Tampere University of Applied Sciences

Research and Development on Shipping Container Homes

Dedicated to the Finnish Market

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ABSTRACT

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Dedicated to the Finnish Market

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This dissertation aims to discover a market for shipping container homes in Finland and find competitive advantages in development, which can later be defined in practice. This research will show how this business opportunity is valuable to our commissioner's company. Main focus being on viability, seeking to find if there is a market in Finland, followed by will it be an upcoming trend in the next 5-10 years, and therefore what is the general perception of container homes from the chosen targeted audience.

Our findings will apply a developed and strategic conceptual framework to help readers understand how this body structure will work out. The outline was completed in four parts: primary research done by us, the authors. Secondly, the data gathered from a public survey. Thirdly interviews conducted with professionals in the field of construction, and finally, a conclusion drawn from these three segments. Additional focus will go towards alternative uses of containers, how future development will work in Finland, and financial stability estimations.

Our theoretical analysis backed by the public and experts indicates a possible market in Finland for container homes. By focusing on creating good quality models, innovating, and developing, there is a good chance to succeed with container homes in Finland.

Key words: shipping container housing, alternative living spaces, sustainability

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1 INTRODUCTION

1.1 Background

In the modern world there are new and lucrative ways of living where real estate has become a significant trend in the market. When it comes to housing there are almost unlimited choices when it comes to materials, sizes, and looks. You can live permanently in your own home or rent as you like. When we talk about shipping containers, they mainly get used for exporting and importing goods regularly before gathering dust or just sold off. Container homes are precisely how they sound like, ecological homes rebuilt and designed for the need of alternative ways of living (Hunter, 2017).

With the use of their ideal supported steel framework, containers supply a standard set of four sturdy walls, a floor, and a ceiling; and by cutting out a few windows and doors, it becomes a basic steady structure ready to insulate on, as well as transport. At the current time, they are usually only considered a loading space where goods are delivered either by trucks, trains, and mainly overseas. However, it takes roughly eight containers granting 130m2 to fully design a two-story home. (Hunter, 2017).

This thesis studies the applicability and requirement for container housing in cold areas, so the thesis will primarily focus on understanding the building habits and preferences in living in Finland. The increase in society and urbanization mainly is in large and developed cities. However, the demand for further development of innovative alternatives, where the insufficient availability of space is a significant restraint.

This is where the idea of container homes being the solution comes from. However, these steel structures do require proper good ventilation, mandatory heating, as well as a functional air conditioning system for an individual to live in one. Container homes have already seen much use in warmer regions, so this kind of business model is already established. However, Finland could be a prosperous region for a business model such as this due to the possibilities that container homes have.

1.2 Problem Statement

According to (Truman 2016), various factors determine the sustainable outlook of using shipping containers as modular housing in recent years. With any new development, container homes are viewed as challenging to work with due to their lack of space and simplistic design. However, the problem here consists of how to innovate them enough to be used as contemporary housing.

Some of the key focus points for these issues consist of:

1. Housing cost restraints.
2. High number of students without affordable housing.
3. Limited cost-efficient accommodation for commuting workforce.
4. The issue of having container homes in a colder climate.
5. Lack of knowledge and awareness in the market for modular housing.
6. Stockpiles of unused storage container space in shipyards.
7. Limitations of land in urban city environments causing obstacles.

By understanding the grounds for the thesis topic, it is clear to foresee which factors to consider before developing these homes in the future. This will reflect well on the public's perception and gain more interest in the openness of living in a more minimalistic and affordable housing environment.

Finland's possibility to adopt this approach stands together because it is already a very sustainable and nature preserving country that emphasizes itself as having an ecologically green country. This framework indicates that home architecture and container home designs remain the fastest-growing green construction trend (Truman 2016).

1.3 Objective of the Study

This thesis's primary objective is to understand how viable shipping containers can contribute to society as fully functional homes in the Finnish market. Secondary research will focus on the ideal target group of individuals willing to adopt these as livable

homes in the future. From there, estimate whether this will work out as a viable housing market solution towards a new contemporary housing trend. To achieve these outcomes, objectives for this study follow as:

1. Understand how shipping containers can contribute to society as alternative living spaces in Finland.
2. Find and determine comparisons between different modular housing types to show the benefits of how they have worked abroad.
3. Validate how viable container homes would be in Finland.
4. Figure out the benefits and drawbacks people already have regarding container housing in Finland. Therefore, revolve this concept around their needs to provide a quality standard of living.
5. Certify how socially acceptable people are towards container homes in general and influence the Finnish market.

1.4 Aim and Scope of Study

This research will aim to adapt shipping containers into smart mobile homes for the commuting workforce due to hotels always being full and targeting the younger generation like students who cannot afford a home right away after graduation with the added benefit of sustainability. It will explore the possibilities of low-cost housing and venture into how they will contribute to society.

This study aims first to understand the necessary concerns with container housing already in the market. Then, researching how competitors have succeeded around this concept when utilizing alternative housing in other respectful markets. Lastly, how will container homes affect the low-income and middle-class citizens who are majorly affected by student loans and a lesser chance to purchase property at a younger age.

This study will be sent an online questionnaire to the public, which will revolve around their perceptions, dream home, concerns, and feedback when considering container housing for themselves. Moreover, another sample of data will be collected from construction professionals to grant a deeper understanding of the whole topic at hand.

1.5 Thesis Purpose

This thesis's purpose came from our commissioner, Lee Hills, who suggested the idea of building houses out of shipping containers and wondering how it would work in Finland. Due to not having enough time on his hands to investigate it properly, we decided to make it our thesis topic and find the answers required to find a reliable solution.

1.6 Concepts and Theory

Architects continue to create residences of various forms and sizes using these large segments. Builders can create high-quality, sustainable, and affordable housing by utilizing shipping containers. These designs are ideal for environmentally sustainable living spaces because they use recycled containers to save metal resources. The intended outcome for this study is to find out the gap in this body of knowledge and combine our proposed angle we wish to take.

Becoming a shipping container homeowner will allow the buyer to simplify everything about the building and design process. This could mean the house will have a much faster road to moving-in than the traditional homemade structure made from bricks and concrete. As time goes on, it will offer a sense of security by having a steel structure and no permanent foundations. It can be moved around the land freely, even in remote area landmasses, which could have terrible weather conditions.

As for Finland, many homes are made from wood when referring to cottages or cabins by a lake during the summer, and everyday individuals might like to take their home with them which could be good opening to invest in making cottages out of them (Info Finland, 2020). As a new frontier in the construction industry, “building with an unfamiliar resource can be pretty risky during the creative development process (Curtis, 2020)”. However, with the correct planning, alterations to the design of the container, it could potentially become an excellent investment to the homeowner (Curtis, 2020).

The term "Cargotecture" refers to the process of reusing storage containers to create houses, and because of its heavy metal and aluminum structure (Discover Containers,

2020), shipping containers can create an almost indestructible house. Since they are accessible and inexpensive to purchase, are already made to endure the rough sea weather conditions, containers can keep housing costs down. Although the houses constructed are far from elaborately decorated, containers can provide the basis for a sleek, modern home that keeps costs down and reduces environmental impact (Curtis, 2020).

1.7 Research Plan

This plan will sequentially cover all the sections of the thesis with a variety of different angles in the container house market. We will start with understanding how the housing market is standing right now and where Finland is with knowledge of container houses already. From there, start analyzing and comparing container homes with their competition. Next, we will look into alternative uses of what other structures could be more suitable for Finland as a secondary action.

We will cover the viability of container homes and what issues lie between Finland and make it possible and provide cost estimations with a financial analysis. In terms of secondary research, focus will go into future development in Finland and, by doing so, construct a survey for the general public to fill out, which covers perceptions, purchase motivations, and willingness to adapt and live in tiny alternative housing. Aside from that, we will conduct interviews with chosen professionals for this field of study. Lastly, wrap up with a discussion and conclusion for the topic and keep the commissioner's recommendations.

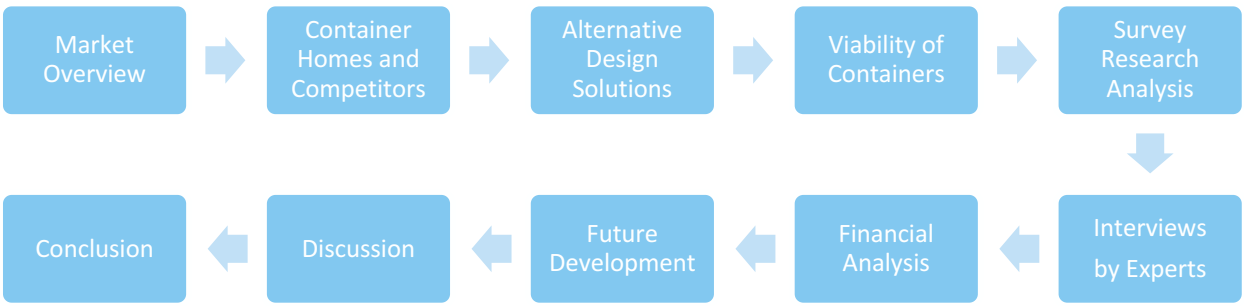


FIGURE 1: Thesis Planning Process

2 FINNISH HOUSING MARKET OVERVIEW

2.1 Chapter Introduction

Container homes have already made their first entrance to the Finnish market. According to OP Media, the first permanent container home in Finland was made in 2017 (OP Media, 2017). There have also been multiple other house projects that have featured containers in Finland (Kotiliesi, 2016) (Ilta-Sanomat, 2016). It is hard to say how many container homes there actually are in Finland, but after doing some investigating online, it is safe to say that the amount is in the range of tens. A short Google investigation also shows that the number of companies that advertise either making or being able to deliver container homes is less than ten.

2.2 Finnish Housing Statistics

The main segment for container homes would most likely be students. Every year thousands of students are queuing for single apartments in the largest cities in Finland, with for example HOAS in Helsinki getting over 4000 applications in 2020 and TOAS in Tampere getting over 3000 (YLE, 2020). The same situation is also in every other city in Finland that has multiple universities and other schools. Each of the student housing companies gets thousands of applications each year with growing numbers.

The second main target segment for container homes is young people looking to buy their first homes. According to an article from YLE, young people are having a hard time buying their first apartments due to investors having too many advantages (YLE, 2020). In the article they mention that new apartments are increasingly expensive and many young looking to be homeowners do not have enough money to compete with investors. Also, in the article it is mentioned, that young people are looking for cheap and small apartments that are sustainable and in good locations.

According to the Finnish Tilastokeskus, which is the organization that governs different statistics in Finland, half of the people living in Finland are living in houses that have

been built after 1980's (Tilastokeskus, 2019). These older houses are due for all kinds of renovations in the future and a lot of potential customers have to start looking for new apartments. This could open new business opportunities for temporary and permanent housing.

They also show that building of new houses is concentrated in the Uusimaa region with 35% of new buildings being built there. The second fastest growing region is Pirkanmaa with roughly 12% of the buildings being built there.

Tilastokeskus also shows that the amount of people living alone almost 1.2 million, which is roughly 44% of the Finnish population. This number is also growing each year, and the amount of people living alone in 2018 compared to the year before grew by 2,5%, so the demand for single apartments is the highest.

2.3 Competition in Finnish Market

The biggest construction companies in Finland are YIT Oyj with a turnover of 1.9 billion euros, SRV Yhtiöt Oyj with a turnover of 1.1 billion euros and Lujatalo Oy with a turnover of 544 million euros (Largest Companies, 2020). However, all these companies are indirect competition since they focus on infrastructure and apartment complexes.

According to Suomirakentaa.fi, the three largest house builders in Finland are Kastelli-talot, Jukkatalo and Kontio (Suomi Rakentaa, 2019). These companies focus on building single houses from wood and glass. These are the main competition for container homes, but there are massive differences in material and prices involved.

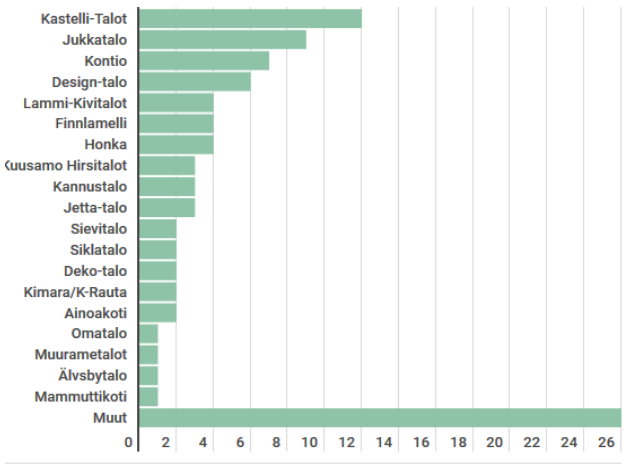


FIGURE 2: Percentage (%) Share of Built Houses in Finland 2019

3 CONTAINER HOMES VS THE ALTERNATIVES

3.1 Introduction to Alternative Housing

Houses are constructed in a wide range of configurations, be they the conventional construction of the house, using old school bricks and mortar, or, ideally, using wood as the main structure, especially in Finland (Info Finland, 2020). However, over the last decade, like-minded individuals have been committed to seeking more creative ways to live and develop pathways to make homes as sustainable as possible (Blue Osa, 2016). This report will explore various solutions to lasting changes that support alternative housing materials in the construction field by concentrating on these alternative ways of living.

PICTURE 1: Shipping Container Home Example, 40" (Cocoon Modules, 2019)

Housing has impacted the society due to its advanced technologies and population growth is on the rise every day (Oaks, 2014). Innovation has become a much higher industry phenomenon due to the ever-growing problem that housing prices are through the roof in value compared to what they were 20 years ago (Fogler, 2020).

As people become more aware of this growth, others rely solely on simple housing structures and affordability, such as Tiny Homes, Kit Homes, Huf Haus, and Parakki Houses. There are many others, but we are currently focusing on these well-known living spaces in the European market.

