute products to traditional housing, are tiny houses and WikiHouses from Open Systems Lab, where people can order a complete set of wooden modules to build a home themselves (Wikihouse, n.d.) Furthermore, there are new possibilities in the Netherlands where residents are

practically free to develop, design and build their own home, for example in neighborhoods Oosterwold and Nobelhorst the city Almere.

2.1.5 Rivalry between competitors

According to Porter (2008), the rivalry between competitors in an industry is depending on the intensity of competition and the basis on which the competition occurs (e.g., price competition, features of the product, services towards customers).

Competition gets more intense when:

- There are many competitors, or they are similar in size. Market leaders decrease the intensity of rivalry. In the Dutch housing construction market, there are some leaders like BAM, VolkerWessels, TBI and Heijmans, but also smaller family businesses for example.
- The industry growth is slow. This is because the only way to gain market share is to take it away from competitors. Due to recent governmental decisions and the goal to build 900.000 dwellings between 2022 and 2030, the housing industry in the Netherlands is growing. This causes more market share to be divided between competitors, thus decreasing competition between the building firms.
- The exit barriers are high. This means it would cost a lost to exit the industry, because firm participants own specialized assets. Especially for the bigger contractors who own a lot of equipment these costs are high. For concept housing suppliers who own a factory and specialized equipment like robots, the exit barriers are also high.
- Rivals have strong commitments and ambitions for leadership, particularly if they have objectives that go beyond the economic performance of the specific industry. High commitment to an industry can develop for various reasons.
- Firms are unfamiliar with one another, have different ways of competing, or have different aims, which causes them to not read each other's signals properly.

If competition only focuses on price, it can be particularly harmful to profitability since price competition transfers earnings from an industry directly to its customers. Price reductions are typically simple for rivals to notice and match, increasing the likelihood of further rounds of retaliation. Customers learn to pay less attention to product characteristics and service as a result of ongoing price rivalry (Porter, 2008). The chance of price competition to occur raises if industry products are nearly identical and there are low switching costs for customers and when fixed costs are high and margins are low. The first factor is only slightly present in modular housing construction, as there is differentiation between concepts. Furthermore, there are significant switching costs to be considered when switching from contractor, as trust is considered an important factor in construction project success (Latham, 1994 and Egan, 1998).

With modular construction the fixed costs are higher in comparison with regular construction, but if done correctly the construction costs will be lower which means that margins will become larger for a period. However these margins will become smaller in the commercial sector when landowners realize they are able to charge developers more for the land because of these lower construction costs (ING Economisch Bureau, 2020). This makes it that eventually the fixed costs will be high and the margins will be low, which can cause price competition to occur.

By looking at these characteristics of the housing construction industry we can state that it is likely for price competition to occur, but competition does not only take place on that subject. Setiawan et al (2015) found that there are contractors whose strategies focus around leadership, contract

management and health & safety management to be competitive, but also other contractors who used competitive bidding as their strategy to gain a competitive advantage. However, they found five key factors of competitive aggressiveness of which none was to focus on bidding the lowest price. The five critical factors were: being a problem solver for the client, ensuring differentiation from other contractors, building and maintain the clients trust and being reliable, maintain good relationships with clients to repeat business and promising better quality than cheaper competitors. Tan et al (2010) found low-bidding was the most common strategy used by contractors to win tenders, but also other strategies like high tech and management innovation are seen as important by industry participants. They also state that because of sustainable development goals, contractors should look for other competitive strategies than low-bidding, like joint ventures, better green practices and better risk management. This gets confirmed by Wong et al (2001), who found that, although the price is important, clients often choose a contractor on project specific criteria as well.

2.2 Innovative startups

The construction sector has been compared to other industries as having less innovation (like implementing new technologies or ways of offering services) (Abbot et al., 2006). Despite making a significant contribution to GDP, the construction industry is not known for producing high-tech startups, despite the other industries' startup development being on the rise (Pacheco-Torgal, 2017). It is frequently argued that the price-only bidding competition prevents the development of innovative concepts in the construction industry (Abbot et al., 2006). Building designers frequently exercise caution when selecting new products because they are concerned about potential failure and potential legal repercussions (Emmitt, 2006). The industry's strict regulatory guidelines may limit projects' creative freedom. However, multiple factors motivate businesses to innovate, according to the literature on general and construction innovation.

Porter (1985) states that competitive advantage, which refers to an organization's or firm's capacity to perform better than rivals in the same industry or market, can be attained through innovation. Schumpeter (1934) also argued that businesses achieve competitive advantage by taking innovative actions. Innovation strategies can take place in four categories, technology, resources, marketing and management, and drivers towards innovation can be internal or external to a firm (Meng & Brown, 2018). Some examples of innovation strategies used by construction firms and their respective category can be found in the table below (Meng & Brown, 2018). An interesting finding in resource innovation strategies is that they see knowledge sharing between supply chain partners as an opportunity which construction firms of any size do not often engage in. Note that their research looked at general construction firms, *not* specifically concept housing firms.

Technology	**Resources**	**Marketing**	**Management**
Enhancement of technical capabilities	Effective use of existing resources	Business vision	Continuous improvement of innovation performance
	Matching resources to strategies	Extension of business fields	Top management support
	Investment in R&D	Focus on long-term benefits	Encouragement of learning and innovation culture
	Recruitment of new and skilled employees		Getting everyone involved in innovation

Table 1: Innovation strategy categories with examples (Meng & Brown, 2018)

Goffin & Mitchell (2005) highlighted four factors that influence innovation: technology advancements, shifting consumer preferences and demands, increased market rivalry, and shifting corporate environments. Sustainable innovation has gained prominence in recent years as a result of the recognition of sustainability concerns as a major innovation driver (Dewick & Miozzo, 2004; Jepsen et al., 2014). This is beneficial for conceptual builders, as they often seek for sustainable solutions for the current challenges in the Dutch housing industry.

According to research (Colombo & Piva, 2008; De Groote & Backmann, 2020; Spender et al, 2017), innovation is one of the strengths of startups. Meng & Brown (2018) compared small and large construction firms and found specific innovation drivers and strategies linked with firms size. They argue that whereas innovation in large enterprises is likely to be fueled by international rivalry, it is more likely to be driven by survival and growth in small businesses. On the other hand, medium and big businesses typically innovate by concentrating on long-term competitive advantages, but small businesses typically do so by quickly adapting to changing contexts, which is also stated by Pil & Holweg (2003). Because of this, it would be incorrect to claim that one-sized businesses are inherently more innovative than businesses of other sizes. In contrast, smaller businesses are more effective innovators in some fields while larger businesses are more innovative in others. For example, it is discovered that five management innovation strategies—quick response to changing environments, making the best decision at the right time, establishment of incentive mechanisms, involving everyone in innovation, and early identification of associated risks and uncertainties—are only used by small firms. This could be explained by the lack of other resources a small construction firm has to deal with, as small businesses should prioritize innovation through efficient resource utilization (Meng & Brown, 2018). This gets confirmed by Abbot et al (2006), who also found that the initial drivers of innovation from a startup are based on economic drivers to survive. At a later stage the drivers are based on getting an competitive advantage, when the firm has gained the capabilities to follow its own agenda.

2.3 Strategic alliances

Being innovative is not enough on its own to become competitive in an industry. Startups often deal with smallness and newness (Partanen et al, 2014). Smallness implies a lack of certain resources like financial or human resources (Hoang & Antoncic, 2003), while newness implies the lack of legitimacy within an industry (Stuart, 2000). Facing both of these liabilities is necessary for a startup in order for it to become competitive (Ahlstrom & Bruton, 2001), which can be done by partnering up with an incumbent firm (Figure 6). Incumbent firms might be open to get engaged in a partnership with a startup to use their technology or innovation for their own products (Spender et al, 2017) and promote its own innovation efforts by utilizing the startup's flexibility and specialized knowledge (Hogenhuis et al., 2016).

Despite potential advantages for both partners, the asymmetry between them in key organizational aspects like learning processes and organizational compatibility (Das & He, 2006) presents difficulties for the partnership (Hogenhuis et al., 2016), making the choice of the ideal partner crucial. When choosing an innovation partnership, Emden et al. (2006) note the importance of complementary resources and knowledge and outline three crucial steps: technological alignment (e.g., overlap of specific knowledge areas in addition to complementarity), strategic alignment (e.g., a match of the objectives and motivations of the partner organizations), and relational alignment (e.g., cultural fit). While technological alignment between partners is easy to manage, ensuring strategic and relational alignment between incumbents and startups is difficult due to the asymmetry in the partnership (De Groote & Backmann, 2020). Furthermore, strategic alliances do not have to be with big incumbent

firms in order to be beneficial. According to Lam & Mok (2022), collaboration between startups on small-scale building projects are thought to be the most efficient approach to accelerate the growth of built environment startups for societal benefit. The use of technologies that have successfully completed minor projects may subsequently be scaled up for use in larger ones. However, because of the high entry barriers linked with conceptual housing explained in paragraph 3.1.1 these types of partnerships are more difficult to gain benefits from, due to the startups newness and smallness.

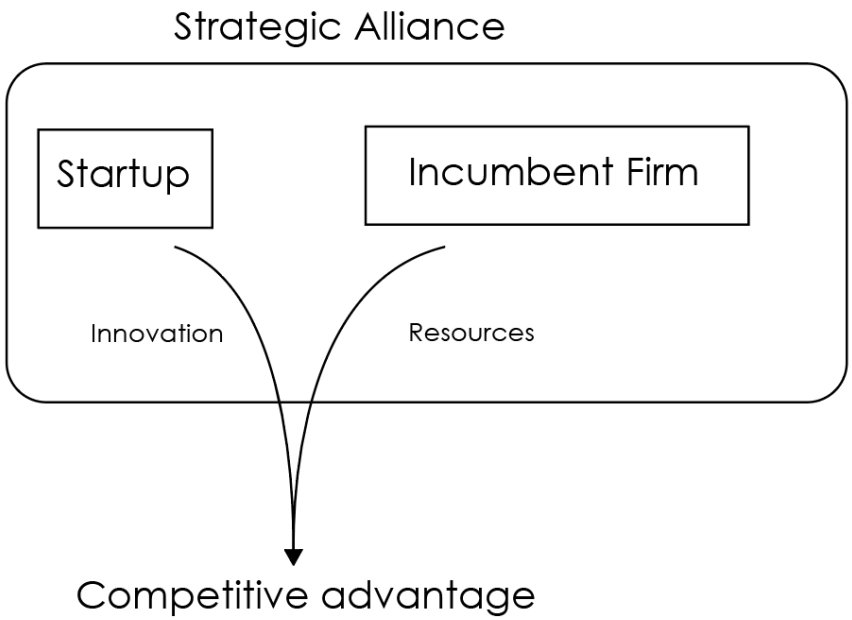


Figure 5: Asymmetric strategic alliance between startup and incumbent firm (Own image, 2023)

The question is then: how to choose a partner to form a strategic alliance with? The most crucial factor pertaining to a possible partner is, in accordance with De Groote & Backmann (2022), their specific knowledge. Along with the partner's competence, commitment is cited as being essential. The term "commitment" refers to the entire organization, including the top management team, as well as the people who are directly participating in the project. Another crucial selection criterion is sympathy for the people participating in the collaborative project. Another crucial factor was found to be prior collaborative experience. Trust and partner reputation are of similar importance, even though it might be challenging to establish them when working with start-up businesses. Trust encompasses not only the project itself but also confidential information that may have no direct bearing on the project. Financial stability is a requirement for some of the incumbents when dealing with startup companies, since they need to be sure that the partner can remain in the market for at least the period of the collaboration. Professionalism is also mentioned as a criterion. These criteria increase the chance of a positive collaboration in an open innovation setting, and increasing the chance of project success (De Groote & Backmann, 2022). Performing well in a project can help the startup overcome their liability regarding lack of legitimacy, and should increase their resources (e.g., financial, intellectual, human). Like stated before, overcoming these liabilities is needed to become competitive (Ahlstrom & Bruton, 2001).

2.4 Conclusions literature review

To conclude on this chapter, it can be concluded that the Dutch house building industry, which was analyzed through Porter's (2008) five forces, is a competitive industry which imposes many challenges for newcomers, and startups in particular. The threat of new entrants is low, which is because of the high capital requirements and the difficult process of gaining access to clients due to

the importance of trust in this industry. The power of suppliers is likely to be higher for conceptual housing firms in comparison to traditional housing firms, as the collaboration is product based instead of project based. The actual power of a supplier is also highly dependent on the level of supply chain integration. The power of buyers is high, due to multiple reasons. High fixed costs, a limited amount of buyers who order large volumes and are price sensitive are the most important reasons for this. There are also known cases of backwards integration, where a developer or housing association starts building their own homes. The rivalry between competitors is difficult to measure without speaking to any professionals who are active in the industry. However, due to high exit barriers and some price competition, rivalry between competitors is at least present on an average level. The threat of substitutes is negligible as concept housing itself is a substitute to traditional housing. These dynamics associated with Porter's five forces are shown in the table below, with colors indicating whether they are positive (green) or negative (red) for startups. Some dynamics are orange as these are situational: while the current government policies seem to be positive for startups, they are subject to change whenever a new election occurs.

Threat of new entrants (low)	**Power of suppliers (avg)**	**Power of buyers (high)**	**Threat of substitute products (low)**	**Rivalry among competitors (avg)**
High capital requirements	Less project based	High fixed costs	Concept housing IS a substitute product	High exit barriers
High fixed costs, economies of scale	Depending on supply chain integration	Limited amount of buyers, large volumes		Less emphasis on price competition
Access to clients	Construction is their main/only income	Cases of backward integration		Not many competitors, clear leaders
Government	Lack of differentiation	Price sensitive		
Influence on startup: Red = Negative impact; Orange = Situational impact; Green = Beneficial impact				

Table 2: Concept housing industry analysis through Porter's Forces (2008), based on literature (Own work, 2023)

Furthermore, the construction industry is generally perceived to have less innovation compared to other industries, as it often is slow in adopting new technologies and innovative project delivery methods. This is attributed to factors like competitive bidding practices that prioritize price over innovation, concerns about failure and legal issues associated with new products, and strict regulatory guidelines that limit creative freedom. Innovation is seen as a potential source of competitive advantage in the construction industry. Businesses that innovate are likely to perform better and gain an edge over rivals. Both Porter (1985) and Schumpeter (1934) emphasize the link between innovation and competitive advantage. Innovation strategies in construction firms can encompass technology, resources, marketing, and management. Different-sized firms have varying drivers for innovation. Small businesses often focus on survival and quick adaptation, while larger ones concentrate on long-term competitive advantages. Sustainable innovation is gaining importance, especially for concept housing providers. Innovations related to biodiversity, material usage, and resident health are examples of areas where construction firms seek sustainable solutions.

Startups in the construction industry often face challenges due to their small size and lack of

legitimacy. Strategic alliances with incumbent firms are seen as a way to overcome these challenges and enhance competitiveness. Collaboration can provide startups with access to resources, knowledge, and networks. Choosing the right partner for a strategic alliance is crucial. Factors such as complementary knowledge, commitment, shared vision, prior collaborative experience, trust, partner reputation, financial stability, and professionalism play a significant role in forming successful alliances. Successful collaboration can help startups overcome their liabilities and gain legitimacy in the industry. The relationship between business size and innovation is complex. Both small and large businesses can be innovative, but their drivers and strategies may differ. Small businesses often innovate to survive, while larger ones aim for long-term competitive advantage. Innovation drivers in startups can shift from economic survival to gaining a competitive advantage as the firm matures and develops capabilities. While these conclusions have been supported with multiple arguments from available literature, they will be either confirmed or adjusted in the next chapter, by using the interviews with the experts and industry participants as sources.

2.5 Conceptual model

Resulting from the literature review, a conceptual model has been developed to show the relevant actors, innovation flows and categories, which will be examined and analyzed in this research. Startups in the concept housing market and three different partners will be interviewed. These partners are all incumbent firms. These interviews will provide the data needed to answer the main research question on how startups become competitive through collaboration with incumbent firms, and how these partnerships facilitate the involved companies' innovations. The different types of partnerships that will be analyzed are: startup – supplier, startup – architecture firm, and startup – client. These types of partnerships are selected based on Winch's model on innovation in the construction industry (1998), which was also used by Wamelink & Heintz (2014), where the innovation infrastructure (consisting of trade contractors, specialist consultants and component suppliers) and the innovation superstructure (consisting of clients, regulators and professional institutions) are linked by the system integrators (consisting of architects, main contractors, and in this research the startups, being concept providers) who deliver them the complete product. As is visible in figure 6, the partnerships overlap through these groups of stakeholders, or are between system integrators.

