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SERVICE DOMINATE LOGIC AND SUSTAINABILITY IN REAL ESTATE INDUSTRY

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Master in Management of Services and Technology

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INDUSTRY**

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Resumo

A sustentabilidade no imobiliário e em particular na construção tornou-se uma grande tendência e uma necessidade para fazer face à escassez de materiais, à durabilidade e resiliência dos negócios e ao apelo das necessidades sociais entre os diferentes tipos de stakeholders. Pela perspectiva da lógica dominante de serviço, a participação dos clientes no processo é evidente e ao mesmo tempo sublinha a dependência do sucesso desta nova tendência no comportamento dos stakeholders em relação à sustentabilidade. Portanto, esta pesquisa destaca o comportamento dos stakeholders, especialistas ou clientes finais, na aquisição de produtos e principalmente materiais de construção sustentáveis. Os resultados da pesquisa mostram que o critério mais importante na hora de tomar decisões de compra é o custo, independentemente de os stakeholders terem ou não conhecimento sobre sustentabilidade ou quer façam parte do processo de concepção ou não. Isto abre as portas a mais investigação sobre o comportamento das partes interessadas e como reduzir os custos de produtos e materiais de construção sustentáveis.

Palavras-Chave: sustentabilidade, imobiliário, construção, comportamento dos stakeholders, lógica dominante de serviço

Abstract

Sustainability in real estate and in particular in construction has become a major trend and a necessity to face the material's scarcity, business's durability and resilience and the call of the social needs between the different types of stakeholders. Through the lens of service dominant logic, the participation of the customers in the process is evident and at the same time underlines the dependence of the success of this new trend on the behaviour of the stakeholders in relation to sustainability. Therefore, this research subline the behaviour of the stakeholders, specialist or final customers, when purchasing products and especially sustainable construction materials. The results of the research show that the most important criteria when it comes to purchasing decisions is the cost, whether if the stakeholders have knowledge or no about sustainability or if they are part if the process of conception of a real property or no. This open the doors to more research about stakeholder's behaviour and how to reduce the costs of sustainable products and construction materials.

Key words: Sustainability, service dominant logic, real estate, construction, stakeholder behaviour

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Introduction

The world we know is changing at an unprecedented pace due to factors such as climate threats, a fast-growing population, resources getting scarce, and the rise of new technologies. Companies therefore need to adapt and evolve in a sustainable way in order to ensure success, revenue, and perennity. In recent years, many industries have undergone significant transformations driven by changing customers' preferences, environmental concerns, and the evolving role of technology. Sustainability, or the consideration of environmental, social, and economic impacts, has become a central focus within this transformation.

Real estate industry is not a particular case. It is one of the sectors that countries count on the most to ensure economic growth while being one of the largest contributors to CO2 emissions. The 2022 Global Status Report for Buildings and Construction states that between 2010 and 2021 the CO2 emissions in buildings is almost at 10 Giga tons

It is also a very complex and multi-disciplinary sector where the emergence of new processes to create value in a sustainable way is subject to resistance from its different actors. The adoption of sustainable practices in real estate should not be just a trend but a necessity as stakeholders demand more responsible and eco-friendly solutions.

A world built in such a way that the goal of 0 emissions by the horizon of 2050 is attained, buildings that are better designed to ensure the well-being of people, as well as a steady growth for the real estate companies are the three main objectives of the sector. As Portugal and Europe stride forward in their commitment to combat climate change and prioritize sustainable development, the construction industry emerges as a critical arena for transformative change. Amidst a rapidly urbanizing population and the challenges that energy consumption and housing affordability bring, “sustainable houses as a service” is a concept that should gain prominence as it offers a novel approach to harmonizing human habitation with ecological balance.

Portugal's dynamic landscape showcases the tension between preservation and progress. Urban centres have experienced exponential growth, fuelled by demographic shifts, tourism, and economic development. This phenomenon is particularly present in cities like Lisbon and Porto, where rising populations and increased housing demands have led to concerns about urban expansion, infrastructure strain, and environmental impact. As the country aspires to achieve its ambitious climate targets and transition towards a greener economy, reimagining the housing sector emerges as a pivotal step.

At the heart of this transformation lies the concept of Service Dominant Logic (SDL), which represents a shift in perspective from the traditional goods-dominant logic to one that emphasizes services as the primary value proposition. In the context of the real estate industry, this means viewing properties not merely as physical assets but as platforms for delivering services and experiences to occupants, communities, and the environment.