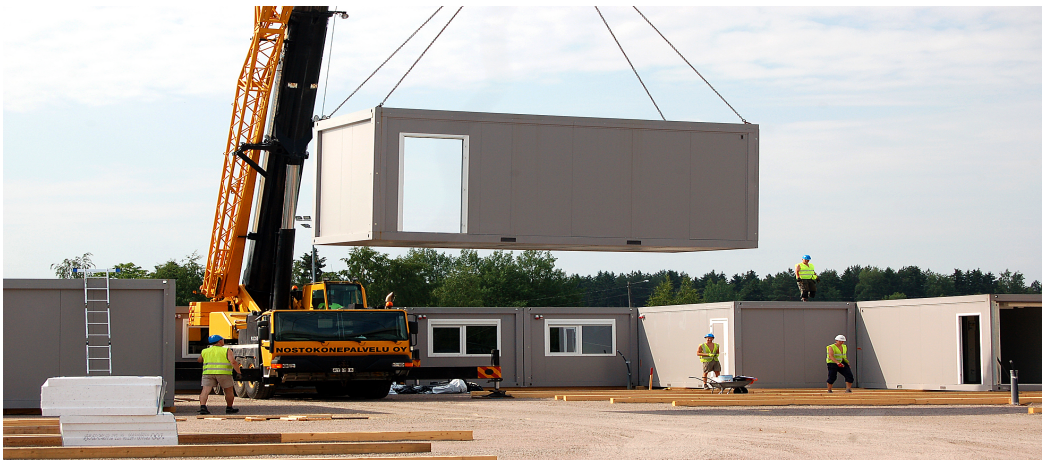
To understand the pros and cons of container houses, we will analyse the most popular alternative housing styles in use. This solution will provide how helpful each housing model will appear to the public eye and show how valued and easy it would be to use containers instead of alternative housing solutions.

3.2 The Chosen Alternatives

The alternative buildings we chose to compare are the most popular ones used in Europe. The Parakki buildings have been in use for roughly a hundred years in Finland; the same goes for kit houses worldwide. For comparison, we also chose Huf Hauses, which are growing in popularity in Germany. Lastly, we will also talk about pros and cons of traditional housing.

3.2.1 Parakki Buildings

The main difference between Parakki buildings and container buildings is that Parakki buildings are tailor-made for the occasion. They look similar and function similarly, but container buildings start as containers and then turned into livable buildings, unlike Parakki buildings. The term Parakki building is very shallow and can also mean a building made from a container. Usually, these Parakki buildings are relatively similar with container homes, although living long-term is not usually recommended or used as conventional houses.



PICTURE 2: Parakki Usage on the Construction Site (Akaanseutu.fi, 2013)

During the past few years, Parakki-schools have been the most common replacement when schools have gone under renovation. Parakki buildings are also most commonly used at construction sites for temporary sleeping areas, kitchen areas and toilets. This alternative is a more costly way of building a house, but it is more flexible since they are tailor-made for the situation. Function wise they are remarkably similar to container buildings. Using an old Parakki building as a foundation could work wonders when building an alternative house.

According to Hämeen Sanomat (Hämeen Sanomat, 2018), the main issues with Parakki buildings are that they are cold, ugly, cramped, and have no soundproofing. It seems that these problems could be solved but are not due to the buildings' temporary use. Parakki buildings are not direct competition to container homes since Parakki buildings are not intended for permanent use.

3.2.2 Kit Houses

Kit houses are a type of housing where the buyer orders a kit that contains all the instructions and materials to build a particular type of a house fast and easy. According to Kitome, an Australian company that makes Kit houses, the first kit homes were built as early as 1830 but became popular after World War 1, especially in America (Kitome, 2011). These kit home frames are made from either steel or timber, depending on the buyer's needs and requirements.

PICTURE 3: Kit Home (Imagine Kit Homes, 2018)

Kit homes are a cheaper alternative to traditional housing, mainly due to reduced labor costs. Most of the work is done in factories that have perfected the making of kit houses. According to Kitome, the prices of kit homes will vary on the type of home chosen, what is and what is not included in the package, and how much work you do by yourself (Kitome, 2019).

Another company Anchor Homes summarizes Kit houses as: "*Kit homes can appear the more economical option, but they require a substantial investment in time and effort from the owner to see the project through to completion. Modular homes provide plenty of flexibility in design and the time benefits of off-site construction methods. Also, they provide peace of mind to the owner that the project will be completed to a high standard, within budget every time* (Anchor Homes, 2015)*."* The benefits of choosing a Kit home are great, but they do lack on certain aspects. Kit homes are a direct competitor to container homes.

3.2.3 Huf Haus

When it comes to modular housing, people tend to think that a house is primarily just made up of numerous pieces in a factory and delivered to the client on-site. However, Peter Huf, CEO of Huf Haus, discusses how his company has accumulated innovation for the past 105 years to get to the stage where they are today (Huf, 2019). Initially, the idea of modular housing was invented by Huf's grandfather but was passed onto him later on. His TED video on *How HUF HAUS has Invented the Modular House* explains how many people underestimate the way modular housing compares to traditional housing (Huf, 2019). However, in 1972 they had a breakthrough, meeting several architects who were ahead of themselves, and one day, they decided the post and beam framing was so loved that they decided that it was their future and focus.

The vision of HUF Haus came around to focus on this traditional element being post and beam, not looking into market research but just choosing that one resource and concluded that this is what houses should look like: primarily to be made of glass and lots of timber. They took traditional craftsmanship and made it into high tech precision with its impressive innovation of design (Huf, 2019).

According to the company (Huf-Haus, 2020), every Huf Haus is different and does not use the “traditional plan," as is fitting to an architecturally designed home. Although these types of houses are more expensive than alternative modular design because they specialize in top quality research and are committed to supplying their consumers with high quality products, and in addition to making the carbon efficiency a lot lower.

PICTURE 4: Huf Haus (Huf-Haus, 2020)

Relatively speaking, the desires of clients are considered in a design that takes the location and meaning of the site into account. That is why the teamwork begins with the consultation and preparation process at the beginning. It proceeds through engineering, processing, assembly, and equipment preparation. Each task is worked on together with a team of specialists who each have their own additional qualities. Once the walls and door frames are assembled, they are stored away in the factory ready to be delivered once all parts have been created, designed, and produced (Huf, 2019).

By understanding the backstory of what HUF HAUS does, we wanted to look at the advantages of what they offer. In constructing energy efficiencies of modern timber frame homes, HUF HAUS has selected a strategy that guarantees exceptionally low energy usage by using large glass surfaces and timber frames (Huf-Haus, 2020). In comparison with container homes, HUF HAUS first builds its structural parts in warehouses and then ship all the parts to their client on-site for installation and assembly. Any waste that comes back goes directly towards heating their factories for the means of being economical and supporting their circular sustainable aims.

As for container houses, they are usually delivered on-site and then transformed into a house once the land is chosen. They can also be constructed in factories and transported to the entire site, but the benefit is that either way can be decided, and with HUF HAUS; they require premade solutions to avoid water damage on site during the process and container being waterproof and equipped with a roof first-hand. In conclusion, Huf Haus is a German company specializing in alternative housing structures. Their houses mainly consist of beams of wood and glass. In comparison with shipping containers, they are made from steel and hold an essential structure for housing and weather-resistant conditions; they are also accessible for mobility and can already be renovated on-site with the correct building permits and licenses. Huf-Hauses and alike are a direct competitor to container homes.

3.2.4 Traditional Houses

When making comparisons between container homes and traditional housing, there are a few vital main differences that help build someone's own modular, inexpensive home. It takes much time to figure out all the financials, get the permits for land and the materials needed for assembly (Holmes, 2020). Most importantly, the construction process takes significantly longer. When looking into modular homes such as containers, this accessible design model comes with the basic structure. This large metal box, which is equipped with four strong, stable walls, a durable, robust roof, and an evenly leveled out floor with the option of cutting out a few windows and doors, it is already a solid start for one day's work when building these living spaces.

PICTURE 5: Traditional Finnish House (Visit Finland, 2020)

Factories from around the world already build modular homes in workshops as segments (Modular Building, 2020), so when transported, shipped, and arrive on-site within an estimated delivery, they are ready for adding utilities like plumbing and electricity. With the use of multiple containers, they can be renovated and welded together rather easily when assembled correctly with the right instructions and support of the supplier's workers. In the long run, they are more cost ineffective and less viable for mobility due to it being a permanent structure when compared to a container home, although beneficial architecturally speaking during the design process and they are more flexible with for planning out land utilities in advance. Traditional housing is a direct competitor to container homes.

3.3 Container Houses Vs. Alternatives: Conclusion

Container homes are by far the fastest to build compared to the other alternatives. The most straightforward assembly of a container house to completion can be completed from a few days to a few weeks. A container home can also be delivered readymade to their targeted location. However, shipping container homes are subject to delays due to building regulations in certain areas because of the permits and land requirements for future development. Although, container homes are still faster in building productivity since other more complex houses will generally take a few months to a year, depending on budget and workforce.

3.3.1 Comparison to Parakki Buildings

While it is true that Parakki buildings are not meant for long term living, neither are containers as they are built. While someone could argue that an old Parakki building can be easier to turn into a livable home, they still lack space, heating, and soundproofing. All in all, there are very few arguments to be made when comparing these two. Both require a lot of work to be made into permanent homes, but with the right knowledge and know-how, they subsequently can be used as alternative living spaces for the right purposes in the construction field.

3.3.2 Comparison to Kit Houses

Kit houses are so far one of the greatest solutions when a customer wants a fast but traditional option for living. Generally, kit homes are delivered in average a months' time and can be assembled as fast as 8-weeks depending on how much you spend on workforce. (Kitome, 2019) With a lot of parts that go into a kit-home there will be manufacturing costs and building costs. While the costs are not as massive as they would be in a traditional house, they are still more than what can be expected from a container house.

3.3.3 Comparison to Huf Hauses

Huf Hauses are not really in the same playing field as container homes are. The only thing they have in common is metal as a material. Huf Hauses are generally expensive and take approximately a year in planning and making. They are made mainly from glass and timber and are sustainable and incredibly beautiful. When looking at Huf Hauses one can only draw inspiration from them.

3.4 The Benefits of Container Homes

Now that we have made comparisons to the traditional and alternative housing options, it is time to look at the benefits a container home will have against other options. The most significant factors that make containers shine against their opposition are cost and speed. A container home can be delivered ready to live in, and various adjustments can be completed quickly. A used container will also be cheap compared to, for example, the Parakki buildings. Even if someone gets a container and starts building from scratch, they can easily cut out windows, insulate the container and have a solid base for a house. Containers are generally also already weatherproof since they must endure the weather and climate of the seas.

4 ALTERNATIVES USES OF A CONTAINER

4.1 Chapter Introduction

The process and design of a shipping container can commonly be used as a building foundation, which has become a growing trend in the market for sustainability. The containers' internal strength constitutes to a secure space of 30 square meters for anyone to use as their office or business space – or even as their home. These low costing containers can influence living, economical, and transportable structures, making the conventional way of living much easier than traditional. Although this thesis revolves mostly around the implementation of container homes for the Finnish market, it would be useful to envision which other types of structures can be made.

4.2 Schools & Universities

When it comes to education, the traditional construction of a school can be rather costly in the building process and time-consuming. However, there have been temporary classrooms made from containers to withstand renovation work to the main buildings (Smith, 2020). In previous construction developments, shipping containers have proved relatively successful already in the world as alternative educational facilities. They would provide an excellent solution for permanent facilities because of the easy implementation of adding additional windows, doors, air conditioning, heating, and other features.

4.3 Student Housing Facilities

One core idea mentioned previously for this thesis and the ideology of containers would be to build more student accommodations in Finland. According to a YLE, students require more housing options due to high demand, meaning that every student would not get their student apartment right away when leading up to when their studies starting date (YLE, 2020). Having permanent or temporary student apartments made

from containers would provide universities and any other educational institutions a reliable way of having their students nearby.

4.4 Temporary Businesses

Acknowledging that shipping containers are just building blocks; any type of business or office can be made from them. If someone cannot find a premise to rent, they could innovate and design a container's interior to their liking and transform it into a temporary structure for special events or even as a pop-up stall. A key factor for adopting them would also include that they are transportable, which provides mobility and a more flexible range on their location throughout the year, without the whole process of breaking down and setting up their stall time and time again during live events.

4.5 Houses and Hotels

One of the most common and well-developed trends is housing and accommodation. Over the past decade, companies like Airbnb and hotels aim their business to rent out their homes and residencies to the public for a fee. A business in the real estate market is one of the most successful ways to make money nowadays (Adams, 2013). When an opportunity arises, that container could be the next thing trending in upcoming years. The fact that containers are highly functional and secure assures there is a profit when building them for a fraction of the cost compared to traditional buildings. This result will also grant the ability to reduce the Finnish market's environmental footprint as it is a very green country overall. Also, Temporary housing is a highly valued way of supplying students with enough space to live affordably near their universities.

4.6 Restaurants and Cafes

According to (BoxmanStudios, 2019), shipping containers are another leading trend revolving around the restaurant and café businesses. Business owners are starting to

notice that they are a perfect solution for their restaurants/pop-up food stands due to the size and mobility options. By opting to accommodate a company inside a modular unit, the owner can build quicker while equipping themselves with a sleek, comfortable, and completely personalized facility, adding no high costs and keeping their structure safe and secure.

4.7 Vacation Homes and Cottages

There has always been a market and demand for owning a vacation home or cottage in Finland. If converting shipping containers into summer cottages in Finland, or even vacation homes, would attract people a lot more, knowing that they could have the perfect living space that was efficient and easy to move. Finns are not as invested in having fancy second homes; they are mostly looking for a place to relax, somewhere peaceful and quiet for an occasional get away from their lives. Container cottages would be an ideal factor to boost the likelihood of someone being able to afford their cottage and solve matters of changing land if they wish due to a container's mobility and simple nature.