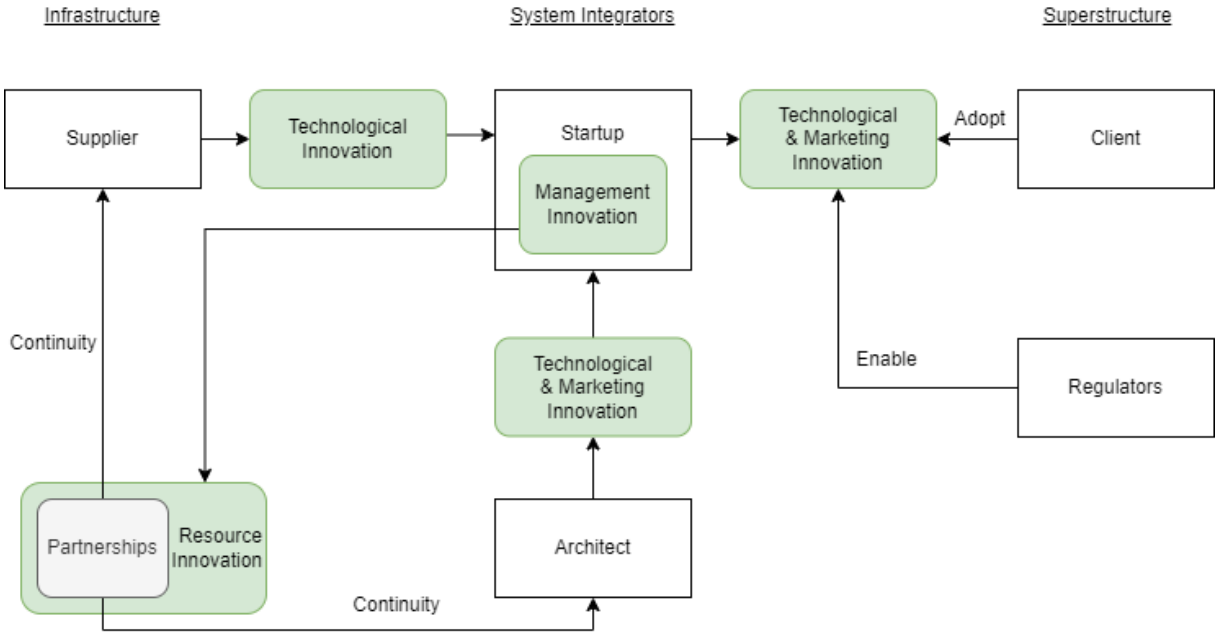


Figure 6: Conceptual model of empirical research Chapter 4 (own illustration, 2023)

The ‘flow’ of innovation categories as described by Meng & Brown (2018) is also visible in the green nodes and a key aspect of the partnerships, as open innovation takes place to develop a competitive product by the infrastructure and system integrators. The flow of innovation strategies is seen from the perspective of the startup, as they are likely to be the initiator of the new housing concept. While Porter’s Forces (2008) are not explicitly shown in the conceptual model, the analysis of the Dutch housing industry gave extra insights on what type of innovation strategies are practiced by the relevant actors. Startups are known to be agile and use specific managerial innovation tactics like quickly reacting to changing contexts. Due to their smallness and newness they are also likely to use innovation tactics related to resources, which takes shape in the form of partnerships with other firms. These partnerships could help the startup, which is a new entrant to the industry, overcome the challenges associated with the high capital requirements and the difficulties to gain access to clients. From these incumbent firms they are also likely to receive technical innovations which can be used to enhance the housing concept, and possibly some marketing innovation tactics when partnering with a renowned architecture firm. These technical and marketing innovations are then used to show the clients, the buyers, that the startup is to be trusted. This should lower the switching costs for the buyer and make it more likely for the startup to sell the housing concept, the product, to them. As regulators (the Dutch government and municipalities) play an important role in innovation enablement as they are part of the superstructure, they are mentioned in figure 6 as well. They can either enable or restrict innovations coming from the industry. However, they were not interviewed in this research.

3. Research design & methods

To answer the research questions, a qualitative and descriptive research was necessary. The choice of doing a qualitative research was based on the complexity behind business growth, because startups are motivated and able to make more decisions about their development than theorists have ever thought of (Garnsey et al., 2006). Data was gathered by doing an exploratory literature study and interviews with two experts on conceptual housing and entrepreneurship in the built environment, followed by doing expert interviews with top-managers of startups in the Dutch concept housing market and one of their partners. Both the data from the literature study and interviews were analyzed and synthesized to formulate a conclusion to the primary question.

Literature studies

The foundation for the problem statement was established by a preliminary literature review. A subsequent literature review defined essential keywords in greater detail to ensure that the reader and the researcher comprehend terms like concept housing, startups and strategic management. A thorough literature review also ensured that enough background information was gathered to build a solid foundation for the remainder of the thesis, and served as inspiration for questions to be asked during the expert interviews. For example: learning about the role of innovation for startups made it possible to formulate questions for the top managers on how they use their innovation to their advantage. The literature review also raised specific questions which can be asked during the interviews. The problematization and literature review phases were not completely independent because one always guides and informs the other. Literature was gathered using a variety of terms in databases like Google Scholar and Scopus. To give some empirical examples in the literature study, webpages from certain companies were also referenced.

Expert interviews

The two expert interviews were done in a semi-structured way. These interviews were the first source of this research's primary data. After the literature on the topic of this thesis was reviewed, one expert on conceptual housing and one expert on entrepreneurship in the built environment were interviewed to make sure the findings from the literature are valid and enabled the researcher to ask further questions about these findings. A more coherent view on the theoretical and practical context was shaped this way. Because of these interviews and the literature studies, questions were able to be formulated on how managers deal with certain challenges associated with the concept housing industry, innovation and asymmetric partnerships. The findings on the influence of Porter's five forces of competition, innovation and strategic alliances were used to formulate questions about those topics, which were asked during each interview with the industry participants. However, due to the complexity of management and innovation, the answers to these fixed questions were expected to be quite varied. To be able to ask follow up questions to gather a viable amount of data, it was necessary for the interviewer to differ from only asking the fixed questions, thus choosing for a semi-structured approach.

Interviewee/case selection

First, by using internet and the NCB (Network of Conceptual Construction), an inventory was made consisting of 11 Dutch concept housing startups. An exploratory interview with a manager of NCB helped to realize this inventory. Any personal connections with startups in the conceptual housing industry were also added to this inventory. When this inventory was complete, every company was contacted to see if they were interested in doing an interview and contributing to this research. To get a comprehensive and complete view of the partnerships, it was important that one of their

partners also got interviewed. There are three types of partnerships which were analyzed: startup-supplier, startup-architect, and startup-client. By analyzing three different types of partnerships, it became possible to better explore the different aspects of asymmetrical partnership management and innovation strategies in the conceptual housing industry. As the pool of potential cases was not very extensive, and the request to also do an interview with a partner made it more complicated to make appointments in the limited available time for this research, cases are solely selected based on: whether they fit the definition of being a startup concept provider, the type of partnership they have, and whether this partner might have been willing to do an interview as well. The interviewees were top managers of those selected startups and their respective partner, or someone who is closely involved with the strategic management of the firm. The goal is to interview 3 startups, and 1 supplier, 1 architect and 1 client.

Data analysis

Before the primary data could be analyzed, the interviews needed to be transcribed. This was done by doing the interviews via Microsoft Teams, which has a recording and transcribing function integrated. An additional recording was made with a smartphone to serve as a backup if the Teams recording fails. Because Team's transcribing function was not always correct, the recordings were used to make sure the version of the transcriptions which were analyzed were 100% accurate. The transcriptions of the interviews were analyzed by coding them openly and axially. This was done in software program ATLAS.ti, which made it possible to compare the interviews with each other, which enabled to answer the research questions. The list of used codes can be found below (Table 1)

#	Open	Axial
1.	Startup	Smallness, Newness, Rivalry among competitors, Treat of new entrants
2.	Supplier	Power of suppliers
3.	Architect	System Integrator
4.	Client	Housing Association, Developer, Superstructure Adoption, Power of buyers
5.	Regulator	Superstructure Adoption
5.	Open innovation	Technological Innovation, Continuity, Realism
6.	Resource Innovation	Smallness, Newness
7.	Management Innovation	Startup
8.	Marketing Innovation	Superstructure Adoption, Client, System Integrator

Table 3: Codes used during data analysis (Own image, 2023)

Data plan

The FAIR Guiding principles were adhered to in this thesis, making sure that the data used is findable, accessible, interpretable, and reusable (Wilkinson, Dumontier, Aalbersberg, et. al., 2016). The information used was gathered through qualitative and exploratory interviews, and a review of the literature. Through the literature study, secondary data was gathered and examined, and through the analysis of the interviews, new primary data was generated. The names and firms of those who participated in the interview were anonymized and will all remain private. The amount of personal information was also restricted to keep the interviewees anonymous for the reader of this research. All data was referenced, and the authorships were acknowledged. Additionally, all the data which was gathered for this study was kept on a personal laptop, and a weekly backup was made on an external hard drive. Password security was used to protect access to the device. In the end, the thesis was added to the TU Delft repository. The data which was not anonymous could not be shared publicly and was only available to the student, his mentors and the delegate of the Board of Examiners. The student writing this thesis was solely responsible for managing the data. The

anonymized transcriptions of the interviews were be stored in the TU Delft repository as well, under restrictions that it can only be used for non-commercial follow up research.

Ethical considerations

Several ethical considerations, such as respect for human dignity, scientific value, social responsibility, and beneficence, were crucial throughout the research procedure (Blaikie & Priest, 2019). This references to treating research participants fairly and ethically, including interview subjects, and anybody else who may have been associated to the study. First and foremost, as stated in the data plan, all parties' identities were secured, and no research practices were defamatory of any kind. The main goals of the thesis have been to advance science, maximize social benefits, and minimize any harm. As interviews were done with top managers, it was important to be sure that no confidential trade secrets were shared, if an interviewee might state anything confidential during the conversations (on purpose or accidently).

4. Results from practice

While the knowledge gained from the literature review is very valuable, it is not enough to be able to answer any of the research questions with a definitive answer. In this chapter, the insights from experts and professionals in the concept housing industry will be presented. These were gathered through interviews done with an expert on concept housing (Expert A), an expert on entrepreneurship in the construction industry (Expert B), three interviews with startups (Startup A, B and C), an interview with a supplier (Supplier A) and an interview with an architect (Architect B). To better understand the asymmetrical partnerships between startup and clients, it would be beneficial to also interview a client. However, Startup C's client was eventually unwilling or unable to participate in this research, and the time period for this research was too limited to be able to find another partnership between startup and client. However, as this scenario was foreseen as a risk, questions about this type of partnership between startup and client were asked during the other interviews as well. This way, enough information on this partnership and relevant innovation strategies have been generated through the interviews to be able to answer the research questions. For a clear overview of the different types of partnerships and the innovation strategy categories they revolve around, figure 6 in chapter 3.5 visualizes these in a conceptual scheme.

Expert A	Expert on conceptual housing in the Netherlands, employed at NCB (Network of Conceptual Housing)
Expert B	Prof.dr.ir at TU Delft specialized in circular construction and entrepreneurship in the built environment

Startup	**Partnering Incumbent Firm**
Startup A, founded less than 5 years ago, 15 – 20 employees. Interviewee: commercial director	Supplier A, façade module supplier, founded 50+ years ago, 70 – 80 employees. Interviewee: Director
Startup B, founded less than 5 years ago, 20 – 25 employees. Interviewee: cofounder Startup B & developer, also at other firm	Architect B, founded 25+ years ago, 35 – 40 employees. Interviewee: Architect & Partner
Startup C, founded less than 5 years ago, around 15 employees. Interviewee: commercial director	Developer C *(Note: I did NOT interview this firm. See chapter 8: Discussion)*

Table 4 & 5: Overview interviewees (Own images, 2023)

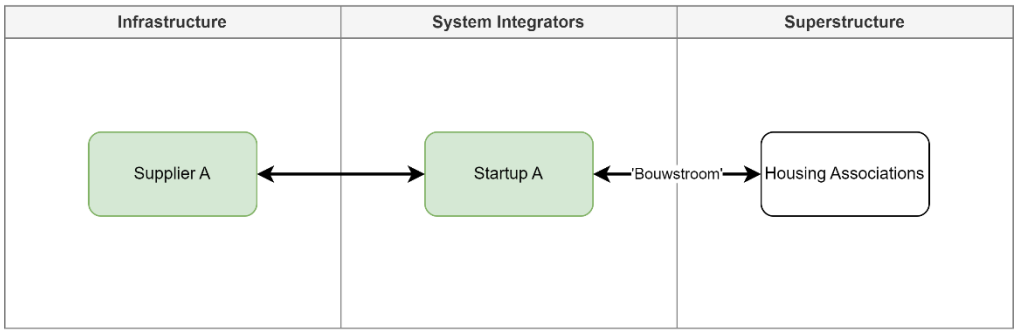


Figure 7: Startup A & partners

Startup A (figure 7) is founded by two people: one was already an entrepreneur in the built environment and has a company which focuses on circular reuse of building materials, and one who had experience in a different sector, where he developed projects where subcontractors would cooperate without main contractor, which eventually lead to a more efficient and enjoyable experience for all involved parties. This led to the idea to found a startup in concept housing which serves as a 'director' between suppliers of modules, thus being a system integrator which sells dwellings to housing association through specific construction agreements which are called 'Bouwstroom', making the client a partner as well. Supplier A is the supplier which is interviewed for this research, and is Startup A's façade supplier.

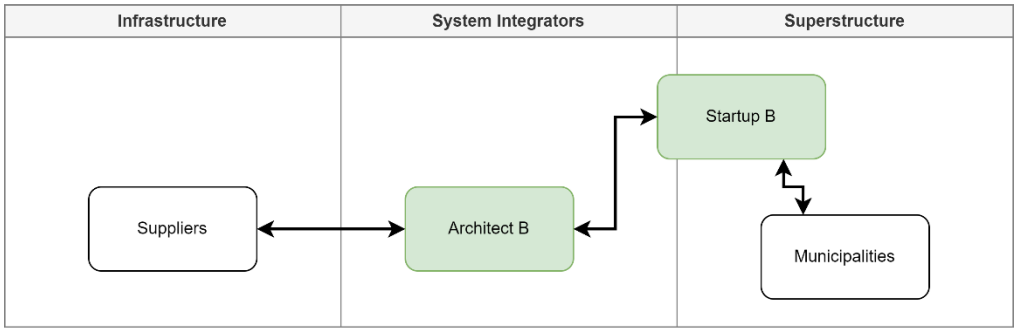


Figure 8: Startup B, partners & municipality

Startup B (figure 8) is founded an entrepreneur who founded a successful stroller brand, together with a young and relatively small developer firm. While they are involved in the system integration, their core business is to develop housing projects, they mainly take the role of the superstructure. This is why they have partnered with Architect B, as the architect focuses on product development and system integration. Architect B also has developed a strong image in innovate and sustainable design solutions through the years. As Startup B takes the role of the developer, they are mainly responsible for finding profitable business cases and plot acquisition from the municipality, which proves to be challenging due to their newness.

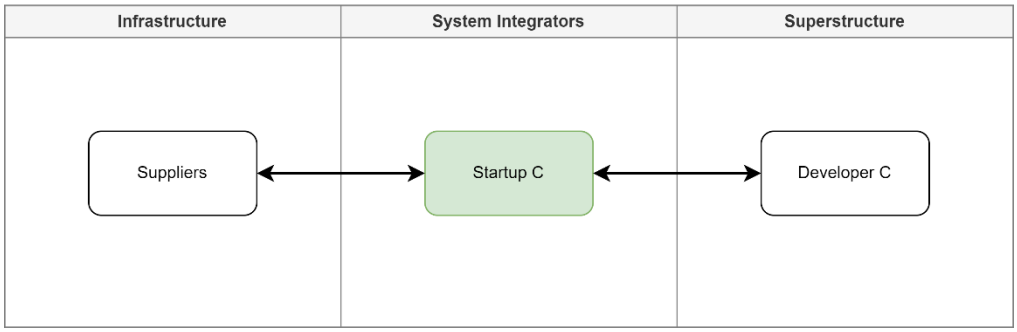


Figure 9: Startup C & partners

Startup C (figure 9) is the only startup of the three which did not have to deal with challenges related to smallness, as they were founded by successful entrepreneurs in housing development, who also invested in the startup. This also caused them to start with a strong network in the industry, as they had a good relationship with Developer C, who is mentioned often in the interview with Startup C but not interviewed for this thesis. This also caused them to have less challenges which are associated with newness. As there are multiple startups in the conceptual housing market who are founded this way, it is a relevant case for this research, and this case shows how certain aspects are important to start and grow in the concept housing market.