In his thesis, *Service-Dominant Logic and Sustainable Development*, Johannes Hogg (2021) indicates that “S-D logic’s narrative is the continuing story of actors interacting, resource integrating and exchanging service, and co-creating value through service ecosystems, governed and evaluated through their institutional arrangements. Though with regards to sustainable development the reflection on conceptualizing value co-destruction is critical.”

Thus, SDL emphasizes the co-creation of value through interactions between service providers (real estate developers, property managers, etc.) and customers (tenants, homeowners, investors) (Galera-Zarco and Campos, 2021). In sustainable real estate, this co-creation extends to environmental stewardship, where stakeholders work together to minimize the ecological footprint of properties (Fry and Egel, 2021). Sustainability is a central driver for the adoption of SDL in real estate, it involves incorporating green building practices, energy efficiency, renewable energy sources, waste reduction, and sustainable materials into property development and management (Parida and Wincent, 2019). These initiatives align with the broader societal and environmental goals of reducing carbon emissions and resource consumption.

On the other hand, SDL encourages real estate professionals to understand and cater to the diverse needs and preferences of occupants. Sustainable real estate focuses on creating healthier and more comfortable living and working environments, which contributes to tenant satisfaction and well-being (World Economic Forum Industry Agenda Council on the Future of Real Estate & Urbanization, 2016). SDL emphasizes the importance of engaging with local communities and understanding their needs. In sustainable real estate, this involves considerations such as affordable housing, community green spaces, and sustainable urban planning that benefits all stakeholders (Matemilola and Muraina, 2023).

Sustainable real estate can also attract responsible investors who are looking for both financial returns and environmental impact (Bügl et Al., 2009). SDL can help structure financial products that align with sustainability goals, such as green bonds and sustainable real estate investment trusts.

In summary, the integration of Service Dominant Logic and sustainability in the real estate industry and construction represents a paradigm shift that recognizes properties as dynamic platforms for delivering value and advancing environmental and social objectives (Reinhard, 2022). In fact, real

estate and construction are related but distinct industries that are often intertwined in the process of building and developing properties. (Ball, 2006). It requires collaboration among stakeholders, innovative technologies, and a commitment to creating spaces that not only serve the occupants but also contribute positively to the planet and local communities.

As a preliminary step to this study, it was important to research and understand the Real Estate industry and construction, the concept of sustainability and that of services, as well as their intersection. SDL has been adopted in real estate, and this adoption knew a relatively small improvement with practices being quite scarce (Palm, 2013). On the other hand, sustainability in Construction, the pillar of the sector of real estate and the one responsible for most of CO2 emissions, has gone through several improvements, such as Building certifications that were developed to give an answer to the high CO2 emissions.

While the benefits of adopting sustainable houses are clear in terms of environmental responsibility, cost savings, and improved quality of life, it's important to acknowledge that some studies suggest that many customers are still hesitant to prioritize sustainability when making purchasing decisions, especially regarding their level of knowledge about environmental, social and economic environment (Saari et al., 2021). And that awareness of environmental issues should bring a positive change to the customers behaviour regarding sustainability (linh et Al., 2022). Meanwhile, services in real estate is addressed as the future of real estate that depend on the enhancement of the managers to cope with customer's needs (Zighan et Al., 2018).

This thesis explores the concept of "Sustainable Houses as a Service" (Galera-Zarco and Campos, 2021) within the unique context of Portugal. Its overarching goal is to comprehensively analyse the potential, challenges, and implications of this innovative housing model. The research seeks to investigate the extent to which individuals, acting as consumers within the real estate sector, demonstrate a desire to acquire sustainable products, and how the importance of sustainability criteria is reflected in their purchasing choices (Martinez and Olander, 2015). This research tries to understand the impact of respondents' commitment to sustainable development and their personal understanding of the concept on the prioritization of criteria in their purchasing decisions. A quantitative research methodology was used to have a deep picture about the attitude of the consumers, how they identify a product as sustainable, and whether they base their purchasing decisions on this criterion or no and also to quantify the interest that consumers have toward services in real estate and construction. And a qualitative one was used through an interview to understand the behaviour of specialists regarding sustainability and services in real estate and construction.