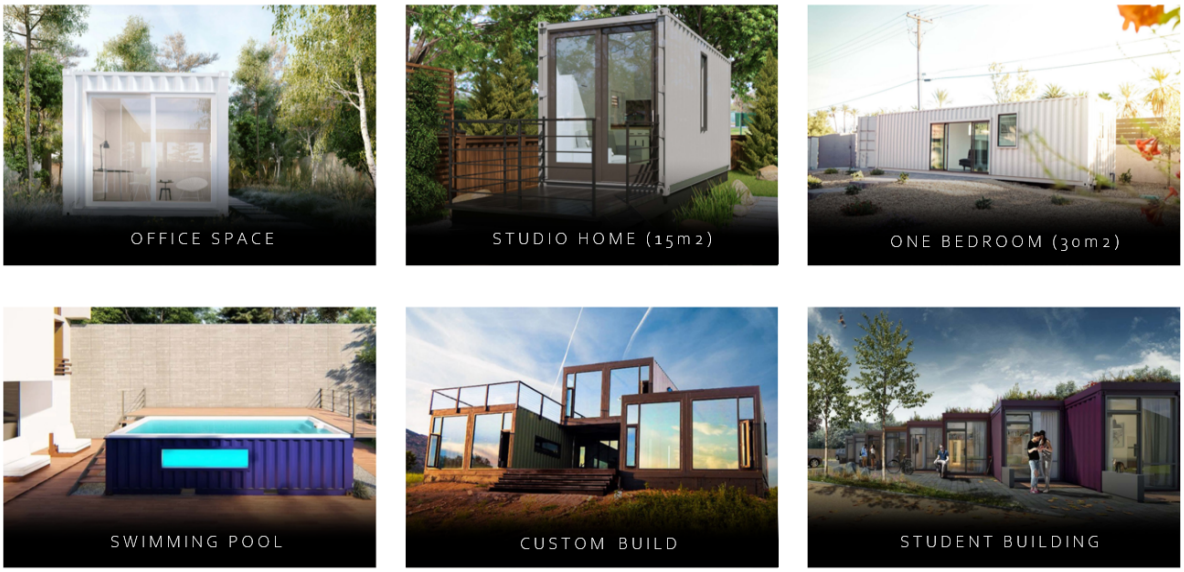
4.8 Workshops, Studio Spaces and Office Space

When it comes to studio space and privacy, individuals might look into the fact that they can't afford their own office space but would like somewhere peaceful to smoothly and consistently get on with their work. With the use of shipping containers, artists and workforce employees could utilize these structures and implement them into their own personalized office space with their design in mind.

This solution would present a person their own office while working remotely in their back garden. Due to a company's own office space, the space required for an individual may be too tight or loud within the working environment, so this availability would work to ensure workflow and a peaceful place to think and work. A container structure also provides you could go off-grid and even stack them onto each other (Discover Containers, 2019).

4.9 Summary

The range of opportunities with cargotecture spreads out across many different buildings, varying between a simple house to hotels and even shopping malls (Cargotecture, 2020). When it comes to a designer's perspective, they can take a regular container and target someone with a specific idea in mind. Container homes may not look like much compared to traditional housing; however, the advantages of them already being resourceful and reliable steel structures, the builder could potentially go different ways with them. In conclusion, there are plenty of ways to innovate the world when building businesses and homes. The container may surprise when someone builds with it, but their solutions present unlimited ideas.



PICTURE 6: Alternative Container Options. [Modified] (Alternative Living Spaces, 2020)

5 VIABILITY

5.1 Chapter Introduction

In this chapter we will investigate the viability of a container house in the Nordic climate. We already know that the main issue with using a container as a house in the colder regions will be insulation since metal is a good conductor of heat, but the question in this chapter is what other weaknesses and strengths containers have. At this stage it is also beneficial for us to understand any apposing threats and opportunities that may stand in our way or open new gateways for design. Construction and innovation alike, could grant us new profound solutions of how to visualize this whole concept as simple and subjectively as remotely possible. With the focus being on cargotecture, we feel the conclusion of this chapter will grant us the answers we require if when finding a potential market for these container homes in Finland.

5.2 SWOT Analysis

To understand the viability of a container house we decided on a SWOT-Analysis on Container Houses. This analysis should give us valuable insight on how viable exactly it will be to build container houses in the Finnish market. The SWOT analysis is a four-field model designed to map internal strengths and weaknesses, as well as external opportunities and threats. SWOT is often used to analyze a business, but it is also used to identify learning or evaluate potential problems.

5.2.1 Strengths

In the community website Discover Containers, people with experiences in container housing have listed their top qualities of container homes. They are affordability, sustainability, strength, uniqueness, and flexibility (Discover Containers, 2019).

A container is a solid foundation to start building from since it already has walls, a floor and a roof. With little work you can easily cut out windows or other necessary parts like holes for HVAC systems. Containers are also strong and weather resistant so they will endure harsher conditions more easily. Having the possibility to stack containers on top of another is also a great benefit and it opens up a lot of possibilities when making a container home.

Buying a used container is cheap and they are quite readily available. Usually, containers have the problem that once they are transported to their destinations they often are then without purpose if there is nothing to be transported back to the place of origin. This is also why using containers are very eco-friendly since they are put into good use after being used for their main purpose. Containers can be transported easily since it they are already in the standardized size to fit boats, trains, or trucks.

However, the storage system is incredibly secure and requires a blow torch or substantial equipment to break into them, which makes it more substantially secure when owning a container-built cottage at the consumer's countryside when not in use – besides, they are too heavy to carry on a truck if it is attached to utilities as well if taken off the ground.

5.2.2 Weaknesses

Container houses impose a large investment on HVAC systems, which are air conditioning systems with the built-in mechanics. These systems focus on providing better air quality, thereby warming and cooling down the inner structure of the container in remarkably warmer or cooler countries. On top of that, these systematic container homes require good insulation that will keep the cold out during cooler seasons, especially in consideration with Finnish market.

Even with all the hype of this new development of housing alternatives, it is tough to do and costly to transport long distances. It is much more convenient and much easier to get them if you live close to a major port city such as Turku or Helsinki and have a large truck and trailer. “*The price for a shipping container of 20" can range from EUR*

2500 to EUR 4000 (excluding the delivery). You will design a house with the same amount of square feet, even as it is reliable and structurally stable. Using conventional construction techniques for less than the expense of a shipping container - It does not weigh as much (HyBrid Architecture, 2011)".

It will also be difficult to find containers suitable for being turned into housing. This is mainly because it is hard to define what the containers have been used for beforehand in transportation. Especially if they were used to ship chemicals or barrels of unknown resources and will for sure need the correct paintjobs and nontoxic primers. In addition, it will be hard to find an experienced contractor since containers are not typically used as a building material yet. And lastly, the controversial appearance may be a factor when individuals are not used to this look.

5.2.3 Opportunities

There is already a market for housing that can be easily transported and set up. There is a lack of housing units in developing countries. "*The idea of living in a shipping container might strike some as odd – unfeasible, impractical, and maybe even a little unappealing. However, it is essential to think of shipping containers not as finished products, but as raw materials – as exoskeletons for future homes"* (Open Access Government, 2019). In other countries that have tested this model, there is an upsurge in demand for new construction, showing growth in population and rapid urbanization. Also, they offer beautiful temporary housing too. At the current rate of the housing market, there lies vast opportunity with this concept.

Whenever possible during mobility, it is best to rent or have a tilted roll-off truck so the container can easily slide off. Simultaneously, the truck drives slowly forward rather than revert to having to use a small crane or a large forklift to move and position the containers accurately on the land. A 20ft shipping container weighs roughly around 5000 lbs. / 2267 kg.

The significant advantage and opportunity of using a container is the new green phrase "Adaptive Reuse" created in different countries due to the trade deficits with

the rest of the world. This concept would mean taking these containers away from wasted space in shipyards and providing ecological homes grants significant advantages and solves both housing and unwanted storage boxes in Finnish ports.

5.2.4 Threats

Regarding possible threats in a container's lifecycle, it is useful to assume that corrosion in homes constructed using old containers might lead to a fast degradation since the weather can significantly affect the building's exterior architecture. Old containers might not be as level and would need additional work to fulfill these usable materials for a building to be constructed correctly. There is also some confusion with building codes and permits when it comes to alternative housing, especially with getting a housing loan from a bank. In retrospect, many things will be up to interpretation during the whole process.

There is a risk that a container's usage would have transported dangerous material/chemicals, which poses a risk to the inhabitants. To avoid issues, there needs to be intensive testing on the container to decide whether it is suitable to be used as a part of a building. There can be workarounds against this kind of damage with a thorough cleanse of the container beforehand.

Rust is the only natural threat to a container; therefore, it is better to use suitable equipment and safe solvents to guarantee the paint job's safety. In relevance to heat, though, these metal containers become ovens or freezers depending on the outside temperature, so having excellent insulation and ventilation is a definite must and air circulation, especially in Finland.

5.3 Summarized Analysis

After doing the SWOT analysis we can see that container homes are not filled with only opportunities and strengths. While the upsides are great and the downsides are mainly things that are also required in regular housing like the insulation and need for HVAC systems, there are still underlying threats and weaknesses.

When you want to build from containers you have to invest time and resources on getting a container that either has a clear history of use, is completely new or one that you clean and test thoroughly. Otherwise, being aware of all the necessary laws and permits is also required.

Luckily, there are huge opportunities in the fact that container homes are easily movable and fast to setup. Container homes will also attract people due to their uniqueness, sustainability, and other features. It is important to take the full advantage of the features that a container home has and to improve them further.

6 SURVEY ANALYSIS & RESEARCH DATA

6.1 Objectives

In addition to consulting the professionals in the construction industry regarding the opportunities provided by containers, a survey was undertaken to gain knowledge of the awareness of the public in terms of containers. The survey aimed to further understand the perception people have over container houses, what their main concerns are and how likely the Finnish market is to adopt the idea of containers as an option for accommodation. Lastly, the survey seeks to define the demographics of the potential target market for container homes and what their idea of a dream home is like.

The following sections will provide a summary of the methodology used in the survey as well as its key findings. The findings of this survey can be considered generally applicable to the target audience. However, the findings can be limited to usual differences in interpretation due to the nature of the survey being opinion based.

6.2 Data Collection & Sample Design

Google Forms was used to distribute the survey online, to which 100 participants aged 19-55 living in Finland responded. This resulted in a random sample to maximize the generalization of the results. However, the respondents were heavily concentrated in the Pirkanmaa region of Finland, which is limiting the reliability of the results to a wider geographical area. In addition, out of the 100 respondents only 62 respondents aged 19-34 were included in the sample as they best seemed the most suitable to represent the target market in terms of their demographics.

6.3 The Survey

The data was collected through a survey of giving respondents approximately 5 minutes at length to fill it out. The details of the survey with its full questions and findings can be found in Appendix B.

The survey consists of 19 questions aimed to assess the following areas:

- Awareness and concerns regarding container houses.
- The market's attitude towards container housing.
- The market's priorities in terms of a dream house and requirements for their standard of living.
- The chances of container housing fulfilling these requirements.

6.4 Key Findings

6.4.1 Public Awareness & Respondents Knowledge of Container Housing

The findings reveal that the awareness of container houses is high, as only one respondent out of 100 reported not to have seen one before. Amongst the respondents, containers have been most commonly seen as restaurants and bars as well as break rooms at construction sites. Significantly less respondents had seen containers functioning as other facilities. Overall, containers were found to be a common sight in the public eye especially understanding all respondents were found in Finland.

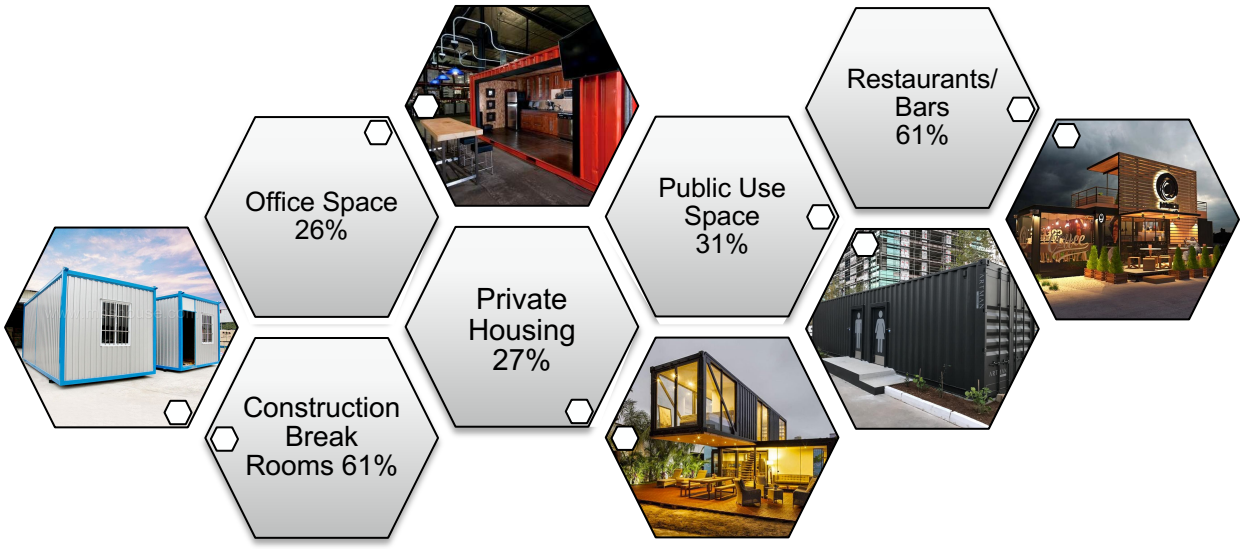


FIGURE 3: Respondents Acknowledgement of Container Housing

However, when the respondents were asked what would prevent them from purchasing a container home, the concern above all others was the lack of space. This demonstrates the misconception the public has over the functioning of container homes. Indeed, one standard container does have a mere 30m2 of living space, but it should not be forgotten that containers can be stacked and made into larger complexes. This finding could be considered a positive, as it can easily be overridden by further informing the target market about the countless possibilities of containers for possible expansion or in multiple stories. The second most significant concern amongst the respondents was the lack of information, which is also positive for the purpose of this research as it can be outweighed by educating the target market. Many respondents were also concerned about where to locate the container house in urban areas, as space in the cities is limited and restrictions do apply. The remaining preventing factors shown in the graph below were not widely represented, and therefore cannot be generalized.