4.1 Porter's five forces in practice

In this paragraph, any additional findings on Porter's forces of competition in the concept housing industry which were found during the interviews will be presented.

Threat of new entrants

The threat of new entrants will again be the first force to be considered, starting with higher capital requirements for concept housing versus traditional housing providers. This gets supported by Expert B, who states that the initial investment for any kind of standardization is higher than traditional, non-standardized construction firms, and makes a distinction between firms which are only standardizing their process (through BIM) with businesses which also standardize their product (through industrially built homes):

> *Expert B: "If you standardize a process, you also need to invest more upfront because you have to hire people in support functions. I know examples of construction companies that have standardized that process very well, and they have a fairly large support staff, for example, with CAD drawers or BIM modelers. You will never come across them in a medium-sized traditional builder. So they already have a larger investment, but of course, it is not as large as building an entire factory to produce houses. So it increases as the level of industrialization increases."*

According to the literature, these high capital requirements makes economics of scale an important factor for newcomers in the industry. This means that the newcomer needs to produce enough units to divide the total fixed costs between them and make the product profitable in the end. Especially for a startup with limited resources this is important to take into consideration, like startup A does:

> *Startup A: "You really need parties that are convinced, believe that the momentum will come and that it is part of the process that in the beginning, project by project, it is not profitable at all. Hopefully, at cost price, but in the first year, you really can't make a lot of money from it. It's an investment that ultimately pays off exponentially because it's a learning experience.*

It's the same system. It's having faith in the people behind it and the team. It's about collaboration, not letting each other down."

To be able to eventually gain benefits from economics of scale, it is of course important to have access to clients. This was also a significant threat to newcomers in the industry, due to the importance of trust in the house building industry. This has shown to be a challenge for two of the interviewed startups, A & B. When asked how they deal with newness, Startup B answered as followed:

Startup B: "I think that it certainly applies in our industry, that you heavily rely on your own reference projects. Your evidence is essentially the projects you've done in the past, and it's also true that afterward, you don't have to explain so much, so to speak, but you needed to have done that first project. So with Startup B, that still needs to happen, right? So I think that also means the other way around, that once you've done that, things can progress quite quickly because everyone suddenly believes it's possible and believes in what you're doing. So it works in a sort of two-way direction. It's quite challenging to get that first project off the ground, but I believe that once it's there, it can take off all at once because everyone then thinks, "Hey, oh yes, this is it, this can work, it's here and it works.""

Startup C, however, did not have to deal with this challenge. The reason behind this is that the founders and owners of Startup C were already entrepreneurs in the Dutch house building industry, which gave Startup C immediate access to their network from the first day.

As for the governmental influences, there were mixed signals coming from the interviewees. Startup C found that the Minister of Housing at the time of doing this research was doing a good job in general. There were also multiple aspects with room for improvement. Startup C for example found that subsidization should be fairer and more consistent. They expressed concerns about the allocation of subsidies in the housing sector. They noted that temporary dwellings receive significant subsidies, even though they often remain in place for extended periods, up to 50 years. In contrast, when they construct a home designed to last as long, they don't receive these subsidies. They found this strange, as Startup C employs sustainable wood construction methods. This difference in subsidy allocation seemed perplexing to them, as it appeared to favor one sector over another.

Furthermore, Startup C highlighted the government's influential role in shaping requests for proposals related to housing projects. They explained that in cases where the government plans the construction of thousands of homes, with an emphasis on biobased and sustainable building practices, the requests for proposals should be made to exclude non-biobased options. However, they see that sometimes there is flexibility in these requirements, which Startup C does not agree with.

Startup C also delved into the challenges within their own sector when it comes to heating, which focuses on infrared heating panels. They noted that the heat pump sectors has strong organization and lobbying efforts, even though heat pumps might not be the most sustainable option. The same goes for the concrete sector in comparison to the wood construction sector. Despite recognizing these issues, Startup C explained that their sector had not yet effectively united to address them.

Expert A also sees that, while the government is seeking to promote innovation, they are failing to do this through their regulation, as the costs for guarantees and quality certifications are very high for innovative startups:

Expert A: "You have all sorts of guarantees where you have to pay a certain fee, and sometimes that's just way too expensive. Or you can't meet the requirements with your

product because you don't have as many years of experience. They [Startups] often encounter that issue. We are gathering this information from our members to see if we can approach the Ministry of Domestic Affairs. We want new entrants, but they can't comply with the old guarantee terms anymore, literally because the content hasn't been innovating along with them. Sometimes it's just way too rigid and innovation is called innovation for a reason. And the budget that often needs to be added there, that's the biggest challenge."

Another important aspect of legislation which startups would like to see changed in the future is the process of gaining building permits or certain subsidies. The current legislation in construction is still very project-specific, while these firms essentially move away from this principle. In theory, this process of gaining certain permits and subsidies does not have to be repeated for every project, or could at least take way less time as every conceptually built project is practically the 'same' in essence: Architect B voiced their frustration regarding delays in project approvals while their concept is ready for implementation without further development. They emphasized that this waiting period, which can take up to 20 weeks in extreme cases, can be particularly frustrating for the client or in their case, Startup B. They gave an example where a project's documents, identical to a permit submitted in Rotterdam, could be resubmitted in different municipalities, such as The Hague and Amsterdam, due to the similarity of the products. They questioned the need for a 14-week delay, consisting of 8 weeks and an additional 6 weeks, and suggested discussing the possibility of expediting the process with the processing officer to potentially reduce it to just two weeks. However, they acknowledged the challenges in achieving this, citing issues such as undercapacity within municipalities and the necessity for coordination among involved parties. Architect B concluded by explaining that, despite the frustration and the logical argument that the projects are identical, the decentralized nature of government operations makes such expedited processing unfeasible. Startup C also noted that a lot of time gets wasted due to the governments regulations regarding subsidies:

Startup C: "This afternoon, I have a meeting with the RVO, the governmental agency for entrepreneurs, because our product qualifies for the MIA subsidy. If you're a corporation or an investor, and you make a profit and pay corporate tax, you can get a discount on your corporate tax. This means you can deduct a portion of the investment you make in a sustainable product like ours from your tax, so ultimately, you receive or have a benefit through taxes, you could say. You pay less in taxes, but it also involves quite a process. So, when you submit that application as a client, you need to have the design evaluated and demonstrate the price difference between what you've invested in this and what you would have spent traditionally. This means you also have to create an entire cost breakdown for a traditional product, even though you haven't done anything with it. But all of this takes time and money. And now, I'm entering a discussion with the government agency where we're saying, can't we simplify this because we're a concept? It's always the same, this is the design, evaluate it once, and everything we apply for is based on this. And the pricing of those houses? Yes, if I have 3 row houses, I'll place 3 traditional row houses next to them and say, yes, this is the price, and then I never have to discuss it again. So, these kinds of process optimizations apply across the board, indeed."

So, to conclude on the threat of new entrants, the practice and literature seems to be aligned quite well. High capital requirements and access to clients are big challenge for most startups, and while the government is taking steps to promote innovation in the house building industry, there are also some big improvements to be potentially made.

Power of suppliers

According to the literature, the power of suppliers is mostly based on the level of how much the supplier is integrated in the process how involved they are in decision making. It was also argued that they are more powerful than suppliers of traditional builders as it is less project-specific and collaboration between suppliers and startups in concept housing is likely to carry on for a longer period. As a higher power for suppliers is seen as a negative aspect for an industry according to the theories behind Porter's five forces (2008), this was expected to be another challenge for the startups to manage. In concept housing, however, suppliers are not 'just' providing certain materials like in many other manufacturing industries. In all three interviewed partnerships, the suppliers have an important role in the product development process of the concepts. Suppliers are seen as partners who should be actively collaborating with the startup to enhance the product, as this will have mutual benefits for the suppliers as well as the startups.

Startup A highlighted the importance of suppliers in their concept, with all their supplying partners manufacturing components in their respective factories. They particularly praised Supplier A, who possesses a large factory. Supplier A believed in the benefits of standardized production and expressed the capability and motivation to produce not just a few facades per day, but potentially way more. Startup A also emphasized the value of Supplier A's early involvement in the project as a supplier. They shared their knowledge during the design phase, contributing to increased standardization. This is beneficial for both themselves and the concept as a whole. This understanding was crucial, and Supplier A ensured that their input during the design process was feasible. Supplier A was described as proactive, always eager to offer ideas, and willing to invest significant time and effort. This dedication included frequent meetings, twice a week, over a period of one and a half to two years, even if these hours weren't billable. Supplier A's proactive and committed partnership was greatly appreciated by Startup A. Startup C also mentioned the benefits of working with fixed suppliers:

> *Startup C: "We work with fixed partners. It's something we believe in, so we don't go shopping for different doors or toilets for each project. Or I'm just giving an example. We have established suppliers for those, especially for our structural framework, all the wood we use – we have fixed suppliers for that. We also have our own fixed installation team. So, in that regard, yes, the advantage of having fixed partners is that they'll think along with you because it's in their interest too, and then you have a shared interest, which improves both our product and theirs. So, we also select partners based on that. Do they want to collaborate with us for the long term, to think along with us? So, for our heating installations, we have a fixed partner; for infrared panels, we have a fixed partner; for solar panels, yes, essentially everything. We have three facade finishes, all with fixed partners."*

In none of the three interviewed partnerships there was an example of a supplier using their power to increase their profitability to the disadvantage of the startups. Only one startup, Startup A, had to part ways with one of their suppliers during the time they are active. This was not because they abused their power however, but because the collaboration did not go as Startup A had envisioned:

> *Startup A: "We changed partners because they weren't actually collaborating at all. They were, as I mentioned, just sitting back and waiting for us to give them an assignment. This was the case with the installers, for instance. They were just waiting for us to come up with a concept so that they could design their installations around it. However, what we were asking was, what's the best installation for a modular concept? Not, if I give you this, what fits best? What's the best in terms of maintenance? What's environmentally friendly? And what works for a wooden house with a concrete floor, or should we go for a fully wooden structure?*

Those kinds of questions. But no, they would say, just give me the drawing and I'll come up with a good installation concept. So, at some point, we had to part ways with them."

This shows that the actual power of suppliers is quite low, as it is a choice from the startups to work with fixed partners as this is beneficial for all involved parties. However, if collaboration does not go as wanted, the startups are able to look around for other suppliers of the modules. This means that it could be argued that the power of suppliers in concept housing is low, but they are certainly not unimportant.

Power of buyers

While the power of suppliers seems lower in practice than in theories, the power of buyers is definitely high in the concept housing industry. Expert B states that they have a leading role in implementing innovations in the construction industry, and this is the same for concept housing.

Expert B: "Clients need to have confidence in those products, that they comply with laws and regulations, that they can be delivered on time, that those companies won't go bankrupt, and so on. And in addition to that, they need to change their request for proposals. They must realize that if they want to have a highly industrialized home delivered, it's just like with a car. If I ask Mercedes or Renault to deliver a car, I can't suddenly say halfway through, well, I'll just go with 3 doors instead of 4. That doesn't work anymore, so that's something that clients find very challenging, especially when we look at housing associations. Traditionally, they have a strong separation in their organization between the construction projects department and the maintenance department. The maintenance department really wants products they have experience with, so they know how to carry out maintenance."

Expert A also mentioned housing associations to be lacking in getting involved with concept housing:

Expert A: "And with housing associations, I continue to be surprised by how little they move forward. There are definitely a few progressive ones. I spoke with one of them yesterday. The people we know there are really trying their best. It's just that the board holds back a lot. Yes, and they are the ones who are supposed to be buying these great products. While all these wonderful individuals you're researching invest so much time and energy into innovations. So, our main goal is to give a platform to these fantastic solutions because they do exist. Now, it's up to the buyers to actually start seeing them, but there's a lot of fear in that market."

This means that, as literature suggests, there are a limited number of potential buyers, which increase their power. Furthermore, there are examples of backward integration in the industry. Startup B is an example of such a backward integrated developer:

Startup B: "Yes, so we develop modular buildings, and to develop those, we actually use the products from Startup B's toolbox. And these products are manufactured – we're essentially manufacturing buildings, eventually – but those buildings still need to be developed, and that is essentially the core business of Startup B, right? So, Startup B is essentially a development company with its own module."

Rivalry between competitors

When looking at literature, the rivalry between competitors in the conceptual housing industry seems average. This is very difficult to state without actually speaking to industry participants, though. In practice, the rivalry seems to actually be very high according to both interviewed experts:

Expert A: "There are also a few who don't allow each other into their factories because they fear their technology or innovation will be copied, especially with newcomers. The larger builders, like BAM and Heijmans, are much less restrictive, but when there's a significant innovation, startups find it difficult to let in their competitors. So, I think industrial partners aren't excluded, but allowing in competitors is indeed challenging. My perspective has always been: come on, guys, you might be able to learn something from each other, and just stand by your product. But I do see that dynamic, yes."

Expert B: "If you were to optimize the capacity of those conceptual builders, I believe you could achieve the annual production of the Netherlands collectively, if they were all to operate at full capacity. However, we know that not everything will happen conceptually. We will always have traditional construction as well. So, I think the market isn't large enough to support more startups."

Expert A also stated that concept housing never will completely take over traditional housing, as some projects demand specific design solutions to realize certain aesthetics for example. Additionally, Expert A mentions that startups do get involved in price competition:

Expert A: "In terms of pricing, everyone in the market is often aware of the prevailing rates. And I believe newcomers are particularly focused on studying what others are doing and how they can make a strong entry. They may consider adjusting their prices to gain a competitive edge, but I wouldn't necessarily characterize it as rivalry. It's more about ensuring their organization's viability in the market."

Because of these differences between the literature and practice, the table from chapter 3.4 has been revised to the following, where the power of suppliers has shifted from average to low, as the relationship between them and the system integrators (the startups) is demonstrated to be very collaborative. Furthermore, the rivalry among competitors is changed to 'high', as there actually are many competitors, who do get involved in price competition. The startups in particular seem to be very protective of their concept and are hesitant to let other conceptual builders in their factory.

4.2 Resource innovation

In this paragraph, we delve deeper into the resource-related innovation strategies used by startups. As stated earlier in the literature review, the reason why many startups are innovative in this category is because they have to deal with smallness and newness: not much capital, small network, and a very limited amount of human resources (knowledge, personnel). Meng & Brown (2018) also noted that knowledge sharing between supply chain partners was an innovation strategy which was not often implemented by construction firms, regardless of their size. However, in this research about the concept housing industry, this is actually the opposite. Every interviewed startup talked about how their suppliers were either enhancing the product's quality or teaching them practical things about how to manufacture homes inside a factory. More about this in the next paragraph, 4.3 Technological Innovation, as this partner's knowledge is often technological in essence and enhancing the product does not (directly) reduce the smallness and newness of a startup. Smallness means that the startup does not have access to a lot of financial resources. Especially in highly industrialized conceptual housing, this is a problem:

Expert B: "The initial investment increases as the concept evolves from not just process standardization, but also product standardization and factory construction. These are a few stages in which you can distinguish it. So, if you standardize a process, you also need to invest more upfront because you need to hire people in support functions. I know of examples where

construction companies have standardized their process very well, and they have a fairly large support staff with CAD drafters or BIM modelers, for instance. Well, you won't find those at a medium-sized traditional builder. So, they already have a larger investment, but of course, it's nowhere near as large as building an entire factory for manufacturing homes. So, it increases as the level of industrialization increases."

From the three interviewed startups, only Startup C has a big factory. This was possible because they were founded and invested in by construction entrepreneurs. Startup C also confirmed that they never had to deal with 'smallness'. This is different for Startup A and Startup B, however. Startup A has a smaller factory meant for assembly, as they let their suppliers build the modules in their own factories. Initially they wanted their suppliers to assemble everything on the construction site, but their suppliers explained them why this wouldn't be practical. This was also possible because their supplier invested in the concept:

Supplier A: "We are also backers of the concept, you see? Because that's a part of commitment as well. In the end, two individuals initiated this and they put their starting capital into the pot. And ultimately, when you believe in it—well, that's where it all begins—when you offer your commitment, it's not just about words, but also about actions. We've also said, 'Well, we're going to invest in it too, and let's see if we can bring this concept to a successful conclusion together.' Because we view it as highly promising in the market."