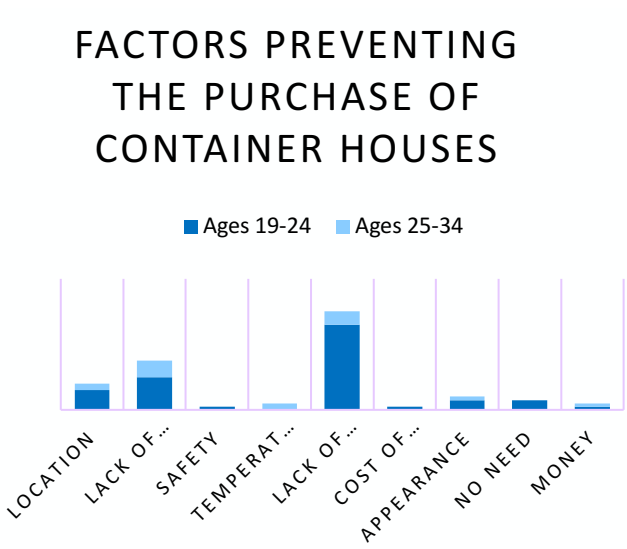


FIGURE 4: Concerns with Container Homes

6.4.2 Future Target Market & Living Demographics

Based on the findings of the survey, two consumer profiles were created. Both profiles represent a certain group of people sharing the same characteristics. Consumer 1 is a student aged between 19 and 24, who's current housing type is rental. Consumer 2 then again is an employee aged between 25 and 34, but who's current housing type is also rental. Both consumers would ideally want to reside in the Pirkanmaa region of Finland and are willing to invest between 150,000€ and 200,000€ in their next house. The most significant difference between the two consumers is that the employed respondents wish to purchase a house within the next 2-4 years, whereas the student wishes to wait at least 5 more years before purchasing a house. Shown in Figure 5.

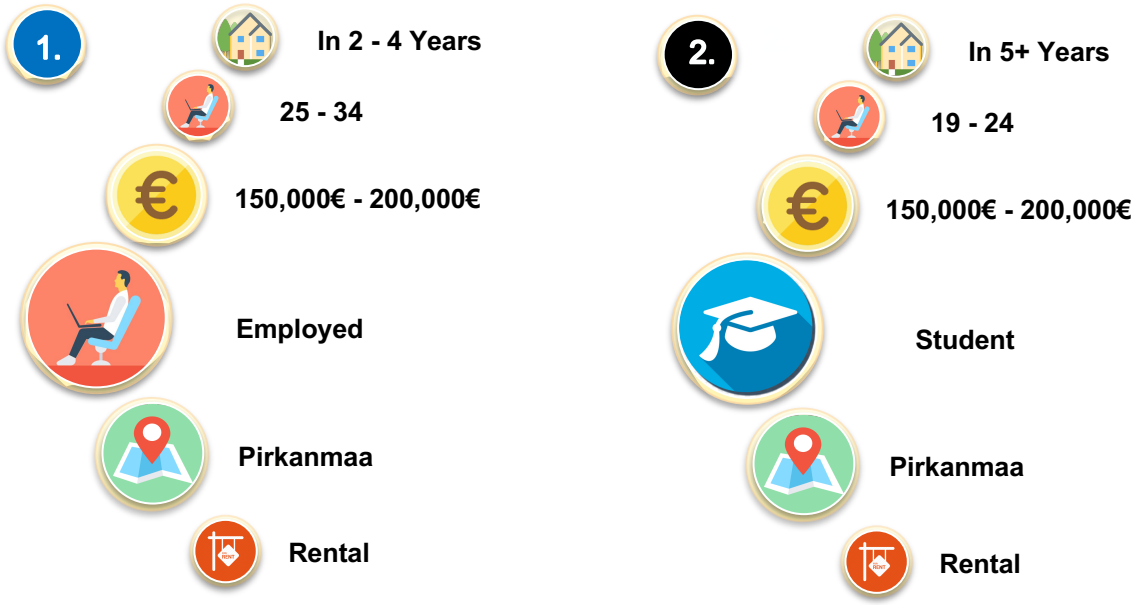


FIGURE 5: Consumer Profiles

6.4.3 Attributes Defining the Target Market's Ideal Housing

The findings revealed some of the most important attributes to the target market in regard to their dream home. The respondents had various different attributes to choose from in the survey – the top 5 attributes are shown below in Figure 6. Appearance and safety were ranked as the most important attributes at the same level of importance, while space came in second.

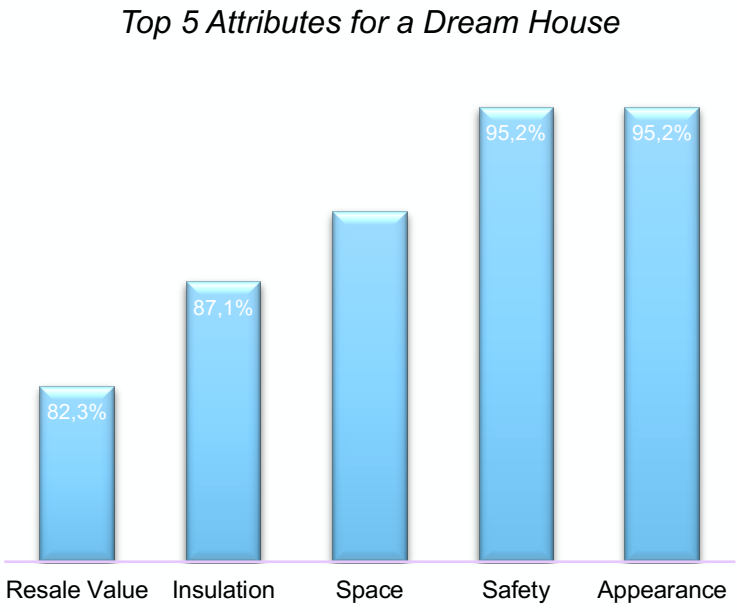


FIGURE 6: Top Attributes for a Dream Home

When it comes to materials used to build their dream home, the respondents unanimously ranked wood, glass, and stone as their most preferred materials. Wood came in first with 90,3% of the respondents choosing it over the others, however, container houses are primarily made out of steel. Favorably, the future market's customers reported to be willing to spend anything between 150,000€ and 200,000€ on their next house. A high-end container house can be made with not more than approximately 50,000€, leaving the customers plenty of room in the budget to use their desired materials in the exterior and interior design according to their liking. Appearance was one of the two most important attributes for the respondents, making container houses an ideal option for them due to its affordability.

FIGURE 7: Material Preference

6.4.4 The Public's Attitudes Towards Adopting Container Housing

One of the main goals of the survey was to determine whether or not people are willing to live in a container home and what the future of container housing looks like based on the perception of the public. The trends shown in the following charts are promising, as it seems like the target market has an open mind when it comes to the adoption of container houses. The respondents opposing the adoption of container housing only make up 21% total of the sample, whereas 29% feel neutral towards it. The rest 50% consists of respondents supporting the idea of containers providing accommodation on a wider scale in the near future. There was, however, a significant trend in the portion of younger respondents making up the pool of those who supported the idea, whereas the opposing side was more dominated by the older respondents.

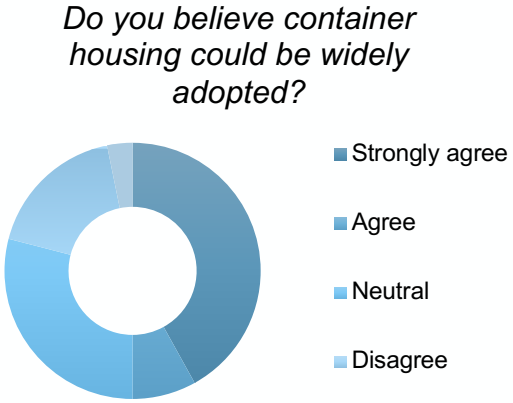


FIGURE 8: Adoption of Container Homes

In addition, the respondents were asked whether or not they would be interested in spending a night or two in a container home if given the chance. Only 2% of the respondents said no,16% said maybe and a promising 82% were up for it. These statistics provide an optimistic baseline for the future of container houses in the Finnish market.

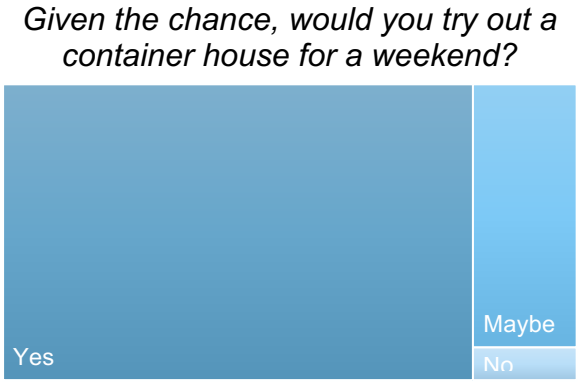


FIGURE 9: Willing to Test before Buying

Lastly, the survey measured the level of interest in purchasing a container house for full-time living as well as a vacation house, for example in the form of a summer house instead of traditional cabins. The findings showed mediocre level interest overall, with most respondents' answers concentrating in the neutral-interested spectrum. The findings showed relatively low levels of high interest in adopting container houses for both full-time living and recreational purposes. However, the findings showed higher level of interest in general in purchasing container houses for recreational purposes. For example, when looking at the differences in the opposing side, the level is significantly higher for full-time housing in comparison to that of recreational housing.

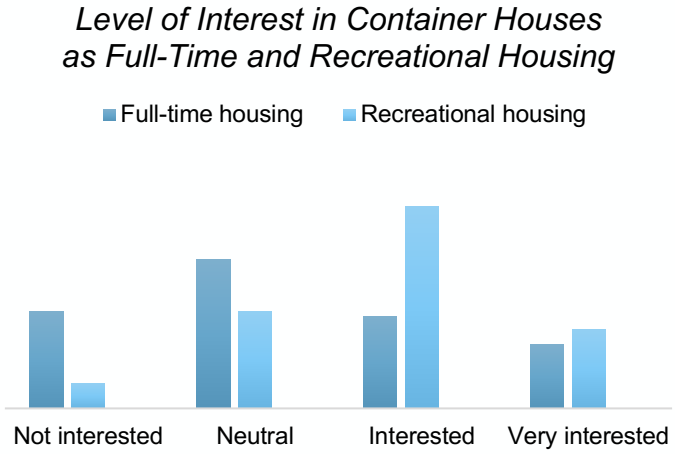


FIGURE 10: Interest to Own Container House Property

6.5 Collaborative Discussion

The survey findings overall highlighted certain key factors that should be considered when bringing container housing into the Finnish market. The findings are as follows:

- Container housing should be targeted at younger consumers, most likely those aged between 19 and 24. The data describes this market to have more interest towards container housing and show more consideration for sustainability and alternative ways of living.

- There are grounds to believe container housing may be more successful in the Finnish market when marketed for recreational, temporary accommodation. The data depicts that the public is yet to be inclined enough to adopt the idea of container houses as a full-time living option.

- Container houses should be marketed to those valuing minimalism, aesthetics, and flexibility in terms of housing. The data revealed that many people had not purchased a house due to lack of finances and unpredictable life situations. Container houses would be ideal for those lacking the finances for buying a traditional house, especially young students who have not yet graduated. More high-end container homes can quickly be built within these customers' budgets, which is not as realistic as traditional housing. Besides, mobile container homes would be an ideal solution to those who would buy a house but cannot do so because it would tie them down to a specific location.

- Further information on container housing and its potential must be distributed across the public in order to override existing prejudices and provide answers to all questions the public may have. Educating the public further on container houses could also aid in bringing forward potential clients.

- The next steps in putting the findings mentioned above to use and bringing container housing to the Finnish markets should include further research into the public's perceptions and focusing on defining the target market more precisely. Providing the public with introductory experiences with real container houses – such as displaying demo versions at expos or providing free nights at a container house – would also be highly beneficial in boosting the level of interest in container houses.

7 INTERVIEWS

7.1 Objectives

In addition to gathering data from the public using a survey, which corresponded to the likelihood of purchase motivations and general perceptions of container homes, it was essential to conduct interviews with a handful of professionals in this study's construction field. The interviews aimed to provide the answers to specific detailed questions that were not imperative to ask from the general public due to lack of knowledge in this area and was fitting to ask from both perspectives.

This segment's intended objective was to investigate which angles were missing from this research study by asking construction professionals' advice to better interpret the subject. By collecting these opinions, the data will provide a more concrete elaboration that will additionally influence the Finnish market more with container homes, merely seeking out and asking what else lies in the possible drawbacks and constraints in terms of land, permits, and the market overall.

7.2 Data Collection

The interviews carried out consisted of creating a document mentioning our study's purpose and how the intended research will prove valuable to us towards our bachelor's thesis. By sending out a questionnaire with more complex matters revolving around containers, assistance and knowledge were valued by targeting professionals who already have experience with them and could project the market in Finland. To enable getting the appropriate answers, we enlisted a series of questions towards experts in the construction field to fill out container home insights, major concerns we may have missed, and how the market will relatively look like long-term with them.

7.3 Interviews Questions and Feedback

The data was collected through four interviews where respondents took approximately 10mins at length to fill out. The enlisted document's details with its full questions and letter to the respondents can be found in Appendix C.

The interviews consist of 7 questions aimed to assess the following areas:

1. What are the benefits of a container house?
2. What are the drawbacks of a container house?
3. What are the trends in building / living and how do container houses fit in?
4. How do you see container homes being used in the future?
5. Which kind of businesses do you feel could be ran from a container?
6. What are the costs of building a simple container home?
7. What permits and building laws you need to be aware of?

I. Respondent ‘A’ (Construction Background)

What are the benefits of a container house?

“You have got your own space to innovate, get yourself a box and innovate whatever you like, and with a home, you are going to be saving a significant amount of costs, not just by living by even building it yourself and in a shortened timeframe. Suppose you have a bunch of containers and rent them out to students. In that case, you could easily have around 400€ each due to passive income, which adds up as well with the amount of tiny homes you can offer and because if you own the building, you do not pay housing tax or housing shares to the company who builds them. They are easily equipped with four steel walls, so cutting out windows and door frames aren’t too much of a problem. Glass is one of the costly expenses, but if you have a whole wall of window, it opens up the lighting far better than feeling like a confined space. They are minimalistic, an upcoming trend I think and cost-effective.”

What are the drawbacks of a container house?

“The drawbacks I can see would be that they are quite isolated confined spaces if someone has too much stuff it can present quite ‘boxed in’ environment who aren’t accustomed to living in such a tiny space, but it does also grant it is benefits, depends on the person. It also adds the risk of being rusty over time due to water precipitation and condensation on the exterior casing. With the imports of a shipping container, people have to be careful when converting them into homes. They could potentially be carrying nuclear waste and become quite hazardous elements if not treated carefully and sanitized properly. Doing all the calculations would seem more manageable to build a container from wood than with steel due to wood being lighter, but the container does come already with a strong structure intact. Hence, another way depends on what you do with it.”

What are the trends in building/living, and how do container houses fit in?

“When talking about the container homes, they would generally be just for one person or even a couple but probably a bit too much hassle if having a family as you are going to eventually turn this temporary structure into a permanent home by connecting up to the mains. The trends with people living in smaller houses are usually younger people who do not mind saving costs on their apartment but having the ability to buy their own home as a container can be a lot cheaper than traditional so in I think that would be quite popular nowadays or in the growing future”

How do you see container homes being used in the future?

“For minimalistic people who do not mind living in a smaller space with the bonus of not paying so much for rent, heating, and other significant costly bills someone would generally have. Tiny homes, temporary homes, not typically a huge trend as of yet in Finland, but only because people have not seen them so much that they can feel a bit skeptical at first, but when one goes up and sees it, it broadens their mind to these new alternative ways of living. Good for housing crisis solutions as well, even bars and cafes. Can completely do anything with them”

Which kind of businesses do you feel could be run from a container?

“If speaking about all possibilities, practically anything can be built with them; it is just a matter of having the land or permits to place them on and the ability to make them mobile enough for transportation. I have my swimming pool in my backyard made from a container just a few weeks ago, which I have been converting into making it blend in nicely with my decking in the yard. The possibilities are endless, but I feel housing and temporary homes, student homes, Airbnb is a big trend at the moment.”

What are the costs of building a simple container home?

“I reckon for as simple as you could go with them, it would be possible get your first used container at around 2,500€, and if converting it into a tiny home, you would be looking at around 30,000€ for the entire thing, including labor work. From a selling perspective, I have seen loads of sellers online who have built swimming pools with jets in them from containers, and they are selling them for around 80,000€-100,000€. If you build a container home with about 30,000 for a fairly decent and good-looking job one, if I were to sell it, you would be looking for at least 60,000-75,000€. A good way to do it is to build a demo model first, have a few people take a look at it, and ask them what they think; there, they can visualize themselves what they like and do not like. Therefore, you can get a down payment from them. As you go, you can negotiate on how to alternate the demo to their liking with added features or however they would like it to be if they are interested. It is not too difficult to build a demo, so stick with that, then go from there with your potential audience”

What permits and building laws you need to be aware of?

“When you are in the container home or container market, make sure that as long as it isn’t fixed to the foundations, you would be all right; I think the law is if it is hooked up to the mains (water and electrical) then regular laws and permits come into play. However, if you were to use a septic tank and generator, even solar power energy, you would be all right without too much hassle with permits. I think with temporary housing you need to have land actually to have it on or someone else’s land and rents it to you; also, you are meant to move our temporary structure/home every six

months; even a few meters but nobody is going to come and check on that but still. Just treat it the same as a caravan, it has to move a little sometimes, but proper building regulations and laws come into play when they're connected to the foundations. More of a plug-n-play sort of home"

II. Respondent 'B' (Construction Consultant)

What are the benefits of a container house?

"Easy to relocate, easy to modify, easy to extend. Just like Legos – mix and match what you want. Container houses are used all around the world but are still a "new" thing in Finland. It could be the next "UFO Mökki" (check Futuro-house Espoo). Could help on relocating people, but also relocating businesses (as a sauna by a lake/remote river)"

What are the drawbacks of a container house?

"The metal core seems that the house is always "cold," A rusty metal container is seen every little village in Finland. The façade is important to improve - no one wants a sauna done in wavy metal. Drawbacks are the limited width – all the rooms might have a "tubular" feeling."

What are the trends in building/living, and how do container houses fit in?

"Ecological and environmental trends are seen locally and globally."

How do you see container homes being used in the future?

"As homes, mökkis, greenhouses etc."

Which kind of businesses do you feel could be run from a container?

"Beach-gear (surfboards, for example, that need storage), café's/bar's, Airbnb/co-sharing housing."

What are the costs of building a simple container home?

"Container 1500-2000e -> decoration and modifying 10 000 – 15 000."

What permits and building laws you need to be aware of?

"It depends where and what you build. If the container is free-standing, then there are fewer permits/laws; if it is fixed and attached to communal plumbing/electricity, then the same house regulations."

III. Respondent 'C' (Construction Expert)

What are the benefits of a container house?

"Fast delivery for the containers."

What are the drawbacks of a container house?

"At the moment, insulation of the containers. The ones used at worksites have relatively thin walls."

What are the trends in building/living, and how do container houses fit in?

"Containers are currently used as temporary shelters, except the student container homes used in Helsinki."

How do you see container homes being used in the future?

”Maybe a few hundred. (Translators note I believe he read the question as how many container homes you see being used in the future)”

Which kind of businesses do you feel could be run from a container?

”They are suitable mainly for office work. In some cases, you could probably rent them day-by-day for work.”

What are the costs of building a simple container home?

”Look at Tilamarkkinat.fi, they have a price list.”

What permits and building laws you need to be aware of?

”You have to check this with the building control of your city.”

IV. Respondent ‘D’ (Container Home Company)

What are the benefits of a container house?

- *Quick to Deploy*
- *Relatively Inexpensive (conditions apply)*
- *Help utilise unused land, unsuitable for conventional builds*
- *Movable if necessary (conditions apply)*
- *Weather (Hurricane and Earthquake proof)*

What are the drawbacks of a container house?

- *Relatively expensive (conditions apply)*
- *Space constraints*

What are the trends in building / living and how do container houses fit in?

- *Quick to deploy homes*
- *Advent of Airbnb*

How do you see container homes being used in the future?

“Diverse uses exist; however, the goal is utilization in creation of luxury spaces, which can serve to bridge the huge gap in the market for luxury real estate.”

Which kind of businesses do you feel could be ran from a container?

- *Saloon, General Store*
- *Café, Restaurant*
- *Gym, School*

What are the costs of building a simple container home?

“In Lagos where we build, prices can range from $8000 and above depending on the design and number of containers”

What permits and building laws you need to be aware of?

“Single container structures may not require build permits (check with local city)
Best practice is to seek one always and communicate all builds through your local building authorities.”

7.4 Collective Discussion

Judging from the answers of the chosen professionals in the field, containers are a flexible and cheap solution to different kinds of building problems. They highly valued the speed that different container buildings can be made and delivered.

The most interesting part from the professionals was the different kinds of applications a container could be used in. From hair saloons to schools and office buildings, the limits are basically in the builder's imagination.

The biggest problem seen is the fact that it is hard to know what kinds of materials have been transported in the containers, so sanitizing the containers for human use is necessary. The second drawback most mentioned is the space constraints.

Pricewise building a container seems to be more expensive in Finland than in Lagos and Florida with the building costs being around 30 000€ in Finland and $8000 in Lagos. This is probably due to the price difference in materials and labor costs. Regulations and standards might also differ.

Permit and law-wise, it is always best to check with your local building authorities, but according to Lee Hills, you need to meet certain standards for Finland if your container home is hooked up on the main electrical and water lines. However, if the container has its own systems and is movable, the laws and permits will be less of a problem.

Other interesting notes we wanted to highlight from the interviews are the fact that containers could be a good solution when conventional housing cannot be used for some reason and the rise of temporary housing in emergencies or in leisure like in Airbnb use. It is intriguing to think about the possibilities that containers have compared to traditional building. Also, the rise in the need for temporary housing will create more and more business opportunities as the world grows.

8 FINANCIAL ANALYSIS

8.1 Chapter Introduction

This chapter aims to utilize and understand the estimation of costs for producing an entirely livable shipping container home in Finland. One of the primary focuses for this thesis is cost efficiency. A total cost estimation will clarify the necessary components needed to ensure a fully established, air-conditioned and secured home ready for potential buyers. It will support this study by acknowledging the cheapest solution someone can build their own container home without the need for permanent foundations.

This result will project how likely it will be for the lower and middle-class income earners to afford a house at a young age without a lifetime of debt. Conventional homes usually consist of brick and mortar and generally increases production costs overall. The survey data mentioned previously showed that potential homeowners aged 19 to 34 would be willing to invest between 150,000€ to 199,999€ on their next house.

8.2 Cost Projections of a Shipping Container Home

An essential factor in this chapter will represent and allow readers to visually understand how much savings there would be on housing, especially for people unfamiliar with this concept overall. It will explain how these compact and stable structures will considerably benefit society and its environment. Moreover, it will affect the cost of housing today and the value of container housing compared to conventional housing.

This section will entail a total cost estimation for someone to build their very own DIY container home. The price plan will display the estimated values and hard costs of what a buyer is potentially looking for when building their very first shipping container home. Note that the projected costs are just for the internal structure. No additional expenses will be added to the exterior to make the home as economically affordable as possible. In order to get the figures as accurately as possible, we managed to find a shipping container home cost calculator from Discover Containers to calculate costs.

Simple & Basic	The Estimate Cost (€)	Inputs
	Total: **9134€ (DIY)** With ± 25% accuracy, the estimated cost range is: **8,316€ to 13,860€** Total: **39,170 (Company)*** With ± 25% accuracy, the estimated cost range is: **'23978€ to 39,960€'**	Number of 40" Equivalent Containers: **1** Responsible Party: **Do-It-Yourself-DIY** Local Considerations: **Low** Climate: **Cold** Necessary Approvals: **None** Site Complexity: **Average** Design Efficiency & Complexity: **Simple** Build Quality: **Basic** + Responsible Party: **Do-It-For-Me-DIFM***
Modern Design	**The Estimate Cost (€)**	**Inputs**
	**Total: 14378€ (DIY)** With ± 25% accuracy, the estimated cost range is: **10,783€ to 17,972€** Total: **50,320€ (Company)*** With ± 25% accuracy, the estimated cost range is: **'37,740€ - 62,900€'**	Number of 40" Equivalent Containers: **1** Responsible Party: **Do-It-Yourself-DIY** Local Considerations: **Average** Climate: **Cold** Necessary Approvals: **Basic** Site Complexity: **Average** Design Efficiency & Complexity: **Average** Build Quality: **Average** + Responsible Party: **Do-It-For-Me-DIFM***
Luxurious Container	**The Estimate Cost (€)**	**Inputs**
	Total: **30,275€ (DIY)** With ± 25% accuracy, the estimated cost range is: **22,700€ to 37,830€** Total: **102,900€ (Company)*** With ± 25% accuracy, the estimated cost range is: **'77,178€ to 128,630€'**	Number of 40" Equivalent Containers: **1** Responsible Party: **Do-It-Yourself-DIY** Local Considerations: **High** Climate: **Cold** Necessary Approvals: **Expensive** Site Complexity: **Complex** Design Efficiency & Complexity: **Elaborate** Build Quality: **Luxurious** +Responsible Party: **Do-It-For-Me-DIFM***

TABLE 1: Cost Estimation for Container House Types (Discover Containers, 2020)

From the data shown in Table 1, it shows what are the necessary hard costs when it comes to choosing the type of container home to live in. The cost for a basic container can average around 9200€ in relevance to a modern container home costing roughly 15,000 and lastly for the most expensive and luxurious model, the buyer is going to be paying an average of 30,000€. All the models listed above are one standard 40” shipping container, and expansions will however cost more if required.

When someone considers building a home, one thing to keep in mind is that no matter what budget the buyer has for a home, they always presume the cost will be twice the whole project (Madgett, 2019). This advice ensures adequate flexibility and a decent buffer of emergency funds if things go wrong during the whole building process, even when hiring professionals to do the work or get better equipment. If done all by the homeowner, everything else like electricity, water, laborers, licensees, contractors, land permits, prep work, exterior paint, and landscaping will not be included in the final costs due to it only being around 10,000€ - 30,000€ (Madgett, 2019).

A majority of expenses when building a container home relies on insulation. The purpose of good quality insulation is needed to ensure the container home does not get too cold during the winter months. Container homes require more insulation than conventional housing as the outer casing is primarily made of steel and can lead to being a good conductor of heat, making it too cold or too warm. Another major cost goes into the windows and doors. One of the crucial attributes for a container home consists of an HVAC system that will provide good air circulation throughout the house. It is required for constructing these mobile homes for inhabitants. Undoubtedly, due to the final hard costs estimating a low cash flow, other external factors must be viewed.

The reasoning for including the container models above was to demonstrate what it would cost to have the entire structure be as cost-efficient, eco-friendly, and mobile as possible. Once assembled, owners can place their home down wherever suitable with the right permits. In terms of sustainability and keeping costs down, extra expenses will go towards utilities and critical features that a modular home requires.

Additional Estimated Costs:

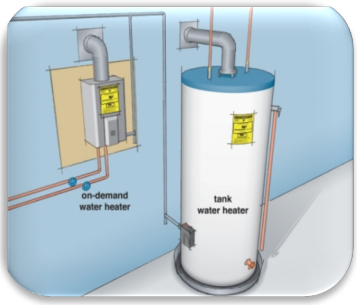
	**A Septic Tank** Can cost around 3,000€ –10,000€, including installment fees. These tanks can be secured under the container and are already suitable for mobility. They must be emptied within 2 - 5 years when living alone and costs around 400€ to be emptied.
	**A Water Heater** must fulfill modern bathroom and kitchen requirements to heat the house during the colder months. An extremely efficient choice for a water heater would be to use an indirect heater between 800€ - 1500€. This method means that the water tank can run on any power source, whether gas, electric, oil, or even solar.
	**A Portable Generator** Can be installed to power up the whole house on its own, which can run energy throughout the container to power enough circuits granting the usage of refrigerators, appliances, and plug-sockets. This would cost around 500€ - 2000€. An alternative solution would be to use solar in the summers.
	**Solar Panels** To go fully energy saving, especially during Finnish summers, it would be considered useful to install solar panels into the container home. They cost a lot but longevity speaking, they can cut costs down the most. Rooftop arrays range between: 1300€ – 2000€.