Startup B is partnered with an internationally operating modular builder, who will build B's concept in their factory.

Next to the initial investment, the Startups dealing with smallness might also need financial support when working on their projects: Startup A discussed the financial requirements involved in construction projects, particularly the need for various guarantees when initiating construction. These guarantees involve reserving a portion of funds that cannot be accessed during the construction period and even some time beyond project completion. For social housing projects, which often involve constructing apartment complexes with a significant number of units (ranging from 30 to 100 or more), this financial reserve can be substantial. Startup A noted that as a startup with limited initial capital, this requirement could mean reserving a substantial sum. This sum could potentially even be 1 million, which is unattainable for many startups.

To address this challenge, Startup A tried to reassure clients by stating that while they were a new entrant in the industry, they could provide the security of their experienced partners. They clarified that they were not the primary construction builder but played a pivotal role in project development. They explained that if they were unable to continue, the project would not be jeopardized. This is because the design, team, and collaborations were already in place. In such cases, either their partners would step in to continue the project, or the housing association would assume the role of Startup A. This would ensure that the project would progress smoothly to completion. This approach aimed to alleviate concerns about project continuity and provide clients with confidence in the project's successful outcome.

As for newness, partners are also useful to increase the legitimacy of the concept and the startups. While startups often lack experience, their incumbent partners have been operating in the construction industry for decades. This is especially important to be able to get the first project, as that has been proven to be a big challenge for Startup A as well as Startup B, of which the latter still need to realize their first project. Startup A handled this as follows:

Startup A: "Our clients are housing associations that also invest societal funds, so there's a strong scrutiny involved. They can't just purchase from you; you usually have to meet various

credit checks, because otherwise, they might not be allowed to invest in you. They see the potential risk, and they can already imagine the headlines: 'Housing Association Invests in Risky Startup Using Societal Funds.' It's been quite challenging, moving from zero to one, when you have no track record at all. Startup A is new, but almost all the partners we collaborate with are family businesses, because that's where the expertise lies. … These family businesses have a proven track record. We highlighted this a lot by saying, 'Startup A is new, that's true, but they've been building for a long time.' Supplier A, who creates facades, has been doing so for three decades. The timber constructions come from another family business, now in its third generation. The only publicly listed company we have is the floor supplier. This was our way of saying, 'If you don't believe us, believe them.' They've been associated with us for three years, designing and investing themselves. This was our approach to tackle that challenge. However, in the end, a housing association needs to have faith in you and believe that you can deliver. And for that, you need at least one that does believe."

Startup B also shows relevant successful projects from the co-founders' development company and Architect B on their website to communicate their capabilities and legitimacy in the housing industry. The importance of realized and successful projects gets emphasized by Startup C, as they have been able to use their first projects to show their next clients how their concepts functions in reality:

Startup C: "Everyone understands the idea: if I build a highly insulated house, I'll have lower energy demands. That's clear to everyone. But when it comes to using wood as a construction material, many people still think, 'Wood? Well, I'll probably hear the upstairs neighbors walking around, or if I'm in my single-family home, I'll hear my kids screaming upstairs.' Those concerns do exist, but they tend to fade away quickly once we demonstrate how it all comes together. However, introducing an unfamiliar heating system, one that people haven't encountered before or have read all sorts of odd stories about on Google, that's a challenge. It's not easy to dispel those notions from their minds. People want to experience it for themselves, and that's where we have an advantage. We have the evidence, it's there, it works, and we can ask people living in those homes, 'Hey, how's it actually working out?' But that initial step, before you take it, requires a lot of discussion about the benefits and, above all, showing that it's real. That's what perhaps makes it more challenging."

Capital and legitimacy are not the only resources necessary for startups, however. Startup A also mentioned that they often partner up with family businesses as they find those businesses to be more inclined to innovate. They are often more willing to take risks for the long term in comparison to publicly traded firms, according to Startup A. Another resource innovation strategy for startups that got mentioned during the interview with Expert B is to use their partners' networks, which was a strategy also employed by Startup A:

Supplier A: "You can either say, 'I don't understand, I'm giving up,' or you can look at it and think, 'What did I do wrong? What can I do better?' There's always the question of, 'Who can I call upon to help me avoid making this mistake?' That's also something, isn't it? And Startup A does this quite well. They involve us a lot and they also ask, 'Do you use your network? Who can help us with this?'"

Architect B also mentioned that they use their network for Startup B's concept, but mostly towards other developers to potentially find opportunities for their first project. As this strategy is targeted towards clients it should be considered as a marketing strategy. The reasoning behind the incumbent firms giving these startups access to their resources has two main reasons. The first reason being that both Supplier A and Architect B were inspired by their young partners: Supplier A got motivated as

Startup A was not only seeking to make affordable housing, but also puts a lot of emphasis on the quality of living and (social) sustainability:

> *Supplier A: "This is a good concept to align with, especially because their philosophy is commendable. They are not just focused on how to build as quickly as possible or how to get the highest discounts. Instead, they are considering sustainability, resident comfort, and social aspects as well. This approach by Startup A has resonated with me deeply."*

For Architect B, they got interested in Startup B's concept because of their founder's background in product development, which made him think much more from the user's perspective. Architect B also states that one of their motto's is to keep the human as center point in all their designs, thus aligning with Startup B's vision. The second reason both of these incumbent firms mentioned is that they hope that a partnership with the startup will eventually lead to more continuity for their own firm. This is considered a marketing innovation strategy internally to those partnering companies, as it is a means for Supplier A and Architect B to extend their business fields and it focuses on long-term benefits.

Lastly, a resource which should not be considered unimportant is to have the right people to work for the startup:

> *Startup C: "When you're aiming to think from a conceptual perspective, you need people who have the capability and enthusiasm for it. People who don't think, 'Oh, I'm doing the same thing every day because it's just a product,' but rather those who embrace the challenge of advancing that product and believe in it. So, it calls for a different type of individuals, I think, and finding them can be quite a task. The interesting part is that I've noticed many individuals find this concept very intriguing, and we don't really struggle to find good people who are interested in it."*

Startup A also is settled in Amsterdam to be able to attract young, educated and motivated future employees.

4.3 Technological innovation

Although partnerships help startups in overcoming smallness and newness, they also have a lot of expert knowledge, like stated earlier by Startup A. For example, the suppliers know every detail about the module they are responsible for, and architects are experts in putting everything together into an integral design. In short: they enhance the concepts' technical capabilities, which was the only technological innovation strategy listed in Meng & Browns (2018) research. By using their partners' expertise on the technologies of their module, the startups engage in open innovation practices:

> *Expert B: "The concept providers cannot do everything alone. So, they rely on suppliers of materials, as well as for installations, for example. And they enter into long-term agreements with them. They try to establish a kind of co-makership or contracts with them. And collectively, they also aim to optimize those modules or components within the concept of that home. So this really requires open innovation."*

Expert B's statement gets confirmed and illustrated by Startup B:

> *Startup B: "Exactly, so the cage structure serves as the foundation for each module, and within each module, there are further sub-modules. You can envision the kitchen and the wet*

room as sub-modules within the main module. These sub-modules are optimized individually as well. This involves using as many sustainable or recycled materials as possible, making them demountable and reassemble-able, and incorporating circular principles into these sub-modules. For instance, we're collaborating with a well-known façade manufacturer to explore creating the most sustainable circular façades that can be attached to these modules. We're considering various façade types and how to incorporate balconies into these façades. Essentially, every sub-component is subject to innovation. Even the building's installations require thorough consideration. In essence, the entire building is deconstructed into each module for a comprehensive approach to innovation.

During the interviews it also became clear that these product enhancement do no only come from the supplying partners, as Startup C also collaborates with their client to make their concept more cost efficient and optimized as they aim to produce affordable housing for lower and middle incomes:

Startup C: "This client is certainly a special case because we have very strong ties with them. They indeed play a crucial role and assist us in optimizing and enhancing our product. This collaboration is mutually beneficial because we both have shared goals for the future. (. . .) Affordability is a crucial factor for us. We aim to create homes that can be offered as social housing, middle-income rentals, or middle-income purchase homes. Achieving this requires paying close attention to the smallest details. All those little considerations add up, contributing to a final price that potential clients are willing to pay, fitting within a certain affordability range. This aligns with the requirements of Developer C, who also develops middle-income rental homes for their own housing fund. They're focused on determining what kind of homes are needed and how a wood construction concept like that of Startup C should be adapted for their purposes. What's interesting for us is whether this adaptation can be replicated for other clients or if it's specific to them. It's apparent that both housing corporations and investors are targeting similar demographics and, consequently, demand a similar product."

Startup A also involves their clients in their innovation efforts. If a client wanted a specific circular material for the kitchen, for example, they would link this client with their partner who supplies the kitchen sub-modules so they could discuss the topic together and explore the possibilities. This way the suppliers also get a better idea on what the clients want and are more motivated to innovate on those areas. However, there are not only tangible aspects which can be enhanced to realize technological innovation. According to expert B, innovation on certain internal processes can also shape technological innovation.

Expert B: "I believe that innovation is necessary to optimize internal processes in order to technically assemble a home in such a way that they can deliver it at a lower cost and ensure that it complies with the regulations. And considering the changing regulations, you know, when you look at the energy requirements, that's becoming increasingly important. The same goes for sustainability and circularity. So, a lot of innovation is required for that, both in terms of technology and process innovation."

This gets confirmed by all three interviewed startups. Startup A explains this clearly, as the suppliers enhance the technological aspects of the modules. Supplier A, for example, is one of the few firms which is specialized in building timber-framed facades suited for high rise projects, which requires technical solutions. However, the process innovation takes place at the startups and architects, the

system integrators. The process innovations in this paragraph will focus on the technological aspects, which makes the role of the architect in concept housing clear:

> *Startup A: "Our suppliers are all individually responsible for their own components, and they contribute their expertise in those areas where they're responsible. So, if something goes wrong with the wooden walls, for instance, we have architectural experts within our team who oversee the system and act as a kind of oversight to ensure everything is proceeding well. However, the in-depth knowledge of these elements resides with the respective suppliers."*

The process innovation in this case is that the architect takes on a different role than he would do in traditional construction processes. Instead of thinking about context and 'genius loci' as often is taught in architectural education, a concept housing architect focuses on putting every (sub)module together into one comprehensive design, as explained by Architect B:

> *Architect B: "We have carefully synchronized our modules in a way that they can be combined with each other. That's why we offer a range of sizes from 40 to 70 square meters as our building blocks. With these building blocks, we can accommodate almost any housing typology, whether it's corridor dwellings or central core towers, and more. Essentially, we start designing from the end result and work backwards. (. . .) We primarily focus on product development. This involves the fields of construction, architecture, and modular and integrated design. The way we approach this is by bringing various stakeholders to the table. We analyze the minimum and maximum requirements, to put it broadly, and then strive to create a comprehensive, intelligent design from those insights. However, it's crucial to have a deep understanding and control of how the construction chain operates. I believe this is where our strength lies as an architecture firm. With 30 years of experience, we possess a wealth of knowledge about how construction processes function."*

Furthermore, by innovating on the housebuilding process in a conceptual way, the architect also mentioned that they learned things they could use for their other traditional projects. The example he gave was that they started to design with industrial measurements, so there will be way less waste as materials did not have to be cut into custom sizes at the construction site.

While it is noted that the suppliers mostly technically innovate on their respective submodule and the architect innovates on the design process associated with house building, the startups themselves also pursue innovative technologies. Startup A for example uses a digital configurator to quickly test feasibility studies for their projects, which can also be used to share maintenance related data with their partners. Meanwhile, Startup B is developing their own modular 'cage' system which they believe to be more efficient than the current method which is being used by multiple conceptual builders:

> *Startup B: "We have two individuals dedicated to improving the product, and we are also working on creating our own system that could potentially be applied independently to various module builders. Innovation is a key focus for us, as we believe there's room for further improvement. Currently, we are designing modules based on the existing systems of different manufacturers. Simultaneously, we're developing our own system."*

Another noticeable aspect of the technological innovations in the concept housing industry is that these innovations also can come from different fields and industries. Expert A mentioned new entrants to the concept housing market who came from the aviation industry and used their knowledge on certain techniques and materials for an innovative housing concept. This is also

comparable with the founder from startup B, who became successful in a totally different industry. According to Architect B, this has a positive influence on innovation:

> *Architect B: "Our projects are infused with sustainable solutions, systems, and construction methods, so we believe that innovation should come from within as well. For instance, if a suggestion is made that it's faster or cheaper to use concrete, we will continue to push and advocate against it from the top, because that approach misses the mark. This principle applies not only to technology but also to our extensive knowledge and experience, which we need to leverage for innovation. What's interesting, as I mentioned earlier, is that one of the founders at Startup B is a product developer, highly skilled in the technical aspects. This perspective from a different angle allows us to combine expertise from various fields, fostering innovation. Bringing people from diverse backgrounds into the mix is key. Only then can you start thinking outside the box, as innovation revolves around thinking creatively and breaking away from conventional paths."*

The last technical aspect related to innovation that came forward during the interviews is that startups sometimes have unrealistic ideas on how to innovate. Supplier A spoke about sometimes needing to explain Startup A certain practical things. An example he gave was that Startup A wanted their supplying partners to assemble their submodules on site. This was an unrealistic innovation however, as Supplier A does not have in-house contractor capabilities, they are a façade manufacturer. Furthermore, projects would be more prone to delays and failure as the partner ecosystem would be more dependent on each other being on time with their work. Architect B also noted these dynamics between the module builders and startups, and explained how this should be viewed as something positive for innovation:

> *Architect B: "You can say, "Module builders have been doing this for a long time, and that's why they are old and stubborn." On the other hand, you can say, "The startup is very naive and doesn't understand the market, thinking that everything will be easy, but that's simply not the case in practice." I think it's a combination of both, and you need to find synergy between them. Instead of thinking, "This is terrible, it's not working," it's much better to think, "Okay, let's dig deep into both sides and peel back the layers to harness it as a strength." I believe that's much more important. I think the entire circular economy should revolve around, or can only thrive through, smart and open collaboration with each other."*

4.4 Managerial innovation

While process innovation has been mentioned in 4.3 already, this was focus on the architectural design process of the concepts which is different than traditional design methods. In this paragraph, process innovation will also be mentioned, but instead of the design, it is about the development process of concept housing and shaping the startup's organization and partner ecosystem as that is where the startup's management plays an important role:

> *Expert A: "Consider being distinctive as an organization by the way you organize your process. For us, conceptual building isn't just about the end product in a specific location; it's also about how you've structured your process, how you ensure that all stakeholders are engaged from the start, and how you, as a concept provider, assume a certain role to provide certain guarantees upfront. It's a conceptual process in itself, and that's where you can truly set yourself apart."*

In literature, there were five managerial innovation strategies linked specifically with small firms in the construction industry: quick response to changing environments, making the best decision at the right time, establishment of incentive mechanisms, involving everyone in innovation, and early identification of associated risks and uncertainties (Meng & Brown, 2018). During the interviews, however, not all five of these strategies were mentioned by the startups. There are, however, other strategies which have been implemented by the startup managers: new types of sales agreements with clients and specific partner selection criteria. The latter gets explained by Startup A and C:

> *Startup C: "The advantage of having fixed partners is that they engage in collaborative thinking with you, driven by their own vested interests. This shared interest results in improvements in both our product and theirs. So, we carefully select partners based on this criterion. We look for partners who are willing to engage in long-term collaboration and contribute to innovative thinking alongside us. For instance, we have a fixed partner for our heating systems, a fixed partner for infrared panels, and another for solar panels. In essence, we have these arrangements across the board."*

> *Startup A: "Well, look at the contracts, for example, the collaboration agreements you enter into. Often, you're dealing with a different person than the one sitting at the drawing table. And then there's another person in the factory producing it. But you need cooperation at every stage, and you really notice it when the vision is just at the executive level and it doesn't trickle down to the DNA of the organization. You might have the designer still sitting at the table saying, 'Well, you tell me what to do. I'm waiting for your guidance.' No, we want your input. 'Well, that's not how I work.' So, you can't have that approach. You're dealing with so many different players within an organization, so many disciplines that it needs to be embraced throughout the entire organization."*

Expert B also mentioned that it is really important to partner with a firm who is willing to share their knowledge. This means that, as a startup, not only is it important to find a partnering firm of which the director or top-management team is willing to collaborate with you, but also do a 'DNA-check' on the firm and see whether the employees who are working for that firm are also willing and capable of collaborating in an innovative way. The director of Supplier A mentioned what he did when he got engaged in a partnership with Startup A to make sure the collaboration would become effective: He stressed the importance of commitment within an organization and highlighted the presence of a dedicated team member who had been with them for a significant period. This individual was described as someone capable of finding enthusiasm and interest in exploring processes from different perspectives, making their contribution invaluable. Supplier A then explained their approach to initiating projects like this. Supplier A likened it to throwing a stone into a pond, where the director first engaged with individuals like the dedicated team member mentioned earlier. Following this, their engineers would join the discussion, employing BIM models to shape the project. Cost calculations would then also join the process to determine the overall expenses. Additionally, team members from the factory would get involved to identify ways to optimize efficiency. This collaborative process allowed for the development of a working process that facilitated project implementation.