TABLE 2: Additional Utility Costs of Shipping Container Living

8.3 Cost Comparison between Cargotecture and Conventional Housing

The stages of constructing a home in Finland revolve around the same process plan and naturally depend on preparing the land, making the foundations, assembling the structural framing, insulating the walls, installing the roof, and any final adjustments. This standard method is typical for conventional housing and other standard buildings; however, the process can be cut down into a more efficient and time-saving manner when referring to modular housing.

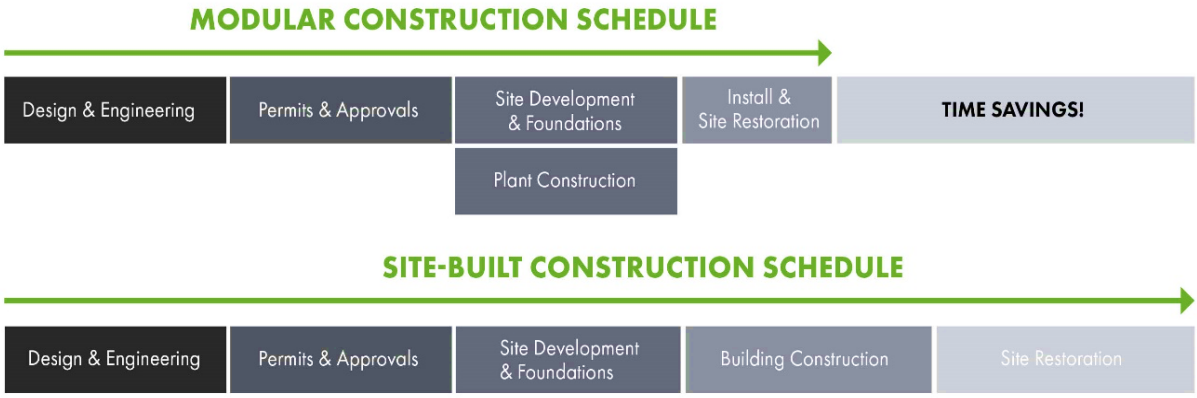


FIGURE 11: Timeline Comparison among Modular and Conventional Housing (Modular.org 2018)

The modular process above when comparing to the site-built construction schedule Figure 11**,** ensures no construction work needs to be done on-site during the winter months in Finland, reflecting positively on-time efficiency and mobility. Having that extra flexibility when placing down the modular home guarantees when and where to put the finished project as soon as the site prep and foundations are allocated accordingly.

With conventional housing, planning and flexibility cannot be altered during the whole process as everything depends on the foundations from the start of construction. A permanent home plan relies solely on mounting it together with the foundations, thus, slowing down the process altogether during the colder months. With modular construction, they can be assembled in various ways, either by themselves or connected like building blocks to enhance more optional rooms and space, combining with conventional to attain a more permanent structure due to their module design and flexibility.

Cost Differentiation Analysis between Cargotecture and Conventional Housing

Criteria	Cargotecture	Conventional Housing
Low-Cost	A low-cost shipping container home will average between 10,000€ - 25,000€ while keeping it as simple and basic as possible.	Conventional housing is expensive due to bricks and cement—estimation price between 150,000€ or higher for a basic one-story house.
Construction Time	Due to their mobility, they are built in factories and shipped on sight by the time the land is chosen. The entire assembly could take from 7 days to a month.	They tend to take a lot more time due to land preparations by planning utilities, and are homes are much larger in scale.
Structural Strength	Compared to timber houses in Finland, a container with built-in structural strength only needs to be re-enforced when cutting windows and doors, saving time and money with framing.	For a conventional house, they rely on a concrete foundation filled with steel rods before adding the supporting beams to strengthen the house's main points, which is far more costly.
Modular	A container's simplicity presents value with stacking and connecting structures together smoothly, making fewer technical adjustments overall.	Conventional housing can grant more creativity in the design scale; however, doing so also requires more structural strength and resources, increasing costs.

Transport	With the entire unit made up in a factory, the newly build container home is shipped using train, truck, or overseas as a whole.	Cost will increase due to the amount of construction materials needed for the house production process making the price a lot higher.
Availability	Shipping containers can be acquired from anywhere globally because of their everyday purpose and need when transporting overseas.	By building conventional, acquiring concrete is always available but a lot higher in demand and more expensive overall.
Temperature	However, a container's internal structure conducts heat very well; however, it requires more insulation costs than conventional housing when building in colder climates.	Typical housing requirements come already equipped with standard insulation installed in the building process.
Labour Costs	If a container home isn't connected to the main foundations, it can allow the builder to do most of the work themselves with the experience to do so.	Standard housing relies more on labor centered costs for different fields of study in construction.
Limitations to Flexible Design	Container homes are cost-effective as a whole, although it is far more challenging to change the shape's entirety in terms of design flexibility.	Bricks and mortar and more costly; however, they allow more creativity in the design scale.

TABLE 3: General Cost Differentiation Between Cargotecture and Conventional Housing (Modular Homes, 2020)

8.4 Tangible Costs

The most significant financial advantage of using shipping containers for sale to create a home is that they are very inexpensive. In a country like Finland, having a 40-foot (12meter) shipping container and turning it into a modest home is much cheaper than buying a typical house, apartment, or cottage by a lake.

When it comes to housing, it is tough to imagine building a typical home without taking a long-term home loan. People who take mortgage loans to buy their homes end up paying massive amounts of interest, and on top of that, the loan sum remains high for a large part of their lives. When relating to students, though, they cannot afford to take out a loan for a house easily because they have graduated from university and are already having a substantial amount of loans to pay from their studies before having a stable credit record or collateral for obtaining a new loan.

Furthermore, several companies can assist in making windows, doors, and other ventilation systems for shipping container homes. Also, installing plumbing, HVAC, lighting, sewerage, electricity, and basic systems add flooring and painting of the exterior with the color or material preference needed.

8.5 Intangible Costs

Given the compact design of shipping container homes, it is valuable to acknowledge that homeowners will save money from land ownership. The benefit of this scenario projects value on the idea that there is no exponential need to buy the land for which the homeowner wants to build their shipping container home on, as they are mobile units.

In a country like Finland, where land and home prices are high, individuals usually buy their own home rather than pay rent as it is much cheaper in the long run. However, of course, building a house using shipping containers can lead to even more significant substantial savings as well.

8.6 Financial Summary

The predicted demand for first-time homeowners from the ages of 19 - 34 in financials proves positive. The budget of 150,000€ - 200,000€ issued previously will cover roughly three times the cost to build their own home. This solution goes hand in hand and will allow a much easier road to moving in while keeping the ability to move around for unpredictable life changes and leave room for expansion in the later years.

When building with containers, the individual can construct an entirely luxurious mobile home for under 50,000€, which leaves them a considerable amount of savings in the long run. However, having that extra amount is encouraging, especially for expanding their entire home later with more containers to open up new possibilities for space restraints needed, such as a family.

9 FUTURE DEVELOPMENT

9.1 Chapter Introduction

This chapter will explain estimated projections of how things could realistically look like in the upcoming future with shipping container homes in the Finnish market. One of the most common misconceptions with container homes is that they look like steel metal containers from the outside, so people do not generally feel attracted to them as housing options. However, once people realize when they set foot inside a fully-fledged container home, they will see that they come equipped with insulation, walls, a ventilation system, and the most common housing appliances with fitted kitchen and bathroom for modern-day living. They even have the potential to be used as cottages or vacation homes due to their mobility. In order to achieve that awareness, a range of demo versions could be displayed in expos. This solution would allow the customer to feel what it would be like to live in a container house for themselves. Once the customer is intrigued, this will allow the salesperson to advertise customized container homes according to the customers' preferences. Overall, displaying the demo versions in public events brings about an excellent opportunity to raise awareness towards container homes, bringing them into the Finnish markets.

9.2 Analysis

Finland is the 8th most sustainable society globally, giving it the motivation and grounds to contribute to the development and implementation of the cargotecture industry (Lyytimäki, 2014). Many Finnish companies have been ranked as one of the most sustainable corporations globally. Many more show an increased interest in facilitating nature conservation and preventing spoiling the nation's environment (Lyytimäki, 2014). By reusing old containers, they could further contribute to this by turning containers into housing while simultaneously solving cost-related accommodation issues in the Finnish housing market. On average, there are 11 million containers in the world that will not carry cargo again (Keller Williams, 2016). With the help of

innovation and creativity, this potential mass of waste should be transformed into renewable structures that can open up possibilities for individuals well as businesses.

Throughout this thesis, shipping containers have offered plentiful options to consumers with different demographics, especially those who do not wish to invest in traditional houses and prefer a more minimalistic lifestyle. Container homes cost a fraction of a traditional home without a lifetime of debt and grant its owner the benefit of not being tied to a specific location due to its mobility. The mobility of container houses would allow people to live a more flexible lifestyle, which would be beneficial, especially in work life. With the way things are going in the world, businesses' needs have changed, and significantly more flexible workers are needed. Besides, people are becoming more self-employed, and the popularity of remote work is increasing. These trends could help people open up to the idea of containers as alternative housing and potentially turn them into corporate space for businesses. Overall, it is highly likely that people seeking cost efficiency, flexibility, and or sustainability would, in the future, contribute to the customer pool of container houses.

So, will shipping container houses will be widely adopted in the Finnish market? Based on the insights acquired through our primary and secondary research, we feel confident that they can be successful. They have been introduced in other countries where they are successful (Discover Containers, 2020). This solution also grounds that container homes can be a reliable solution to current housing issues in Finland. It is interesting to see what the Finnish housing market's future holds in the upcoming years as more research will be done on container homes. Soon, development in the cargotecture industry can boost the container houses’ demand and popularity.

10 DISCUSSION

10.1 Chapter Introduction

Containers as a base for homebuilding is an intriguing thought. After seeing multiple different container homes, you can quickly see how many people have been inspired by their functionality and looks. They seemingly make a living in many ways more straightforward and more flexible than traditional buildings. Not only do containers make feasible housing, but they can also be turned into significant business opportunities, gyms, swimming pools, and more. We believe that we have found so many different opportunities in containers because the builder does not have to wait to lay foundations, make walls, windows, and a roof to start making their vision come to life.

10.2 Analysis

One of the more eye-opening things we found out during the thesis was that people are concerned about the weather conditions and that they could be freezing during the winter. However, the fact that you can treat a container like a regular house, the size of the container is, in fact, a lot smaller in size so during the winter times, even with a simple generator or wood burner, it is going to be surprisingly more hot than cold. Knowing that heat rises, the best way to insulate a container is by the roof, as it is the easiest way for oxygen and air to escape. Having adequate ventilation and the opportunity to have a skylight with an open hatchet, the same as a window on the ceiling, to let hold air in would provide keeping costs down due to natural air from the outside than always relying on the HVAC system continuously running and costing energy.

In terms of costs, it is surprisingly cheaper to build a container home than the ordinary traditional house made from bricks and mortar, which generally uses much water during the construction process. However, with container homes, you do not need water during the whole process. If you have your own company or build the container home yourself, you become the sole owner of the structure, as if you let a building company do it, you own the property but still pay shares to the building company each month.

Interestingly, the general view that people had of containers was more positive than we had thought beforehand. Only 20 people we asked from were not interested when we asked about having a container as their next home. If offered the chance to test out a container home for the first time, there was almost a unanimous result saying yes to testing before buying. 83 answers said yes against two who said they would not, and 13 who would maybe try if given the opportunity.

11 CONCLUSION

11.1 Chapter Introduction

Now to answer the research questions. Is there a market for shipping container homes? We can recommend moving to the next step with container homes and building some simple models. The theoretical work and answers we collected from our survey support this statement.

11.2 Our Analysis

Will it be an upcoming trend in the next 5-10 years? Judging from the variety of altercations of container buildings globally, we found that have been made in the last few years, and all the different possibilities containers have. We can say that there is a positive outlook that presents a steady growth in interest in container buildings and other alternative living options.

Is the general perception of container homes positive? When analysing our survey 67% of the people agreed or strongly agreed that low-cost container homes could be widely adopted. Also, more than 80% of the people who answered would be willing to try and test them out. Judging by these answers and the statements from our interviewed professionals we can say, yes there is a positive perception regarding container homes.

Is the general perception of container homes positive? When analyzing our survey, 67% of the people agreed or strongly agreed that low-cost container homes could be widely adopted. More than 80% of the people who answered would be willing to try and test them out. Judging by these answers and the statements from our interviewed professionals, we can say, yes, there is a positive perception regarding container homes.

However, due to our relatively small sample size, we cannot guarantee that container homes will be a future super-trend with the number of answers we got. The

outlook as a whole appears reasonably promising; however, everything we found out has to be taken with a grain of salt.

11.3 Recommendations for our Commissioner

1. Our survey data shows that 76% of respondents have a plan for purchasing a new home in the near future. To capitalize on this fact, it is recommended to try and attract these potential customers with affordable container homes, as these first-time buyers are more interested in affordable housing.

2. Overall, based on the estimated output, 67% of respondents are interested in considering a tiny home/container home as a second home or cottage. Due to this, we recommend also focusing on second home/cottage properties of a container home.

3. Based on our study in section “Alternative uses of a container”, we found out a multitude of different appliances for containers. We recommend following these different trends in container building to stay on top of the game. Since a lot of different things can be made from containers, it is advisable to include other builds like pools, garages, or saunas also in your catalogue.

4. The cost of building according to our section “Interviews with chosen professionals” showed us that the costs of building a container home can vary in different countries. We want to point out that since containers are very easily movable, it might be worthwhile to look into building the homes somewhere where it is cheap to build and then transport them to the destinations.

5. Consider including other materials that are important for the end user like wood and glass. Due to our study on alternatives and what the competitors are doing, it is clear that Finnish people feel most at home when there are wooden interior elements such as wooden floor and large windows.

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13 APPENDICES

13.1 Appendix A: Thesis Questionnaire

Research & Development on Shipping Container Homes for the Finnish Market

We are looking to collect data in efforts to understand the market in Finland for alternative ways of living such as container home housing in the upcoming future. During the survey we'll revolve these questions around your perceptions, opinions and purchasing motivations in efforts to write an analysis for our Bachelor's Thesis.

Thank you for your time and valuable feedback!

* Required

Profiling Questions & Housing Details

What gender do you most closely identify with? *

- ◯ Male
- ◯ Female
- ◯ Non-Binary
- ◯ Other
- ◯ Prefer not to say

Which age group do you fall within? *

- ◯ 19 - 24
- ◯ 25 - 34
- ◯ 35 - 44
- ◯ 45 - 54
- ◯ 55 - 64
- ◯ 65 +

Please describe your residence *

- ◯ Rent
- ◯ Own
- ◯ Living with Family / Friend
- ◯ Other: _____

Please select your current situation. *

- ◯ Full-Time Student
- ◯ Student & Part-Time Employed
- ◯ Working Part Time by an Employer
- ◯ Working Full-Time by an Employer
- ◯ Self-Employed
- ◯ Retired
- ◯ Stay-At-Home Parent / Homemaker
- ◯ Military
- ◯ Unemployed
- ◯ Other: _____

What type of property do you live in now? *

- ◯ Traditional House / Omakotitalo
- ◯ Semi-Detached House / Paritalo
- ◯ Row of Houses / Rivitalo
- ◯ Apartment Buildings / Kerrostalo
- ◯ Mobile Home / Caravan
- ◯ Tiny Home / Container Home
- ◯ Student Accommodation
- ◯ Other: _____

How much money would you invest when purchasing your next home?

- ◯ 0€ - 24,999€
- ◯ 25,000€ - 49,999€
- ◯ 50,000€ - 99,999€
- ◯ 100,000€ - 149,999€
- ◯ 150,000€ - 199,999€
- ◯ 200,000€ – 249,999€
- ◯ 250,000 - 299,999
- ◯ 300,000€ – 349,999€
- ◯ 350,000€ - 399,999€
- ◯ 400,000€ - And Higher
- ◯ I haven't thought about it yet

Do you have plans to purchase a home in the future?

- ◯ Yes, in the next year
- ◯ Yes, in the next 2 - 4 Years
- ◯ Yes, in 5 or more years
- ◯ No plans to purchase a new home

If not, please select the top reason as to why you have no plans to purchase a new home in the future?

- ◯ I prefer to rent
- ◯ I cannot afford a house
- ◯ I do not want to invest in a house
- ◯ I like to move around
- ◯ I am unsure of what kind of house I want
- ◯ Other: _____

Do you own or plan to purchase a second home / cottage?

- ◯ I own a second home/cottage and don't plan to buy a new one
- ◯ I own a second home/cottage and plan to buy a new one in the future
- ◯ I don't own a second home/cottage, but plan to purchase one in the future
- ◯ I don't own a second home/cottage, and have no plans to purchase one

If you are considering purchasing a second home / cottage, what type of location are you seeking for this home?

- ○ Urban, metro setting
- ○ Countryside near a lake
- ○ Countryside on a farm
- ○ In a forest/wilderness area
- ○ Other: _____

What kind of materials would you like to see in your house?

- ☐ Wood
- ☐ Steel
- ☐ Glass
- ☐ Brick
- ☐ Stone
- ☐ Concrete
- ☐ Other: _____

If you could live anywhere in Finland, where would you like to have a home?

Choose ▾

Rate the following attributes that are important for you in a house: [Extremely Important to Not Important]

	Extremely Important	Important	Not Very Important	Not Important
Maintenance	○	○	○	○
Safety	○	○	○	○
Room Space / Capacity	○	○	○	○
Sustainability	○	○	○	○
Relocation / Flexibility	○	○	○	○
Appearance	○	○	○	○
Community	○	○	○	○
Energy Efficiency	○	○	○	○
Accessibility	○	○	○	○
Security	○	○	○	○
Storage	○	○	○	○
Insulation	○	○	○	○
Resale Value	○	○	○	○

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Container Home Awareness & Perceptions

We are interested in learning about your perceptions and opinions about container homes/spaces in Finland. Shipping container homes are homes, offices or other buildings that have been built for their sleek alternative design. By using containers, they will keep costs down, making your home more durable and grant opportunities for mobility. This in turn, will provide a more sustainable outlook for our society.

Have you seen shipping containers used for living or public spaces? Please select all that apply.

- [ ] Home
- [ ] Cottage
- [ ] Rental Accomodations
- [ ] Hostel / Hotel
- [ ] Restaurant
- [ ] Bar
- [ ] Shop / Boutique
- [ ] Public Use Space
- [ ] Construction Sites / Break Rooms
- [ ] Private Business / Office Use
- [ ] I have not seen shipping containers used before
- [ ] Other: _____

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Research & Development on Shipping Container Homes for the Finnish Market

Container Home Purchasing Motivations

By conducting this research, we will be able to find out if or not using recycled shipping containers can be converted into cheaper and more sustainable living conditions for residential accommodation and businesses.

An average 40ft (12meter) shipping container will supply you around 30m2 of space and give you the ability to move your home, keep costs down and sell it off to another location. A fully designed and beautifully made home wherever you like would cost on average to build yourself around 25,000€ – 40,000€.

How likely would you be to consider a tiny home / container home as your next home purchase, now that you know a little more about them?

- ◯ Very interested
- ◯ Somewhat interested
- ◯ Neutral
- ◯ Not interested at all

How likely would you be to consider a tiny home / container home as a second home or cottage?

- ◯ Very interested
- ◯ Somewhat interested
- ◯ Neutral
- ◯ Not interested at all

How likely would it be that you would rent out a container cottage for a vacation / holiday?

- ◯ Very likely
- ◯ Somewhat likely
- ◯ Neutral
- ◯ Not likely at all

What is the one most critical factor that would prevent you from considering a container home?

Your answer

Do you feel a low cost container home could be widely adopted?

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

If you were offered the chance to test out a container home, see it up and close for a few nights, would you do it?

- ◯ Yes
- ◯ No
- ◯ Maybe

Thank you for answering the survey!

Your answers will strongly influence our market analysis towards our Bachelor's Thesis on Shipping Container Homes.

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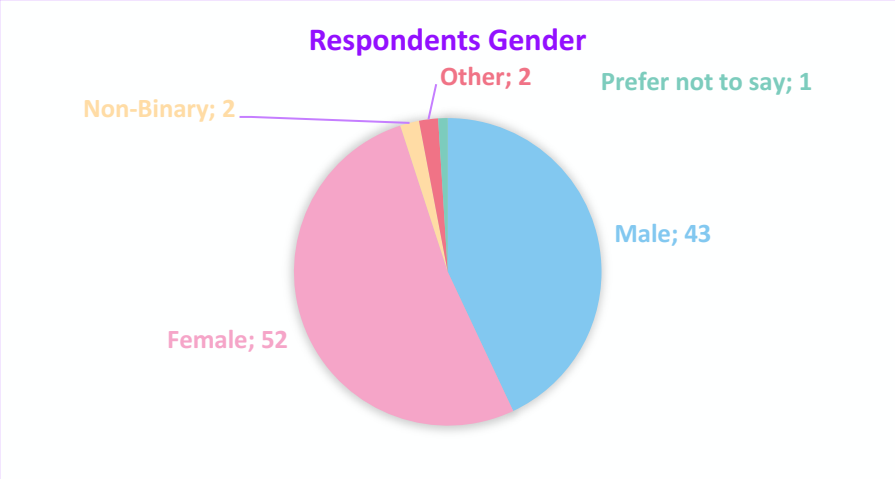
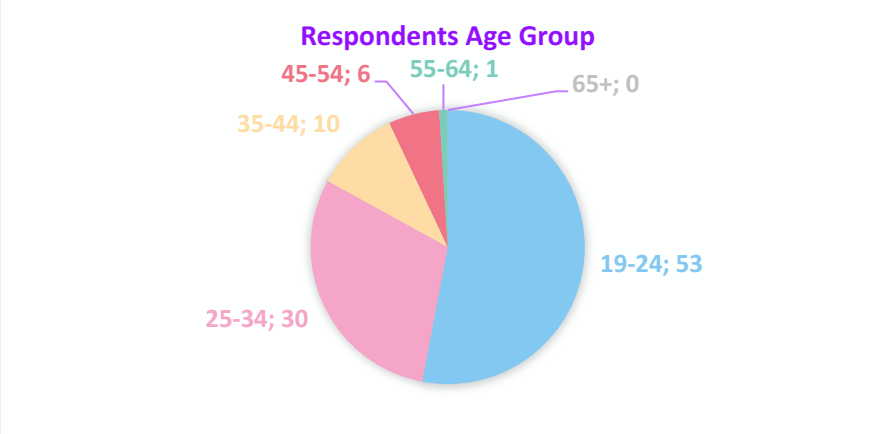
13.2 Appendix B: Research Survey Results

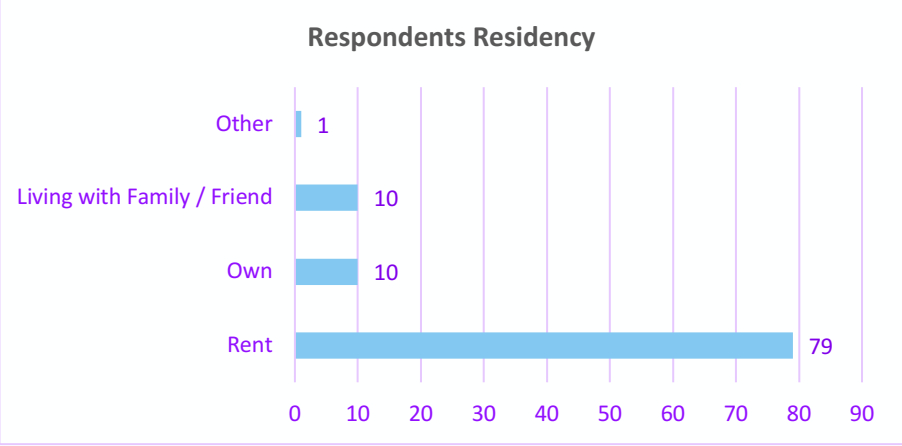
Respondents gender based of description of data



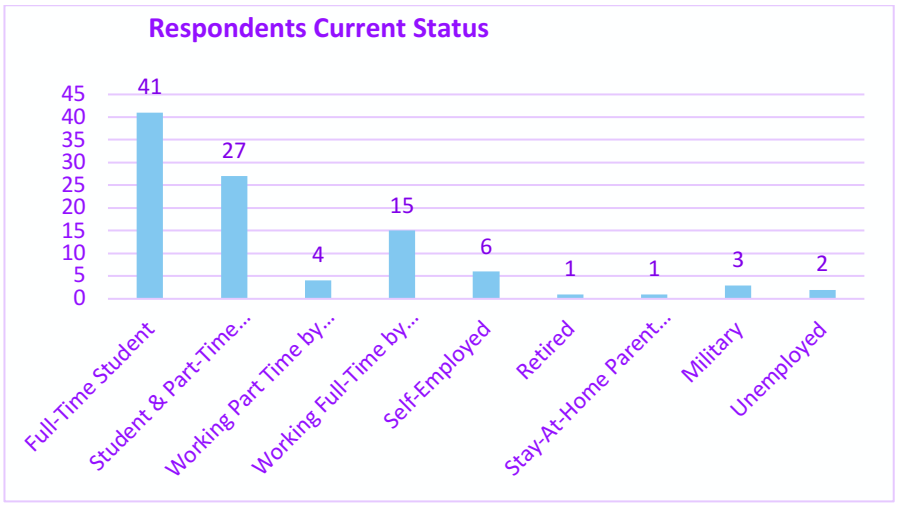
Respondents age-based description of data



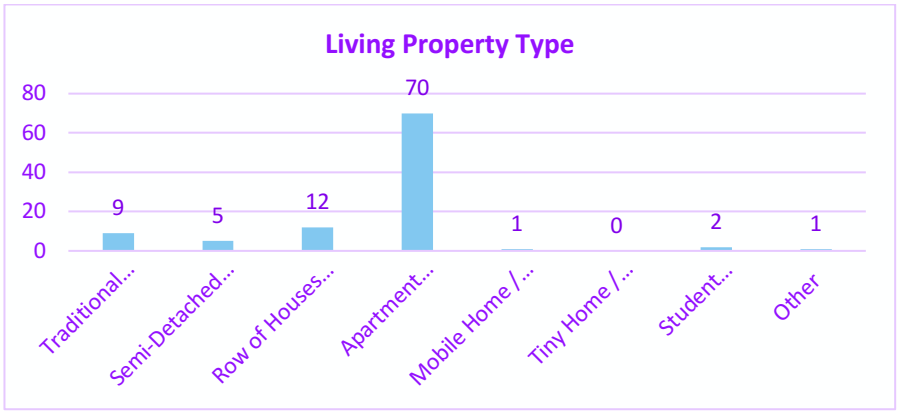
Respondents residency-based description of data



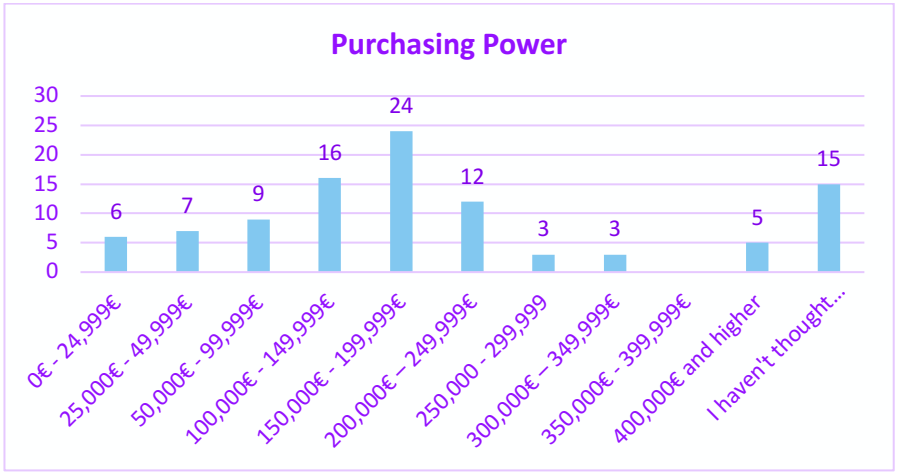
Current status-based description of data