When Startup B decided they wanted to partner with Architect B after they invited them for a competition as done with traditional building project, they also knew that Architect B was a front runner of innovative, sustainable design. This also got mentioned by Architect B themselves during their interview:

Architect B: "We're constantly engaged in this effort, I must say, to remain and become a frontrunner in the field of sustainable architecture. Sustainable innovative architecture, I should specify. We're very actively involved in a broad spectrum of activities. We collaborate with various institutions such as TU Delft and TU Eindhoven, where we deliver lectures and contribute to development. Additionally, we've formed partnerships with prominent sustainability agencies."

So when selecting a partner, it is important that the innovative culture is not only present with the person the startup signs a contract with, but it should really run through the whole organization. Furthermore, Startup B and Architect B are located very close to each other, which also eases the collaboration between the two firms.

Another managerial innovation which came forward during the interviews was the need to different contract forms between startups and clients, as described by Startup C:

Startup C: "[The contracts are] still quite traditional. We often prefer to establish a manufacturing-type agreement. It's like saying, 'We're a factory. You order something from me, and when it's ready at the end of the line, it's yours.' In an ideal scenario, we'd also need to agree on a settlement amount so that we can manage our pre-financing more easily. The less we need to pre-finance, the more we can produce. Otherwise, a significant portion of our capital would be tied up in inventory, and that would hinder progress or lead to high financing costs. I believe many concept builders are grappling with this, if not struggling. It's a fascinating challenge."

According to Startup C, if the standard construction contracts would be replaced with more innovative contracts more fitting with the concept housing industry, this would improve the continuity of the startups and the development process as a whole. Getting paid when the modules in the factory are finished instead of when the building is constructed onsite will make the financing process be even more efficient.

Another process innovation Startup C mentioned was the stage a conceptual builder should get involved in a project. While both concept providers as architects are system integrators, a concept provider should get involved much earlier: Startup C emphasized the importance of early collaboration and involvement in the planning stages when working with concept-based projects. They pointed out that the traditional approach, where clients hire an architect to create a plan and later explore costs with contractors, doesn't align well with conceptual housing projects. This is because a concept imposes specific rules on plot layout, chosen solutions, and architectural elements, offering flexibility but within certain limits. Startup C highlighted their preferred approach, stating that they should be brought in at the early planning stage when a plot is being developed and a building layout is considered. While they don't take on the role of the primary developer, they desire a collaborative role in decision-making alongside the developer. By being present during initial planning discussions, they can offer valuable input that helps the developer make informed choices and create the most optimal product, while also avoiding unnecessary time and cost expenditures. This collaborative relationship often involves informal discussions that promote productive dialogues about project requirements and choices. The goal is to prevent situations where conflicting decisions have already been made, thereby preventing unnecessary time wastage.

If a startup gets involved late in the development process of a concept housing project, this can cause them quite some challenges. Startup C is not the only one who has to deal with this, as Expert A and B mentioned that other concept housing startups deal with this as well. And like described earlier, it is difficult as a startup to get their first projects. Startups then tend to try and

comply with the whishes from the client, even though this goes against the point of having a housing concept. Startup C did mention that the see a shift where clients are starting to understand this better, and are involving them from the beginning more often.

4.5 Marketing innovation

Earlier paragraphs presented the innovation strategies used by startups to develop their partner ecosystem, their concept and their own organization. The last innovation strategies category that remains is marketing, which is not only about communicating with potential clients, but also about business vision and extending business fields for example. A very good example of this is the backwards integration done by the co-founders of Startup B, who already had a development firm but now also have a concept housing provider. Even though Startup B themselves do not identify themselves as being integrated backwards because they do not actually build the modules, the fact is that a developer is part of the superstructure and the concept providers are system integrators, being the link between the supplying infrastructure and superstructure. Normally, a developer would contact a concept provider to realize their developed housing project. Furthermore, Startup A also do not build their concepts themselves so that is not a prerequisite to being a concept provider. Startup B does mention that their core task still is to develop housing, but in a conceptual fashion which confirms the backward integration:

> *Startup B: "Yes, so we are developing modular buildings, and to develop them, we essentially use the products from our own toolbox. These modules are manufactured, and we are essentially producing buildings. However, these buildings need to be developed, and that is the core business of Startup B. So, we are a development company with our own modules."*

According to Expert A, there is not only backwards integration present in the concept housing industry, but also forward integration of industrial parties who start to develop their own, new concept. Backward integration was not the only marketing innovation strategy identified at Startup B. The cage system they are developing, which got mentioned earlier in 4.3, is also a way for Startup B to extend their business fields. They expect the concept housing market to grow, and new concept manufacturers to enter the industry. These new entrants might be interested in using Startup B's more efficient cage system, which creates a new source of income for Startup B and also shows a focus long term benefits:

> *Startup B: "That means what you come up with yourself has to be so good that it's attractive for them to make a change in that regard. But it is a universal system, so what we see as a possibility is that even builders who are not module builders but aspire to become one in the future, because we expect it will have a substantial market share in the future, can also adopt it. So, it's kind of a multi-track policy. But in the ideal world, our current manufacturer will continue with our system in the future. That's sort of a long-term goal."*

Another decision which can be considered a marketing innovation strategy is choosing Architect B as a partner due to their image in the Dutch construction industry as being one of the front-runners in innovative sustainable design. They also have a big network of clients which they can use to get involved with certain projects in the shape of a consortium, according to Architect B. The architect did however emphasize that while they mention their concept to other developers, their main task in the partnerships remains to be the product developer of the concept.

Another aspect in marketing strategies which has been mentioned by Expert B is to be aware of your future goals:

Expert B: "There are industrial builders now who have built large factories and could, I believe, build 3,000 homes per year. That is, of course, a very clear strategy. However, you can also devise a strategy where you only want to build 50 homes. A specific segment. But you need to be able to meet the demand, so you must be very clear about the volume you want to create and how large that factory needs to be. I see that there are also some small startups now building a row of homes, but then they cannot expand because the warehouse they work in becomes too small. So, the demand is there, but you can't deliver. There's nothing more deadly than not being able to deliver a demand in business. So, think carefully about the volumes and the strategy that goes with it. I think that's very important. So, make sure the idea becomes concrete very quickly and is put on the market and simply made."

These two strategies described by Expert B have both been implemented by Startup A and C. Startup A chose for a specific segment: housing associations. This made it possible for them to join a 'Bouwstroom', which is a collaboration between housing associations, municipalities, suppliers and concept providers. This is beneficial for Startup A:

Startup A: "We are actually looking for partners, both among our suppliers and our clients. We are involved in a Bouwstroom, which is a collective of housing associations. They have selected a few builders to construct for them for an extended period, so that's a partnership. Through this, we are guaranteed a volume and can provide them with quality. We can then tell our partners on the backend, "Look, for the next 10 years, we are really going to make 500 houses per year. Dare to innovate.""

So by deciding to build housing only for a certain segment, Startup A put themselves in this promising position which guarantees some continuity which they communicate with their suppliers to motivate them towards innovation as well. Startup C chose the opposite direction and is aiming to become one of the biggest concept providers of the Netherlands in the future. Because of this, they decided to acquire a big factory:

Startup C: "The factory is quite large, so we currently have a certain number of machines and a team. We've already looked into it, and if we put that team to work in different shifts, we can achieve a doubling of production with the same number of people, meaning those 400 to 500 houses. We can manage that quite well, and it doesn't require many additional investments. If we want to go beyond 500, then we would need more machines and a longer production line. However, the facility is acquired for that possibility. We might need to address storage for the walls we've fabricated because the available space would get smaller. But, you know, all of that is manageable. I think we can expand production to 2000 to 3000 houses in the existing facility without immediate concerns."

Another marketing aspect which came to light during the interviews is that the concept providers should become more transparent towards their clients in order to changes certain stigmas about industrially manufactured housing and the construction industry in general: Expert B discussed the importance of how concept housing providers interact with customers, considering it a part of marketing innovation. Expert B emphasized that these providers should be capable of explaining to customers why changes in their procurement are necessary and effectively convince them of these changes. This communication is crucial in highlighting the benefits of conceptual building and demonstrating how it delivers value to the customer. Expert B addressed a common misconception in the market, where people expect concept housing providers to offer significantly cheaper houses compared to traditional builders. Expert B then argued that this expectation is not necessarily realistic. Concept providers optimize their processes and streamline various aspects to reduce costs,

but offering houses at a significantly lower price point means that they reduce their own profit margins. Instead, their primary goal is often to enhance margins and ensure the stability and continuity of their company. As a result, Expert B recommended that concept housing providers should stop with claiming to be cheaper builders, as this could mislead clients. While clients may initially choose for a concept-based approach instead of hiring an architect to design and then build a house, they may eventually realize that the cost savings are not as significant as they initially believed. Clear and transparent communication about the value proposition of conceptual building is essential to managing client expectations and fostering trust.

Additionally, Expert A mentioned that there are concept suppliers who fail to meet certain criteria their clients expect. To mitigate this risk, she stated that it is important for these concept providers to attend certain events to get in touch with their potential clients to really learn what the superstructure wants and expect from them:

> *Expert A: "They need to pay close attention to the end user. What we're finding more and more is that there are products and concepts in the market that use materials which housing corporations think are easily damaged by their tenants or not sturdy enough. For instance, if internal walls are made of wood, housing corporations don't find that attractive because they consider it not durable. A tenant might put a thousand holes in it. Then, you won't have any wooden panels left. Startups often don't think about these aspects, so it's important for startups to connect with housing corporations. However, it's not always easy to establish that connection. Many startups have told us that they struggle to get in touch with housing corporations. You almost can't get them out of their shells. You really need to attend trade shows or network with them at events and gatherings to gather information because it's not always about making a sale right away, but rather about obtaining information about your product."*

Lastly, while this paper is written with the concept housing startups as main subject, it is good to note that getting involved with concept housing as a partner also is a form of marketing innovation, as these partners were already functioning in the traditional construction industry. Next to gaining continuity, the suppliers and architecture firms who are active in concept housing also extend their business fields:

> *Supplier A: "Ultimately, you have to eliminate all costs that the customer isn't willing to pay for. A customer doesn't want to pay for things being developed three times, made three times, or tried three times, right? They want everything done right the first time. So, when you think about it that way, these concepts are simply the right foundation. They have been thought through, they have guiding principles that deeply resonate with me. In my 30 to 40 years of working, I've never managed to achieve that. That's why I see this concept as a potential solution. Well, I would find it challenging to make it happen, but that's the kind of challenge I'd be willing to take on."*

4.6 Superstructure Adoption

While the previous paragraphs were mostly about strategies on how startups could shape their organization, concept and partnerships, this last paragraph is meant to show whether the superstructure is adopting the innovations coming from the concept housing startups, as the construction industry is known to not be very innovative in comparison to other industries, which has been described in the literature studies. This also gets confirmed by Startup B, as he explains the current image the superstructure generally has on modular housing:

> *Startup B: "The construction sector is indeed a very traditional and sluggish industry. Even though, in the broader context, all the signs have been green for a long time, the sector itself needs to adapt, and that takes a considerable amount of time. It's not just the construction sector; it's also the governments and everything that revolves around it. Even banks struggle to fully understand it. So, the first question you often get when you mention modular construction is whether it has the same quality as a traditionally built building. Many people still associate it with container housing, so there are many different parties that need time to get used to the idea."*

When analyzing the power of buyers in 4.1, it already became clear that housing associations are quite cautious with adopting concept housing, but according to this statement from Startup B it is the superstructure in general which is slow to adopt modular construction innovations. This also includes the municipalities, which makes it difficult for Startup B to get their first project, as explained by Architect B:

> *Architect B: "These locations are released by municipalities in 9 out of 10 cases. They want a reliable party, a company that can develop, build, and manage with their own risk, for example. This can be quite challenging when you're a startup or a scale-up because that reliability is simply not established yet. You need to realize that, which is a bit tricky in the way the procurement market operates. Once you're in, you're in. But getting in is complicated. You often have to piggyback on other companies. We have a lot of references in architectural housing, but you also need a developer who has developed and built at their own risk. One of the partners of Startup B is a real estate developer. They can be considered reliable, but it's still complex to break into the market. So, I think the most challenging aspect for conceptual construction is obtaining those locations, because all the big players, all the major developers, already have a foothold everywhere. They are seen as more 'reliable' in quotes, because they build much more. This is something you run into. So, on one hand, you say that it provides continuity, but to achieve that, you have to take on a lot of personal risk, as these tenders are often unpaid. You're investing a lot of time without an immediate project outcome. You need to have a long-term vision. When one finally falls into place or after a lot of lobbying with municipalities, a plot is secured, that's when you get to work. But location remains a significant challenge for us."*

Architect B also understands the municipal's perspective, why would they choose a company which they do not know a lot about? What if development goes wrong? The municipality might waste a lot of time and money, including community funds. Instead of taking these risks, they are more likely to opt for a company which has been established for years and has a strong track record of delivering excellent homes and has a reputable name. Architect B does see an opportunity in this tendency however, as the larger developers which are preferred by the municipalities are recognizing the potential of conceptual housing. This gives Startup B the possibility to join the bigger developers in the shape of a consortium. Architect B already sees this trend happening.

It is, however, important to note that Startup B is the only interviewed startup in this research which has yet to realize a project, as Startup A and C already did. A and C did however mention that the first step is the most difficult and that if you innovate, you also have to demonstrate the functionality of that innovation. As mentioned in 4.1, Startup C also stated that the strong lobbies regarding concrete construction and heat-pumps have a negative impact on the superstructure adoption as these are not sustainable at all. To be able to convince a client of their innovation which differs from these lobbies' standards, a startup needs to invest quite some resources to show the validity of their innovation:

> *Startup C: "When you start something new, you're often like David fighting against Goliath. Interestingly, in traditional construction, many things occur behind the scenes that we're not aware of, and they're rarely required to prove anything, right? You perform one BENG [translation: Almost Energy Neutral Building] calculation, and you get a number. Everything seems fine, and no one ever asks questions like, 'How long will this heat pump actually last? Have you tested that?' Nobody asks those questions. However, when we implement infrared heating, suddenly it becomes very intriguing. 'Have you tested it? How long does it last? Is it comfortable?' I've heard from housing associations that they have tenants who don't know how to operate a heat pump properly, so they either can't heat their homes or they overheat them, simply because they don't follow instructions. But these questions are not asked upfront. So yes, in that regard, we have faced challenges. Everything we say, we've had independently verified to show that yes, what we're saying is true. As a startup, a lot of time has been invested upfront in proving the viability of our concept."*

In conclusion, the construction industry's resistance to change and slow adoption of innovation present formidable obstacles for startups. The challenges facing startups in the construction industry are significant, especially when it comes to the slow adoption of innovative concepts like concept housing. Overcoming these challenges requires dedication, extensive effort in demonstrating the viability of innovative concepts, and the formation of strategic partnerships with incumbent firms to navigate the traditional landscape of the industry.

5. Conclusion

In this concluding chapter, the sub questions from chapter 1.2 will be answered, followed by the conclusion on the main research question on how asymmetric partnerships between concept housing startups and incumbent firms strategically manage innovation to become competitive in the Dutch housing construction industry. After this conclusion, the discussion (paragraph 5.1) will explain the differences and similarities between literature and practice. Suggestions for further research will also be given in this paragraph. This chapter will finish with recommendations for industry actors, and especially startups, who would like to get involved with concept housing.

SQ1: How do Porter's five forces of competition (2008) shape the housing construction industry in the Netherlands?

When examining Porter's Five Forces model (2008) within the context of the housing construction industry in the Netherlands, several key dynamics come forward based on the insights provided during the interviews:

The threat of new entrants is low, as the concept housing industry demands relatively high capital investments, setting a significant barrier for newcomers. This highly depends on the amount of process and product standardization the newcomer aims to establish. Access to clients and the achievement of economies of scale emerge as crucial factors for new entrants aiming to establish profitability and continuity. Government policies and subsidies, while seeking to promote innovation, also present challenges for startups. During the interviews it became clear that governmental bodies do not innovate their regulations and development processes along with the concept housing industry as fast as would have been appreciated by industry actors. Nonetheless, there is potential for improvement in this regard. This is also

The power of suppliers is also low. Unlike other manufacturing industries, suppliers in the concept housing industry are more like collaborative partners. They actively engage with startups in product development, contributing to the standardization of products. However, one of the startups parted ways with a supplier due to collaboration issues. This means suppliers in this industry seem to wield low power and are expected to engage in high levels of collaboration. The fact that the startup was able to swap suppliers shows that the startup was not dependent on the initial supplier.

The power of buyers is high. Buyers, notably housing associations and developers, have considerable influence in driving innovation adoption within the construction industry. Clients have the power to shape product preferences and still often choose for familiar, traditional products. The limited number of potential buyers for concept housing further enhances their collective bargaining power.

Rivalry among competitors in the conceptual housing industry is also notably high. Especially startups in the sector tend to be protective of their unique concepts, at times restricting competitors from accessing their facilities. Price competition is a prevalent strategy as newcomers aim to gain a competitive edge in a highly competitive market.

In summary, the housing construction industry in the Netherlands is marked by fierce competition among startups and established players. Buyers exert significant influence over product choices and the adoption of innovative practices. Suppliers, in contrast, act more as collaborative partners than as dominant stakeholders. The threat of new entrants remains low, with factors such as client access, capital requirements, and certain government policies reducing this threat. The threat of substitute products can be considered negligible as concept housing is seen as a substitute product for traditional housing itself. To conclude, the concept housing industry is not an easy

endeavor for any new entrant, especially for startups who have to deal with smallness and newness. However, by knowing about the dynamics associated with Porter's five forces (2008), any new entrant can anticipate on these challenges and manage them more effectively.

SQ2: How do asymmetric partnerships help startups in the conceptual housing industry to overcome smallness and newness?

Asymmetric partnerships are important in helping startups within the conceptual housing industry overcome the challenges of smallness and newness, as evidenced by the information provided by literature and during the interviews.

Smallness, in terms of limited financial resources, can be addressed through asymmetric partnerships in the following ways: Some startups start partnerships with incumbents who not only provide materials or knowledge but also invest in the concept. The commitment from those partners goes beyond words and includes financial backing. This demonstrates a shared belief in the startup's potential. By gaining financial support from partners, startups can lessen the burden of large upfront capital requirements associated with conceptual housing projects. Startups often need to reserve significant sums of money as guarantees during construction, which can cause trouble with their limited capital. Asymmetric partnerships allow startups to use the financial stability and resources of their more established partners, providing assurances to their clients. This reassures stakeholders that projects will be completed, even if the startup would start facing financial challenges.

Newness, which implies the lack of industry experience, can also be mitigated through asymmetric partnerships: Partnering with established firms in the construction industry provides startups with legitimacy and credibility. Clients and other stakeholders are more inclined to trust startups when they collaborate with well-known industry players. This credibility helps startups secure their initial projects and overcome skepticism related to their newness. Asymmetric partnerships also should facilitate knowledge sharing between startups and their experienced partners. Suppliers, for example, actively contribute to startups' product development and manufacturing processes. This knowledge exchange enhances the startups' understanding of industry best practices, production techniques, and product quality, thereby reducing their learning curve. Asymmetric partnerships often grant startups access to specialized expertise from their partner organizations. This expertise can cover various aspects of the housing construction process, from design and materials selection to manufacturing and sustainability consultancy. Such access enhances the startups' capabilities and enables them to deliver high-quality projects. It is unlikely for any concept housing startup to have all of this knowledge in-house. Startups can also tap into the extensive networks of their partners. By using these networks, startups can access valuable resources through new partnerships and identify potential clients or project opportunities. This strategic networking helps startups overcome the challenge of having a limited network.

In conclusion, starting asymmetric partnerships with incumbent firms serve as a vital resource innovation strategy for startups in the conceptual housing industry. These partnerships enable startups to access financial resources, gain legitimacy, acquire practical industry knowledge, leverage their partner's extensive networks, and make use of each other's specialized expertise. By doing so, startups can effectively address the challenges of smallness and newness. Established firms are often motivated to support startups due to their innovative approach and fresh perspectives, in addition to providing continuity to the incumbent firms. This motivation comes from a shared belief in the potential success of the startup's concept. Therefore, these asymmetric partnerships push innovation and risk-taking within the industry. This drives forward new and more efficient construction methods and brings innovation and competitiveness into the housing construction sector.

SQ3: How is open innovation between partners facilitated?

Open innovation between partners in the conceptual housing industry is facilitated through collaborative relationships that leverage each partner's expertise and resources. There is an important reason why firms are interested to engage in a partnership with concept housing startups: the business model related to concept housing could greatly contribute to the continuity of the incumbent firm. This makes open innovation a mutual benefit for both partners, thus promoting the collaboration between companies. This collaborative approach allows startups to tap into the knowledge and capabilities of their partners, leading to technological advancements and process innovations for their concept. Partnerships enable startups to access the specialized, technological expertise of their suppliers. They possess in-depth knowledge about the modules they provide. For example, a startup might aim to develop a concept with which they can stack dwellings on multiple levels and want to use as much circular materials as possible. In this case, partnering with a wooden façade manufacturer who specializes in high rise can be considered a fitting business strategy. Suppliers actively contribute to product development and module optimization. Within the conceptual housing modules, sub-modules are also optimized individually. This could be the kitchen or a balcony, for example. This optimization often extends to sustainable and circular principles like incorporating biobased materials, reusing parts of old buildings, and making components demountable and possible to reassemble. The collaborative dynamics between suppliers and startups can sometimes involve unrealistic ideas or expectations. For example, startups may propose on-site assembly by suppliers, which is not feasible for many sub-module manufacturers. However, such challenges are viewed positively as opportunities for smart collaboration. Balancing realism and innovation requires seeking benefits and harnessing the strengths of both sides.

An example on process innovation in these collaborative efforts can be seen in the changing role of the architect. Architects in conceptual housing still play their role as system integrators like they do in traditional construction. However, instead of focusing specifically on architectural design, they work closely together with sub-module suppliers and other partners like sustainability consultants to create a comprehensive and intelligent design. Partnering architecture firms work collaboratively with concept providers to ensure that the modules can be combined seamlessly and optimize them for various housing typologies. They do this through open innovation practices. This shift in the architect's role from traditional design to modular integration pushes innovation in the design and assembly process, as the architect needs to work ‘backwards’. The modules cannot be designed with a context in mind, so making sure that the project fits with its physical surroundings and provide architectural value stays as a core task. This can be done by either a partnering architecture firm or an in-house architect at a concept provider.

Some startups also actively collaborate with their clients to optimize and enhance their housing concepts. These partnerships are mutually beneficial, as they share common goals for creating affordable housing. This type of collaboration focuses on cost management, attention to details, optimization of floor area’s and adapting the concept to specific client requirements. It helps in understanding the market needs and improving the product accordingly. Open innovation can also take place when the concept provider makes it possible for their clients to speak with a specific sub-module manufacturer, if they have specific requirements for the kitchen, for example.

Open innovation also happens in the concept housing industry through cross-industry innovation. While this does not necessarily imply innovation between two partners, there are newcomers in the conceptual housing industry who originate from different fields and industries. These new entrants, including entrepreneurs with backgrounds in aviation or other unrelated manufacturing sectors, bring unique perspectives and ideas. Their knowledge of specific techniques, materials, and technologies from other industries can inspire innovative solutions in housing construction.

In conclusion, open innovation within partnerships in the conceptual housing industry thrives on collaborative relationships and expertise-sharing. Collaboration coming from these open innovation practices focus on product enhancement, design and construction process innovation, and cost efficiency. These partnerships bridge the knowledge gap between startups and established industry players. This enables the development of more sustainable, affordable, and technologically advanced housing solutions. Cross-industry collaboration further enriches the innovation ecosystem, bringing in more creativity and out-of-the-box thinking. While challenges on practical topics may arise, they are seen as opportunities to find synergy and drive smart collaboration for the benefit of the startup's housing concept.

SQ4: Which innovation strategies are facilitated by the startups management?

Startups in the conceptual housing industry employ various innovation strategies directed by their management. These tend to shape the partner ecosystem, contract agreements, and development process. The goal behind this is to enhance the effectiveness, efficiency, and funding of their operations. Based on the interviews, the following innovation strategies pushed by the startups' managers are evident:

The first strategy pushed by the startups' management is the method partners are selected. Startups recognize the importance of assessing a potential partner's organizational culture and commitment to innovation. They conduct a 'DNA-check' to make sure that willingness to innovate is not limited to only the top management but is present throughout the partner's whole organization. This is especially relevant on the suppliers' side. This strategy makes it more likely that collaborative efforts yield innovative results, as knowledge sharing should come from anyone who is involved in the collaboration. Startup managers actively seek partners with a collaborative mindset who are willing to engage in long-term collaboration and contribute to innovative thinking. This shared interest and collaborative mindset can drive improvements in both the product and the processes. This collaborative mindset and innovative thinking in regards to conceptual housing is also important to be present with the startup's employees themselves, so recruitment of new human resources is also based on these criteria. The management innovation strategy is to get everyone involved with the innovation.

Startups also explore innovative contract forms towards their clients, inspired by contract agreements which are often seen in (other) manufacturing industries. These agreements prioritize payment upon the completion of modules in the factory instead of project delivery. This helps with optimizing financing and efficiency in the production process. Doing this aligns better with the concept housing industry's needs, improving continuity for startups and their partners.

Managers from startups also advocate for early involvement in projects, emphasizing the importance of being brought in at the initial planning stages. They prefer to collaborate with clients and possibly architects right from the beginning to influence decisions about plot dimensions, floor plan layouts, and possible architectural elements. This early engagement ensures that the concept's principles are integrated effectively, preventing unnecessary time and cost losses. Startups highlight the need to be part of the decision-making process from the project's initiation to achieve the most optimal product.

Overall, startups in the conceptual housing industry actively manage innovation by strategically selecting partners, exploring innovative manufacturing contract forms, and are advocating for early involvement in projects. These strategies enable startups to drive innovation, optimize efficiency, and deliver on the promise of concept housing solutions.

SQ5: Which innovative marketing strategies are implemented by startups?

Startups in the conceptual housing industry employ several innovative marketing strategies to expand their business, reach potential clients, and shape their market presence. These marketing strategies are beneficial for effectively communicating the value of their concept housing solutions and establishing a foothold in the industry. Based on the interviews, the following innovative marketing strategies are evident:

Some startups in the concept housing industry showcase a marketing strategy by integrating backwards or forwards into the conceptual housing industry. While a startup might primarily identify as a development company, they could also function as a concept housing provider. With their own concept, they link the supplying infrastructure with the superstructure, in which they themselves mainly operate, through system integration. There are also examples of sub-module manufacturers who integrated forward and started being a concept provider. This approach expands their business fields and could position them as key players in the industry, bridging the gap between traditional construction firms and concept providers.

Product diversification like developing an efficient cage system also got highlighted during the interviews, and is also a means for startups to increase business fields. This anticipates the growth of the concept housing market and can position the startup as a provider of innovative, efficient solutions for both existing and new entrants to the industry. This expansion into new product lines can create additional revenue streams and long-term business benefits if done correctly. To be successful, the startup needs to convince current manufacturers of the benefits in comparison over their current systems.

Strategic partner selection can also be considered a marketing innovation strategy, as the selected partner might have a certain image in the industry already. Partnering with an architecture firm who is known in the Netherlands to be a front-runner of innovative, sustainable design practices should also have a positive impact on the image of the concept as viewed by other industry participants. These type of partners are also more likely to have an extensive network which the startup might be able to leverage while looking for clients or other partners. From the perspective of suppliers and architects, partnering with a concept provider should also be considered a marketing strategy as they extend their business fields adding to traditional construction projects, which they will keep doing.

Another aspect startups should keep in mind during marketing efforts is to be transparent with their clients, explaining the benefits of concept housing and managing expectations regarding costs. Concept providers should refrain from claiming to be cheaper than traditional builders, as this can be misleading. In practice, the standardization which is coherent to the concept housing market increases the concept providers' margins rather than to lower their client's costs. Instead, they should focus on communicating the value of their innovative solutions and the potential benefits for clients. This could include faster construction time or less probability for errors during construction, for example. It is also important for startups to connect with housing corporations to better understand client expectations and preferences. Networking at trade shows and industry events provides valuable information about clients' needs and allows startups to improve their product accordingly.

The last marketing strategy which came up during the interviews is to set clear volume goals for the long term. In business it is considered to be 'deadly' if a firm is not able to deliver the demands of clients. It is important for a startup to have a clear idea about their customers: are they aiming to serve a specific segment or are they aiming to grow and become one of the bigger concept providers in the market? If they decide on the latter, it is crucial to acquire a factory which has enough room and set up the manufacturing process to be able to accommodate potential future

production volumes. These clear goals guide startup's marketing efforts and operational decisions.

In summary, startups in the conceptual housing industry employ various innovative marketing strategies to position themselves strategically. They diversify their product offerings, establish meaningful partnerships, communicate transparently with clients, and expand their networks. These strategies enable them to navigate an evolving industry and drive adoption of concept housing solutions.

SQ6: How are the clients and regulators influencing the adoption of innovations from concept housing startups?

The adoption of innovations from concept housing startups by clients and regulators in the construction industry presents certain challenges and barriers, as indicated during the interviews. Here are the key observations:

The construction industry superstructure, including clients (such as housing associations) and regulators (such as municipalities), is traditionally conservative and slow to adopt or innovations or enable them through regulations. The construction sector is known for its traditional and risk-averse nature, making it resistant to change. The industry as a whole needs time to adjust to newer concepts like modular construction, which are often met with skepticism due to misconceptions about quality, for example.

One of the significant challenges for concept housing startups who are involved in project development is obtaining locations for their first projects. Municipalities often prefer established, reliable companies with a track record in development and construction. Startups and scale-ups find it challenging to compete with more established players, even if they have strong references from previous projects. Procurement processes can take a long time and might be unpaid, requiring much investment from startups. Furthermore, municipalities are risk-averse due to the community funds which are involved. They are hesitant to choose less-known concept housing startups for projects. In order to get awarded with a project, concept housing startups thus face the challenge of convincing clients and regulators of the validity and functionality of their innovations. They often need to invest significant resources to prove the effectiveness and sustainability of their concepts, particularly when their innovations deviate from established industry norms. This includes conducting independent verification and testing to demonstrate the reliability and performance of their concept. One of the reasonings behind this which got mentioned is that there are strong industry lobbies that advocate for specific construction methods and technologies, such as concrete construction and heat pumps. These lobbies can have a negative impact on the adoption of new, more sustainable innovations that challenge traditional standards.

The superstructure does not only impose challenges, however. There is an emerging trend that larger developers, which are preferred by municipalities, are starting to recognize the potential of conceptual housing. This shift may create opportunities for concept housing startups to collaborate with established developers within consortiums. Doing this allows startups to overcome some of the challenges associated with obtaining locations for their projects

In summary, the adoption of innovations from concept housing startups within the construction industry, including by clients and regulators, faces significant resistance and challenges. The industry's traditional nature, risk aversion, and reliance on established players make it difficult for startups to break into the market and gain acceptance for their innovative approaches. Overcoming these challenges often requires startups to invest resources in demonstrating the validity of their concepts and building credibility within the industry. However, there are indications that larger developers are beginning to recognize the potential of concept housing, which may open up collaboration opportunities for startups in the form of consortiums. There are also possibilities

with ‘bouwstromen’, where industry players, concept providers and housing associations form a partnership together to promote and realize the development of concept housing projects.

RQ: How do asymmetric partnerships between concept housing startups and incumbent firms strategically manage innovation to be(come) competitive in the Dutch housing construction industry?

In conclusion of this thesis, the strategic management of innovation in asymmetric partnerships between concept housing startups and incumbent firms in the Dutch housing construction industry plays a crucial role for their concept to become competitive. When examining the dynamics within this industry through the lens of Porter's Five Forces model (2008), several key factors emerge that influence the strategic management of innovation (table 6).