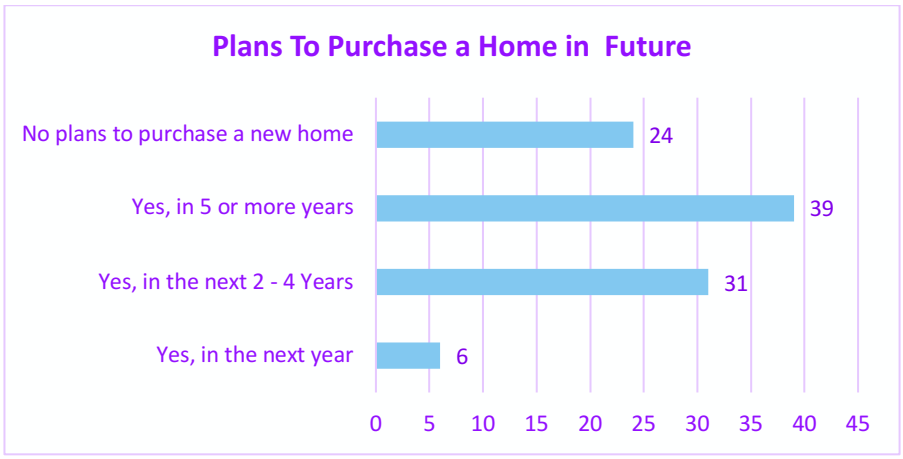
Description based on currently living property type



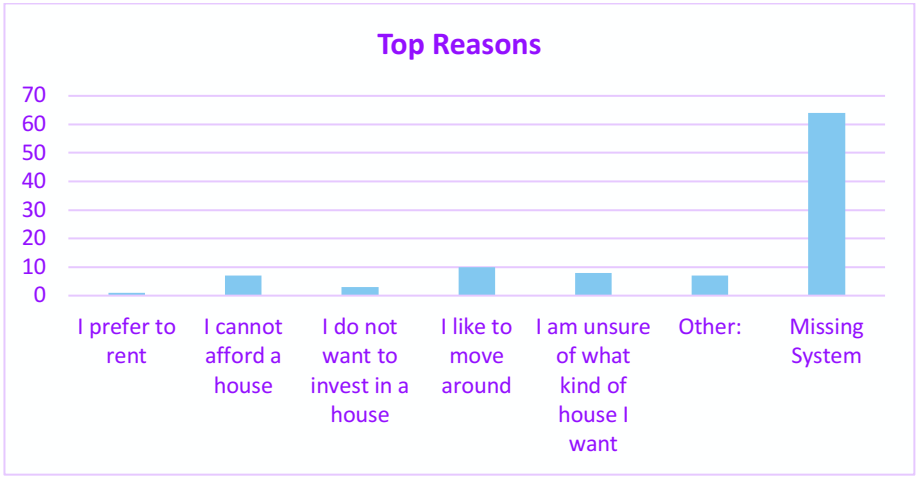
Description based on purchasing power



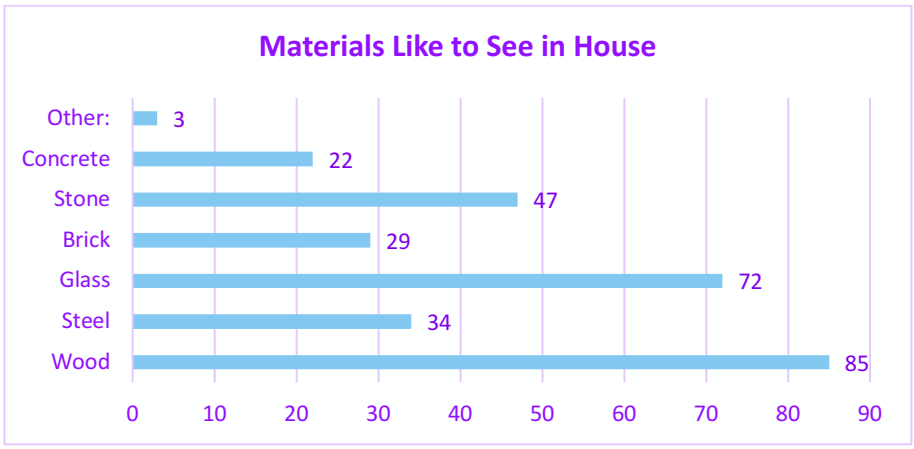
Description based on plans to purchase a home in the future



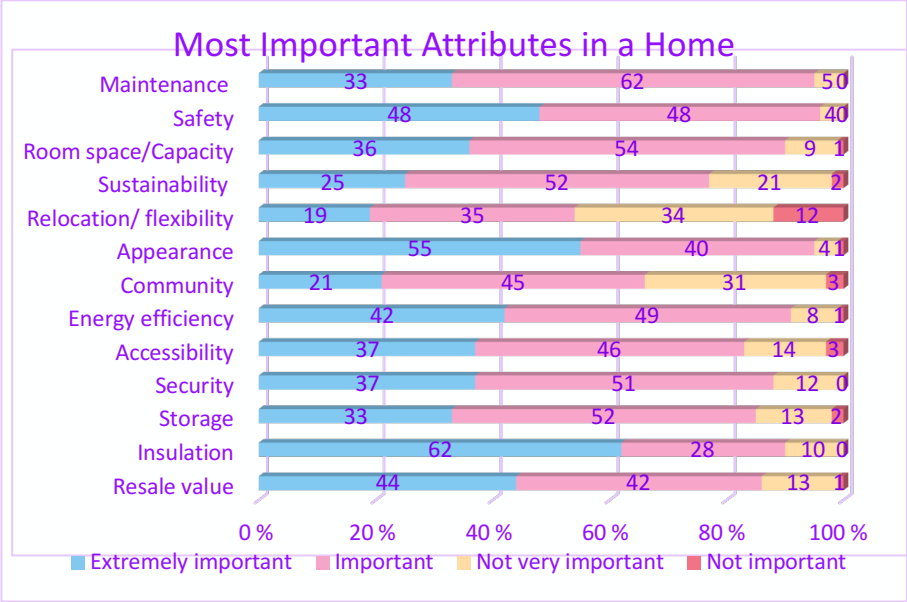
Description based on reasons due to which have no plan to purchase



Description based on materials like to see in house

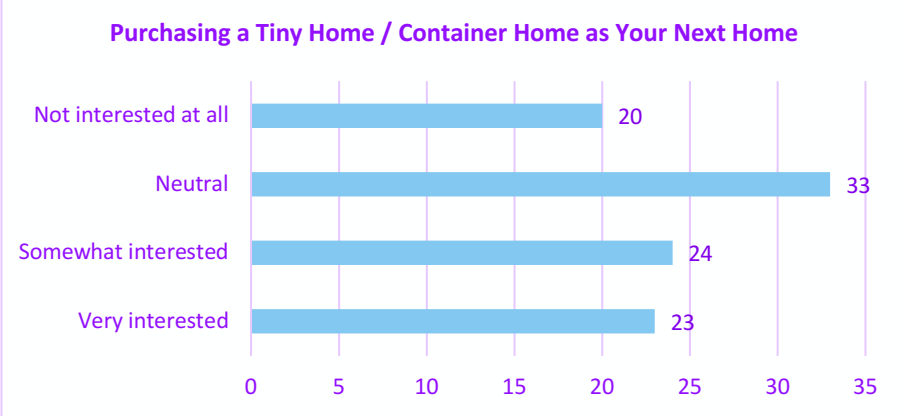


Description based on importance of different factors

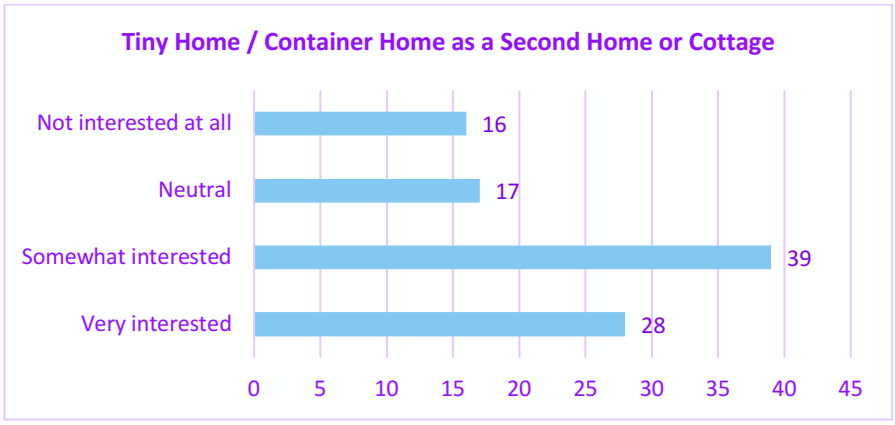


Description based on respondents seen shipping containers used for any purpose

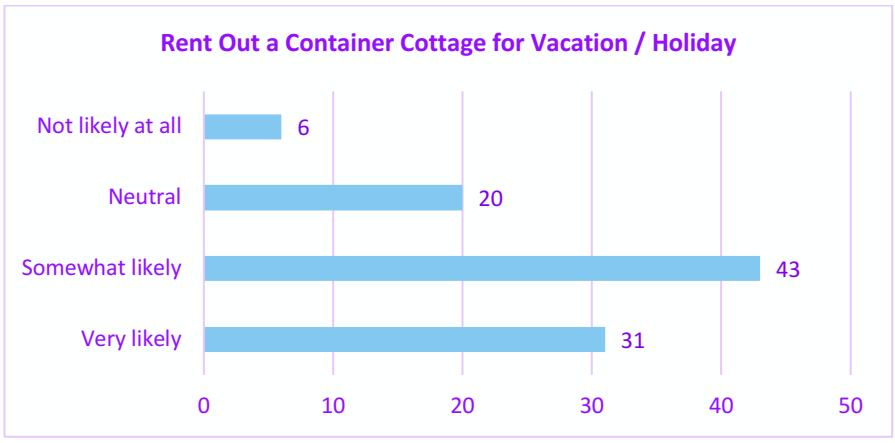
You consider a tiny home / container home as your next home purchase



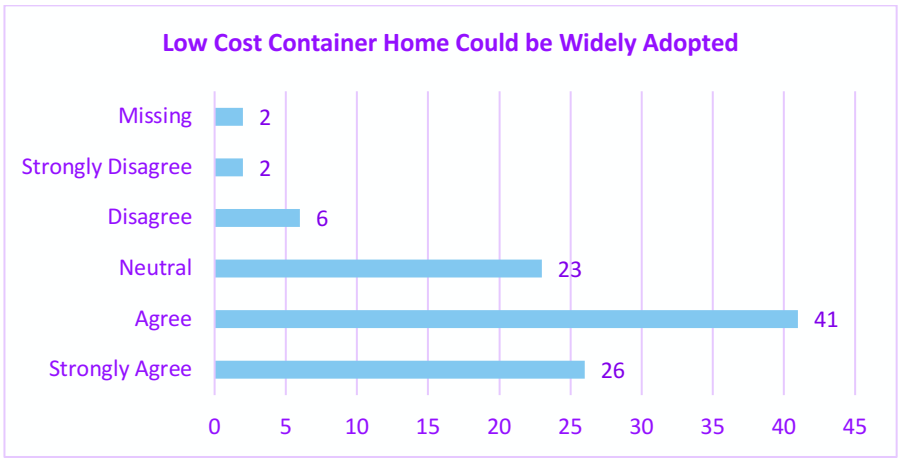
Likeness regarding consider a tiny home / container home as a second home or cottage your next home



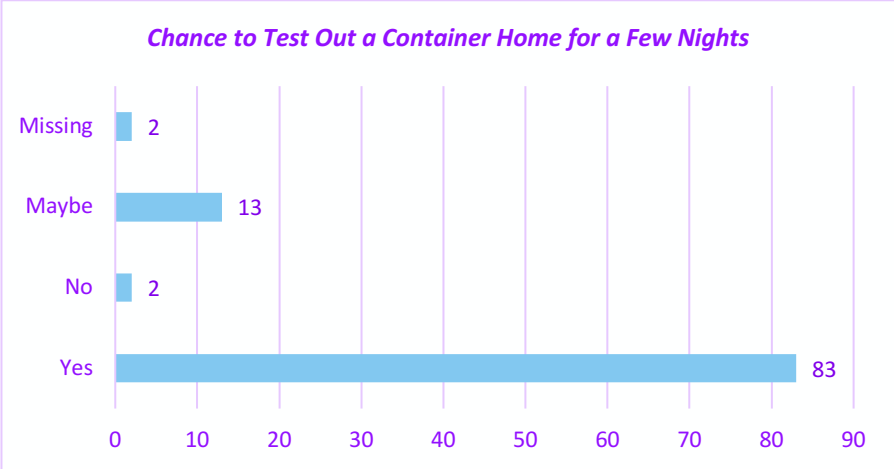
Like to rent out a container cottage for a vacation / holiday



A low cost container home could be widely adopted



Chance to test out a container home for a few nights



13.3 Appendix C. Interview Transcript for Experts

Research and Development for
Shipping Container Homes
Dedicated for the Finnish Market

Dear, (Interviewee)

We are looking to collect data in efforts to understand the market in Finland for alternative ways of living such as container home housing in the upcoming future.

We have enlisted the following interview questions for you to fill out as we believe you could present valuable insight on the matters of this subject. We previously conducted a survey and reached 100 respondents for the public eye to answer which revolved around perceptions, opinions and purchasing motivations. However, some questions felt they were too specific, so we decided to keep them for others that had knowledge in the construction industry.

Thank you for your time and valuable feedback! Your constructive opinion will help how we shape each and everyone's professional opinion as we write our Bachelors Thesis.

The Interview Questions We Would Like You To Fill Out:

1. What are the benefits of a container house?
2. What are the drawbacks of a container house?
3. What are the trends in building / living and how do container houses fit in?
4. How do you see container homes being used in the future?
5. Which kind of businesses do you feel could be ran from a container?
6. What are the costs of building a simple container home?
7. What permits and building laws you need to be aware of?