Threat of new entrants (low)	**Power of suppliers (low)**	**Power of buyers (high)**	**Threat of substitute products (low)**	**Rivalry among competitors (high)**
High capital requirements	Depending on supply chain integration	High fixed costs	Concept housing IS a substitute product	High exit barriers
High fixed costs, economies of scale	Mutual responsibility to realize a good concept	Limited amount of buyers, large volumes		Many competitors
Access to clients	Construction is their main/only income	Cases of backward integration		Price competition
Government	Lack of differentiation	Price sensitive		Not willing to show factory to competitors
Influence on startups: Red = Negative impact; Orange = Situational impact; Green = Beneficial impact				

Table 6: Concept housing industry analysis through Porter’s Forces (2008), based on literature & interviews (Own work, 2023)

The low threat of new entrants, primarily due to high capital requirements for process and product standardization, highlights the importance of access to clients, capital resources, and navigating government policies for startups to establish themselves. Startups often do not have access to clients and sufficient capital resources due to their smallness and newness. Resource innovation strategies are necessary to overcome these challenges. There is room for improvement in government regulations to better align with the pace of innovation in the sector. Concept housing providers would like to see changes in regulations to be aligned with the principles behind conceptual housing: they do not see the necessity of going through lengthy permitting processes or subsidy applications for different projects which use the same concept, for example. The limited power of suppliers, who the startups often work closely with in collaborative partnership ecosystems, is positive for startups. It is, however, very important to select the right suppliers as partners. This selection process involves evaluating partners' commitment to innovation and a shared mindset for long-term collaboration throughout their whole organization. This selection process can be seen as a managerial innovation strategy as they set up the criteria which they see as crucial to facilitate open innovation practices between firms. The high power of buyers, particularly housing associations and developers, emphasizes the need for startups to focus on client preferences by engaging in open innovation

practices with them as well. Collaborating closely with clients can help tailor concept housing solutions to meet specific market needs. This is considered a marketing innovation strategy. Other methods to be used by startups include conversating with buyers during trade fairs. The high rivalry among competitors, contrary to some expectations, highlights the tendency for startups to protect their unique concepts while also engaging in price competition. Strategic management of innovation in this context involves protecting intellectual property and improving or expanding product offerings, the latter being another innovation strategy related to marketing.

Managers from concept housing startups promote innovation through strategic partner selection, innovative contract forms with buyers, and early project involvement. These strategies empower startups to drive innovation through future collaboration efforts, optimize efficiency and financing, and deliver on the promise of concept housing solutions while adhering to the client's demands. Forming asymmetric partnerships play a vital role and are a common resource-related innovation strategy as it is crucial for most startups to overcome challenges related to smallness and newness in the industry. These partnerships can provide financial support, legitimacy, knowledge sharing, specialized expertise on their sub-modules, and access to networks, ultimately fostering innovation and competitiveness. Knowledge sharing and leveraging specialized expertise often happens through open innovation practices. This approach leads to technological advancements, process innovations, and creative problem-solving. However, the adoption of innovations from concept housing startups by clients and regulators in the construction industry faces resistance and challenges due to the industry's traditional nature, risk aversion, and influence from established players and industry lobbies. Overcoming these challenges often requires startups to invest resources in demonstrating the validity of their concepts and building credibility within the industry. Nevertheless, emerging trends suggest that larger developers are beginning to recognize the potential of concept housing, which may create opportunities for collaboration in form of consortiums. Innovative marketing strategies employed by startups to increase their probability for success include expanding business fields, product diversification, making use of their partner's image and network, transparent communication with clients, and focusing on long term benefits through their business plan. These strategies are beneficial for effectively communicating the value of concept housing solutions and establishing a foothold in the market.

In summary, innovation strategies are integral to the success of concept housing startups in the Dutch housing construction industry. Strategic partnerships, open innovation practices, innovative management, establishing industry presence through innovative marketing efforts, and persistence in overcoming adoption barriers from the superstructure all contribute to the competitiveness and growth of startups in the traditional but evolving housing industry.

5.1 Discussion & Recommendations

Discussion

When looking at the results, there is one clear aspect which does not match with the hypothesis which came from the literary research: being the misalignment between startups and incumbent firms who are engaged in a asymmetric partnerships. This could be because the difference of founding years for the incumbent firms were older in de Groote & Backmann's research (2020), of which most were founded before 1900. It might be because in their research, mainly the view of the incumbent firm was considered as there were five interviewed incumbent firms and two cases were startups. Another reason might be that the interviewed startups in this research were more proficient in their partner selection than the firms which were interviewed by de Groote & Backmann. Lastly, it might be because in this research, partnerships were interviewed, and all firms knew their partner would be involved too. This might cause them to be less inclined to speak critically on their collaboration. One other area where practice deviates from the expectations that came up in the literature review is that rivalry among startups is, in fact, significantly higher than average. This notion changed when Expert B mentioned that the demand for housing could probably be fulfilled with only concept housing. However, this will never happen as traditional housing will keep existing when projects require specific design aesthetics for example . Expert A also demonstrated the competitiveness between startups when she mentioned that especially these young firms are reluctant to let other firms in their factory due to intellectual property issues and often engage in price competition with the other concept housing providers. Furthermore, this research is in line with the findings from Wamelink & Heintz (2014) which state that the superstructure is very important to enable and adopt innovation in the construction industry. This research, however, does also show the importance and the role of the suppliers (infrastructure) as they are the ones who often develop the technical innovations, and this research shows the importance of the startups and architect as system integrators. Another difference between the findings of the literature review and the empirical research was the power of certain suppliers. According to Porter, if a supplier is highly dependent on a certain industry, it means their power gets reduced. One of the examples in the case of construction is concrete. During the interviews, however, it became clear that the concrete suppliers have a lot of power in the construction industry as they have a strong lobby. As concrete is not deemed to be sustainable by industry participants like Architect B and Startup C, this can also be seen as an additional challenge for regulators in order to realize a circular economy. Lastly, a discrepancy between literature and this research was found on the topic of knowledge sharing between supply chain members. According to Meng & Brown (2018), this was seen as an opportunity to push innovation as they found that construction firms of any size were not involved in this practice. It is important to note that they did their research with general construction firms and did not necessarily focus on concept housing firms. In this research, where concept housing firms were the main target group, this practice was actually a key strategy to promote innovation. One of the similarities between literature and practice, is the traditional nature and sluggishness of the construction industry. Not only are many of the industry actors slow to adopt to innovations, but so are the governments and banks. This is something startups should take into account when starting their business.

The initial goal was to do two exploratory interviews with individuals who have specific knowledge on the field of conceptual housing in the Netherlands, and interviewing three partnerships, thus resulting in eight participants in total. However, the interview with a buying partner (Developer C) did not happen, due to scheduling issues. To make this complication less problematic, two extra startups were contacted, but they were also not able to participate within the

available time period. As this risk was known to the researcher before the interviews were carried out, this startup-client relationship was taken into account, even while interviewing the other two types of partnerships. This way, at least a certain amount of relevant data about this type of relationship between startup and their clients was generated. Furthermore, the focus of the interview with Startup C was around their partnership with Developer C, meaning quite some relevant data was generated during this interview as well.

When reflecting on the chosen research method, there might have been a different method on answering the main research question. If, instead of interviewing multiple startups and one of their partners, a more in-depth research at one startup would have been conducted (through an internship, or an in-depth case study, for example), a deeper understanding of the actual collaboration processes and relationship with their partners could have been identified and analyzed. The exact same research questions could have been asked, but by gaining more in-depth knowledge and going through the whole value chain of supplier-startup-client and possibly even municipality, different results would probably arise than those which are generated by this research. However, when looking back at these results, it is noticeable that the three startups all have a totally different business model. This would mean that the conclusion of the alternative research would have been very dependent on the selected startup, so it would contribute little to the academic field as it would not have been generalizable. By executing the research with the current chosen method, it is also not completely generalizable as there are still more business models apart from those which have been interviewed. However, these interviewed partnerships did provide enough data for the researcher to eventually be able to generally conclude on how asymmetric partnerships in concept housing can be managed, mainly from the perspective of a startup, to become competitive.

Due to the explorative nature of this research, the available time period, and the planning difficulties related to interviewing partnerships, a convenience sampling approach was chosen for this research, which reduces the external validity of the research. A follow-up research might want to select cases with a more valid selection method. Stratified sampling where a division would be made between startups who had a certain amount of invested funds when they were founded might be interesting, for example. Or a division between new entrants, forward-integrated startups and backward-integrated startups. Having a bigger sample size than three partnerships also would make the research more valid. As interviews were done via Teams, and respondents were either at work or at home, this should have a positive influence on the ecological validity of the research, as is stated by Keen et al (2022). Additionally, it would be valuable to do a similar research, but focus on the views of the superstructure as they prove to be key in adopting and enabling this innovative development. It could also be valuable to research the differences between their views on concept housing. As this research showed that for startups it is very important to get their first project going to overcome newness, and they need a client who is willing to give them this opportunity, the follow-up research could dive into the needs of a client. What are their expectations from a startup, and if they would prefer a startup over a bigger, more established firm, or if they would always prefer an incumbent firm. The reasoning behind the slow adoption of these innovations coming from concept housing startups is interesting in a societal context and answers to these questions could be very helpful for new startups in the concept housing industry. Regulators could also be interviewed to learn why regulation seems to be lagging behind the industry's innovations. Lastly, a follow-up research about the design process towards a housing concept can prove to be useful, as this process is very different than architects are used to in their daily practice. The lack of physical context and essentially design backwards is not thought in architectural education and is new for many architects, whether they are working in-house for a concept provider or in a partnering architectural firm.

Recommendations

This research can be used by aspiring entrepreneurs in concept housing to think about what they should look for in their partners, and what kind of input they can expect from them. Startups serve as system integrators, bringing together various components and subsystems provided by suppliers to develop and possibly assemble their concept. Suppliers, architects and clients who read this thesis might get more insight in what their role could be in this evolving market of the house building industry. The role of suppliers is to use and share their expert knowledge about their sub-module or system. The architect's role is to integrate all these modules and serve as a product developer for dwellings, thus also serving as a system integrator. The client's role is to be aware of the aspects associated with conceptual housing which they could benefit from, and how they should change their development process when involving a concept provider into a project. From founding until the first projects, the recommendations towards startups in conceptual housing are as follows:

Founding

A startup always begins with defining a clear and inspiring vision for their new concept housing firm. What innovative solutions or benefits do they aim to bring to the industry? They establish a mission statement that illustrates their goals and aspirations. They also target specific market segments or niches within the housing construction industry. Note that having ambitions to eventually become one of the bigger concept housing providers could also be valid, but the startup should take this into account when thinking about the required capital which is needed to accomplish this. This is especially important when it comes to scaling up production or acquiring facilities. Specialization allows startups to stand out and become an expert in a particular area, making it easier to market their concept.

Partner selection

Startups forge strategic partnerships with incumbent firms like suppliers, architects, and consultants. These partnerships should be built on a foundation of mutual benefits and open innovation practices. Startups leverage their partner's experience, resources, and industry connections to enhance their credibility and financing of the concept. Startups clearly define the roles and responsibilities of the startup and their partners. At the same time, they create a collaborative ecosystem that includes like-minded people who share their commitment to innovation. This network can offer valuable insights, support, and opportunities for growth. If it is possible, they get a buying firm like a housing association or real estate developer involved as well, because this will be very beneficial for fostering continuity. It will also speed up the process of getting the first project going.

Product development

Startups and partnering architects should prioritize understanding the needs and expectations of their clients. They tailor their solutions to address their specific requirements and goals. Concept housing startups emphasize sustainability in their concepts, aligning with growing environmental concerns. They should highlight how their solutions contribute to energy efficiency, reduced waste, and a smaller carbon footprint. While designing, architects follow a completely different process than thought during their education, as they have to design 'backwards'. They start by designing the different dwelling modules in a way that they can be combined in various building layouts. Different building typologies could even be possible with the same concept. A big difference is the complete lack of physical context while designing the housing concept, so testing different hypothetical building layouts through scale models is necessary. It is also important for startups in the concept housing industry to show that their concept functions well. This can be done through independent verification or prototyping, for example. It is especially important to do this when the concept uses

unconventional systems, processes or materials. Prove the functionality, sustainability, and benefits of your concept to gain the trust of clients and regulators.

Marketing

When the concept is thoroughly developed and ready to be built, it is time to market it properly. Startups should help potential clients to understand the advantages of their solutions. This could be a faster construction time and reduced construction risks. At the same time, they should be transparent about the price. It is irrational to charge much less than traditional housing due to capital requirements related to concept housing. However, price competition strategies can be used to get awarded with the first project. Startups could also explore consortium opportunities with established developers and housing associations. These collaborative efforts can help you access larger projects and expand your reach within the industry.

Adoption & Enablement through regulation

The last recommendation is not targeted towards startups but toward their clients and regulators in the Dutch built environment. For clients, it is important to realize that working with a concept providers is different than working with a contractor and architects. Clients should look for concepts which fit their project specifications and involve them as early as possible to ensure alignment between their needs and the provider's capabilities. To further facilitate the concept provider in their practices, clients could be open to explore new types of contracts which are also seen in other manufacturing industries, as the current contracts which are often used in traditional housing are suboptimal for the concept providers financing. This has a negative impact as it will make the construction process less streamlined.

Aspects like permitting and subsidies related to sustainability efforts are currently very project-based, which is understandable for traditional construction projects. However, as the Dutch government is aiming to add a substantial amount of housing in a limited time frame, it is important to adjust their regulations to enable the innovations which are likely to contribute to tackling this challenge, like concept housing. Housing concept providers argue that if a project implements the same concept as one that has already gone through a lengthy permitting process, there is no need to redo the whole procedure which can take a maximum of. The same goes for subsidies in regards to sustainability.

6. Afterword

As I conclude this thesis, I reflect on the journey that brought me to this point. The research, analysis, and writing have not only deepened my understanding of concept housing startups and innovation management, but have also expanded my appreciation for the process of academic exploration.

While this thesis marks the end of my formal education in Management in the Built Environment, it is, in many ways, just the beginning of a lifelong pursuit of knowledge and discovery. The questions raised and the insights gained during this research will continue to inform my academic and personal interests in the years to come.

The academic community is built upon the collective efforts of countless individuals dedicated to the advancement of knowledge. I hope that this thesis can be a small contribution to the ongoing dialogue within the field of Management in the Built Environment and a source of inspiration for others who walk on similar paths.

I am deeply thankful for the opportunities and support I have received, and I look forward to the future challenges and adventures that lie ahead. The pursuit of knowledge is an endless and rewarding endeavor, and I am excited to continue this intellectual journey.

Lastly, I express my gratitude to all those who have been a part of this thesis, and I eagerly anticipate the new horizons that await in my professional endeavors, and to found my own startup somewhere in the future.

Luca Massimiliano Pieck

23-10-2023

7. Reflection

1. Relationship with Graduation Lab, Master Track, and Master Programme:
The topic of my graduation thesis, which explores how startups in concept housing can achieve competitiveness through asymmetric partnerships and innovation, aligns closely with the overarching theme of the graduation lab, "Tackling housing inequality". Concept housing offers a potential solution to address the housing crisis in the Netherlands by employing standardized methods to produce affordable housing. Additionally, the research topic also aligns with the Master track Management in the Built Environment since partnerships and innovation are crucial business aspects that need to be effectively managed. This connection is further supported by the fact that I conducted interviews with (commercial) directors, a co-founder, and a partner of an architecture firm, who all held managerial roles within their organizations. Furthermore, as concept housing represents a rising trend that could change the house building industry, it holds significant relevance to the Master's program in Architecture, Urbanism, and Building Sciences.

2. Scientific Relevance and Methodology:
The research on innovation in the built environment often focuses on project-specific dynamics within the traditional construction industry. However, with the emergence of industrial housing, the sector is shifting towards a more product-based approach, thus becoming comparable to other manufacturing industries (Hall et al., 2022). By analyzing the influence of Porter's five forces (2008) on the Dutch house building industry through the lens of concept housing startups, my research offers new insights not previously explored. It also fills the gap in the literature where the concepts of innovative startups, conceptual housing, and strategic innovation management come together. While existing studies have examined business models associated with industry 4.0 in construction (Hall et al., 2022), they mainly are based on established entities developed by global companies, so it is not reflecting the startup perspective. By researching the competitive position of young, small companies in the housing construction industry which are known for fostering innovation (Colombo & Piva, 2008, De Groote & Backmann, 2020; Spender et al, 2017), this research contributes valuable knowledge and a modern perspective within the Dutch context.

3. Challenges in Data Collection and Mitigation:
I tried to gather comprehensive primary data by interviewing startup representatives and their partnering incumbent firms, providing a more integrated view of the partnership dynamics in concept housing. During the data collection process, however, I encountered several challenges. One notable obstacle was scheduling interviews within the limited timeframe scheduled for the MSc thesis. Although I managed to conduct interviews with most of the relevant stakeholders, I regret that I could not interview Developer C, an important player in partnership dynamics as they are a stakeholder in the superstructure an thus important to drive innovation (Wamelink & Heintz, 2014). Some unforeseen circumstances caused delay in communication with Startup C and the unavailability of their contact at Developer C due to a business trip halted the interview process. Recognizing this risk beforehand, I discussed relationships with clients with all the startups to extract valuable insights, and thus compensated the lack of data which should have been gathered during the interview with Developer C.

4. Wider Social, Professional, and Scientific Framework:
The findings and conclusions of this research project hold implications beyond its immediate context. By investigating the potential roles of startups and their partners in the conceptual housing market, the results offer guidance to aspiring entrepreneurs in concept housing, helping them identify

suitable partners and teach them about the contributions they can expect. Adding to that, suppliers, architects, and clients in the house building industry can gain insights into their respective roles within this changing market. Suppliers are encouraged to share their expert knowledge about their modules or systems, while architects can play an important role as system integrators of these modules, serving as product developers for conceptual dwellings. Clients are advised to consider the unique benefits of conceptual housing and change their development processes when engaging with concept providers. The transferability of the results may vary due to the diverse business models of the startups which were interviewed. However, the synthesis of the main findings provides a framework outlining potential partnership dynamics in the conceptual housing market, which can be useful in practice.

5. Ethical Issues and Dilemmas:

a. Moral Sensibility: The main moral issue I expected in the research was the protection of intellectual property rights, the startup's innovations. While gathering insights from the startups and their partners, it was crucial to maintain confidentiality about intellectual properties. Ensuring their trust through informed consent, stating that the interviews would not be published publicly, and providing anonymized data in the thesis helped solve this moral issue.

b. Moral Analysis: The relevant values for this moral issue include confidentiality, fairness, and trustworthiness. Stakeholders involved are the startups, their partners, myself as the researcher, my mentors who will have access to these interviews due to transparency and confirmation of my sources, and any researcher wanting to do a follow-up research with this data. The challenge was to balance the need for transparency in the research with the obligation to protect the confidential information of the participants.

c. Moral Creativity: To address the moral issue, some options were considered, such as using pseudonyms for the companies and individuals involved and carefully anonymizing sensitive data. These measures aimed to protect the interests of the stakeholders while still providing valuable insights. While these options are also done, this would still make it impossible to speak about any possible innovation the participant do not want to share with their competitors. This is the reason why the interviews will be stored in the TU Delft repository under restricted access, not available for any commercial purposes.

d. Moral Judgment: Analyzing the moral issue from different ethical frameworks, such as professional codes of ethics, utilitarianism, and deontology, showed the importance of adhering to the principles of ethics. Professional codes of ethics guided how to deal with sensitive data, while utilitarianism emphasized the benefit of the research to the industry and new entrants to the concept housing market. These benefits might then also benefit society as a whole due to new innovative ways to construct affordable housing. Deontological considerations stressed the necessity of preserving confidentiality, and to ask questions during the interview in a way that the answers are not likely to hurt the partnerships: instead of asking whether a partner does something wrong, I asked if the interviewee had a tip for their partner, for example.

e. Moral Decision-Making: In light of the moral issue, I chose to follow the principles of integrity and fairness by maintaining strict confidentiality and anonymizing data. This decision aimed to protect the interests of the startups and their partners, while still advancing knowledge in the field of conceptual housing and innovation.

By critically addressing ethical concerns and dilemmas, this research ensures the protection and fair treatment of all involved parties, contributing to the trustworthiness and integrity of the study.

In conclusion, my graduation thesis examining the competitiveness of startups in concept housing aligns well with the graduation lab's theme, the MBE track, and the broader Master's programme.

The chosen methodology offers scientific relevance by filling the gap in existing literature and providing new insights into the housing construction industry. Although challenges were encountered during data collection, efforts were made to compensate for limitations. The project's transferability and possible practical implementations might prove to be useful to various stakeholders in the house building industry. Lastly, ethical issues and dilemmas were addressed by adhering to confidentiality, fairness, and integrity, ensuring the research's moral sensibility.

8. References

Abbot, C., Jeong, K., & Allen, S. (2006). The economic motivation for innovation in small construction companies. *Construction Innovation*.

Ahlstrom, D., & Bruton, G.D. (2001). Learning from successful local private firms in China: Establishing legitimacy. *Academy of Management Perspectives*, 15, 72–83.

Amit, R., & Zott, C. (2015). Business Models. *International Encyclopedia of the Social and Behavioral Sciences*, 33–36. https://doi.org/10.1016/b978-0-08-097086-8.73040-6

Awwad, R., & Ammoury, M. (2019). Owner's perspective on evolution of bid prices under various price-driven bid selection methods. *Journal of Computing in Civil Engineering*, 33(2), 1–12. https://doi-org.tudelft.idm.oclc.org/10.1061/(ASCE)CP.1943-5487.0000803

Byrne, P. (2002). *Risk, uncertainty and decision-making in property development*. Routledge.

Cambridge University. (2023). House. In *Cambridge Dictionary.* Geraadpleegd op 21 januari 2023, van https://dictionary.cambridge.org/dictionary/english/house

Centraal Bureau voor de Statistiek. (2022, 21 december). *Bevolkingsteller*. Geraadpleegd op 17 januari 2023, van https://www.cbs.nl/nl-nl/visualisaties/dashboard-bevolking/bevolkingsteller

Clark, T. (2022, 5 december). *Housing association closes modular factories*. Construction News. Geraadpleegd op 9 januari 2023, van https://www.constructionnews.co.uk/tech/offsite-mmc/housing-association-closes-modular-factories-05-12-2022/

Clúid Housing. (2022). *Delivering Homes*. Geraadpleegd op 9 januari 2023, van https://www.cluid.ie/delivering-homes/#development-acquisition

Coeurderoy, R., & Durand, R. (2004). Leveraging the advantage of early entry: proprietary technologies versus cost leadership. *Journal of Business Research*, *57*(6), 583-590.

Colombo, M. G., & Piva, E. (2008). Strengths and weaknesses of academic startups: a conceptual model. *IEEE Transactions on Engineering Management*, *55*(1), 37-49.

Das, T. K., & He, I. Y. (2006). Entrepreneurial firms in search of established partners: review and recommendations. *International Journal of Entrepreneurial Behavior & Research*.

De Groote, J. K., & Backmann, J. (2020). Initiating open innovation collaborations between incumbents and startups: How can David and Goliath get along?. *International Journal of Innovation Management*, *24*(02), 2050011.

De Luca, P., Carbone, I., & Nagy, J. B. (2017). Green building materials: A review of state of the art studies of innovative materials. *Journal of Green Building*, *12*(4), 141-161.

Dewick, P., & Miozzo, M. (2004). Networks and innovation: sustainable technologies in Scottish social housing. *R&D Management*, *34*(3), 323-333.

Doran, D., & Giannakis, M. (2011). An examination of a modular supply chain: a construction sector perspective. *Supply Chain Management: An International Journal, 16*(4), 260-270.

Dubois, A. & Gadde, L-E. (2000), "Supply strategy and network effects – purchasing behavior in the construction industry", *European Journal of Purchasing and Supply Management, 6*(3-4), 207-15.

Egan, J. (1998), "*Rethinking construction*", report of the construction task force on the scope for improving the quality and efficiency of UK construction, Department of the Environment, Transport and the Regions, HMSO, London.

Emmitt, S. (2006). Selection and specification of building products: Implications for design managers. *Architectural Engineering and Design Management*, *2*(3), 176-186.

European Patent Office. (n.d.). *Espacenet – patent search*. Espacenet. Geraadpleegd op 13 januari 2023, van https://worldwide.espacenet.com/patent/

Galati, G., Teppa, F., & Alessie, R. J. (2011). Macro and micro drivers of house price dynamics: An application to Dutch data. *De Nederlandsche Bank Working Paper 288*(1). Van http://dx.doi.org.tudelft.idm.oclc.org/10.2139/ssrn.1950606

Garnsey, E., Stam, E., & Heffernan, P. (2006). New firm growth: Exploring processes and paths. *Industry and Innovation*, *13*(1), 1-20.

Goffin, K. & Mitchell, R. (2005), *Innovation Management: Strategy and Implementation Using the Pentathlon Framework*. Palgrave Macmillan, Basingstoke.

Goodier, C., & Gibb, A. (2007). Future opportunities for offsite in the UK. *Construction Management and Economics*, *25*(6), 585-595.

Hall, D. M., Lessing, J., & Whyte, J. (2022). New Business Models for Industrialized Construction. In *Industry 4.0 for the Built Environment* (pp. 297-314). Springer, Cham.

Hoang, H. & Antoncic, B. (2003), Network-based research in entrepreneurship: A critical review. *Journal of Business Venturing*, 18, 165–187.

Hogenhuis, B. N., Van Den Hende, E. A., & Hultink, E. J. (2016). When Should Large Firms Collaborate with Young Ventures? Understanding young firms' strengths can help firms make the right decisions around asymmetric collaborations. *Research-Technology Management*, *59*(1), 39-47.

ING Economisch Bureau. (2020*). Industrialisatie in de bouw: Lagere bouwkosten afwegen tegen hogere risico's*. Geraadpleegd op 19 november 2022, van https://www.ing.nl/media/EBZ_ING-Industrialisactie-in-de-bouw_mei-2020_tcm162-194858.pdf

Jepsen, L. B., Dell'Era, C., & Verganti, R. (2014). The contributions of interpreters to the development of radical innovations of meanings: the role of 'Pioneering Projects' in the sustainable buildings industry. *R&D Management*, *44*(1), 1-17.

Keen, S., Lomeli-Rodriguez, M., & Joffe, H. (2022). From challenge to opportunity: virtual qualitative research during COVID-19 and beyond. *International journal of qualitative methods, 21*, 16094069221105075.

Khan, A., Yu, R., Liu, T., Guan, H., & Oh, E. (2022). Drivers towards Adopting Modular Integrated Construction for Affordable Sustainable Housing: A Total Interpretive Structural Modelling (TISM) Method. *Buildings*, *12*(5), 637.

Lam, P. T., & Mok, K. S. (2022). A study of growth barriers and mitigation measures for built environment innovative startups: the case of Hong Kong. *International Journal of Innovation Science*.

Larsen, M. S. S., Lindhard, S. M., Brunoe, T. D., Nielsen, K., & Larsen, J. K. (2019). Mass customization in the house building industry: Literature review and research directions. *Frontiers in Built Environment*, *5*, 115.

Latham, M. (1994), "*Constructing the team*", final report on joint review of procurement and contractual agreements in the UK construction industry, HMSO, London.

Lauridsen, J., Nannerup, N., & Skak, M. (2009). Geographic and dynamic heterogeneity of home ownership. *Journal of Housing and the Built Environment*, *24*(1), 1-17.

Lines, B. C., Kakarapalli, R., & Nguyen, P. H. (2022). Does best value procurement cost more than low-bid? A total project cost perspective. *International Journal of Construction Education and Research*, *18*(1), 85-100.

Luu, D. T., Ng, S. T., & Chen, S. E. (2005). Formulating procurement selection criteria through case-based reasoning approach. *Journal of computing in civil engineering*, *19*(3), 269-276.

Meng, X., & Brown, A. (2018). Innovation in construction firms of different sizes: drivers and strategies. *Engineering, construction and architectural management*.

Ministerie van Binnenlandse Zaken en Koninkrijksrelaties. (2023, 21 april). *Woondeals*. Home | Volkshuisvesting Nederland. https://www.volkshuisvestingnederland.nl/onderwerpen/woondeals

Munton, A. G. (1990). Job relocation, stress and the family. *Journal of Organizational behavior*, 401-406.

Netwerk Conceptueel Bouwen. (z.d.). *Over NCB*. Conceptueel Bouwen. Geraadpleegd op 19 januari 2023, van https://www.conceptueelbouwen.nl/netwerk

Pacheco-Torgal, F. (2017). High tech startup creation for energy efficient built environment. *Renewable and Sustainable Energy Reviews*, *71*, 618-629.

Partanen, J., Chetty, S.K., Rajala, A. (2014). Innovation types and network relationships. *Entrepreneurship: Theory & Practice,* 38, 1027–1055.

Perrenoud, A., Lines, B. C., Savicky, J., & Sullivan, K. T. (2017). Using best-value procurement to measure the impact of initial risk-management capability on qualitative construction performance. *Journal of Management in Engineering*, *33*(5), 1-8.

Phillips, B. & Kirchhoff, D. (1989), "Formation, growth and survival; small firm dynamics in the U.S. Economy", *Small Business Economics*, *1*(1) pp. 65-74.

Pil, F. K., & Holweg, M. (2003). Exploring scale: the advantages of thinking small. *MIT Sloan Management Review*, *44*(2), 33-39A.

Porter, M. E. (2008). The five competitive forces that shape strategy. *Harvard business review*, *86*(1), 25-40.

Porter, M.E. (1985), *Competitive Advantage: Creating and Sustaining Superior Performance*, The Free Press. New York, NY.

Raviv, A., Keinan, G., Abazon, Y. (1990). Moving as a stressful life event for adolescents. *Journal of Community Psychology*, *18*(2), 130-140.

Rungtusanatham, M. J., & Salvador, F. (2008). From mass production to mass customization: Hindrance factors, structural inertia, and transition hazard. *Production and Operations Management*, *17*(3), 385-396.

Schumpeter, J.A. (1934). *The Theory of Economic Development*, Harvard University Press, Cambridge, Mass.

Setiawan, H., Erdogan, B., & Ogunlana, S. O. (2015). Competitive aggressiveness of contractors: A study of Indonesia. *Procedia Engineering*, *125*, 68-74.

Spender, J.C., Corvello, V., Grimaldi, M., & Rippa, P. (2017). Startups and open innovation: A review of the literature. *European Journal of Innovation Management*, 20, 4–30.

Startup Commons. (n.d.). *What is A Startup*. Geraadpleegd op 18 januari 2023, van https://www.startupcommons.org/what-is-a-startup.html

Stuart, T.E., (2000). Interorganizational alliances and the performance of firms: A study of growth and innovation rates in a high-technology industry. *Strategic Management Journal*, 21, 791–811.

Swan Housing Association - Annual Report and Financial Statements 2020 - 2021. (2021). In *Swan.org.uk*. Geraadpleegd op 9 januari 2023, van https://www.swan.org.uk/corporate/key-business-Hoand-financial-information/

Tan, Y., Shen, L., & Langston, C. (2010). Contractors' competition strategies in bidding: Hong Kong study. *Journal of construction engineering and management*, *136*(10), 1069-1077.

Tim Clark. (2022, 5 december). *Housing association closes modular factories*. Construction News. Geraadpleegd op 9 januari 2023, van https://www.constructionnews.co.uk/tech/offsite-mmc/housing-association-closes-modular-factories-05-12-2022/

Volberda, H. W., Morgan, R. E., Reinmoeller, P., Hitt, M. A., Ireland, R. D., & Hoskisson, R. E. (2011). *Strategic management: Concepts and cases: Competitiveness and globalization*. Cengage Learning.

Volkshuisvesting en Ruimtelijke Ordening. (2022). *Nationale Woon- en Bouwagenda*. Ministerie van Binnenlandse Zaken en Koninkrijksrelaties. Geraadpleegd op 17 januari 2023, van https://www.volkshuisvestingnederland.nl/

VORM 6D Wonen. (z.d.). VORM. Geraadpleegd op 9 januari 2023, van https://vorm.nl/over-vorm/familie-van-bedrijven/vorm-6d-wonen

Wamelink, J. W. F., & Heintz, J. L. (2014). Innovating for integration: clients as drivers of industry improvement. *Construction innovation*, 149-164.

Wetzstein, S. (2017). The global urban housing affordability crisis. *Urban Studies*, *54*(14), 3159-3177.

WikiHouse. (z.d.). https://www.wikihouse.cc/

Winch, G. (1998), Zephyrs of Creative Destruction: Understanding the Management of Innovation in Construction, Building Research & Information, 26 (5): 268–79.

Wong, C. H., Holt, G. D., & Cooper, P. A. (2000). Lowest price or value? Investigation of UK construction clients' tender selection process. *Construction management and economics*, *18*(7), 767-774.

Wong, C. H., Holt, G. D., & Harris, P. (2001). Multi-criteria selection or lowest price? Investigation of UK construction clients' tender evaluation preferences. *Engineering, Construction and Architectural Management*.

Wuni, I. Y., & Shen, G. Q. (2020). Critical success factors for modular integrated construction projects: a review. *Building research & information*, *48*(7), 763-784.