Stakeholder engagement regarding sustainability is a crucial aspect of any organization's efforts to promote environmental, social, and economic sustainability (Bal et Al., 2013). However, there can be several barriers and challenges to adopting sustainability practices, and these challenges often intersect with the stakeholder engagement process specially the customers (Sattari et Al., 2020). We can then define the research problem using the following research question “how the understanding of the customer involvement and engagement is important in promoting sustainable behaviours and practices within the construction and real estate industry?”.

To explore the extent of this research problem, five assumptions were formulated and evaluated through quantitative and qualitative research. Customer behaviour regarding sustainability can be complex and multifaceted. The quantitative methodology approach was selected through a survey, because it can allow for comparisons across different motivations and levels of understanding of the studied subject. This can help identify variations in sustainability behaviour and potential factors contributing to those variations. The qualitative one was addressed though an interview with a specialist to understand the reactions of the stakeholders regarding this new trends.

The research consisted of an online survey and an interview to understand how customers understand sustainability, how they base their purchase choices, how the construction specialist sees sustainability, and finally how customers would react if they are part of the project from the beginning. To understand how real estate specialists, understand SDL an interview was conducted with a project manager to describe the practices and the outcomes of SDL in real estate.

The obtained results as an answer to the five assumptions were that customers are aware of what sustainability is, that there is a need to adopt sustainability and SDL in real estate industry, but that there is still a long way to go before professionals and customers strongly adopt this approach.

The thesis starts with a Literature review, followed by a description of the methodology that was used and how the data was collected and analysed, and then presents the final results. This section provides a data analysis in order to validate or refute the formulated assumptions leading to the conclusion and the recommendations

Chapter 1

Literature review

1.1 Real estate industry:

Real estate industry is transforming any raw land into any development that can be realised on it (Gehner, 2008). The real estate industry is a broad and multifaceted sector of the economy that encompasses the buying, selling, development, management, and investment in real property (Martinez and Olander, 2015).

The need of transforming this raw land is a market need of urbanisation (Barlowe, 1978). Depending on the country, this need can arise from a political impulse for example to build more residential products, new hospitals, bridges, dams or economical investment like new industries (Ratcliffe et al., 2004). Or this need can arise simply to satisfy the demand for building more houses, apartments, ...

We can define 5 main types of properties:

- Residential: in this category we can talk about construction or resales. This aspect of the industry focuses on properties intended for personal use and it includes apartments, houses, duplexes,
- Commercial: Commercial real estate involves properties used for business and income-generating purposes. This category includes office buildings, retail spaces, industrial properties, warehouses, hotels, and other commercial real estate assets like shopping centres, educational and medical buildings, hotels, and offices
- Industrial - This kind of real estate includes manufacturing buildings and property, including warehouses. There can be various uses for industrial buildings such as research, production, distribution, and storage of goods. However, buildings where goods are distributed, are considered as commercial real estate
- Land - Land can either mean vacant land, ranches, or working farms. Subcategories of this kind of real estate include undeveloped, early development or reuse, subdivisions, and site assembly
- Public buildings, like dams, bridges...

The development of these property types is contingent on the type of customers they cater to. In each scenario, distinct processes are followed, and the level of interaction among various stakeholders varies (Klimczak, 2010). Customers in the real estate industry can include a wide range of individuals, organizations, and entities, depending on the specific segment of the real estate market and the type

of real estate service or product involved. And from the classification of the different properties we can define the different types of customers:

- The customers that express the need of buying, renting or selling residential properties or lands.
- The customers that are investors, retailers, hotels owners, factories owners and in any case customers that need properties to conduct business.
- The state for the public buildings.

Each type of properties and customers need a different development. For the real estate developers, the concretisation of the project starts, like said before, from a market need.

The real estate industry is characterized by its complex and interconnected nature, as it involves a wide range of professionals and services working together to facilitate property transactions, property management, and investment. It is a significant driver of economic activity and has a profound impact on both urban and rural landscapes.

The real estate development projects operate based on the traditional operating model Design-Build-Market-Sell (Zighan et Al., 2018). This means that the strategic decision or the project concept is usually defined by the real estate developers, in terms of location, properties type, prices and costs.

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The path used can be defined in the following:

- Finding the good land or location. from a location to another the requirements set by the urbanisation agencies are different.
- Defining the type of properties. in term of budget, surfaces, number of rooms ...
- Setting up the business plan of the project to define the budget of construction and the prices of the properties
- Developing the plans with architects
- Developing the technical aspects and finding the right subcontractors and proceed to the construction process.

- Developing the marketing and commercialisation aspects

Construction in the context of real estate refers to the physical process of building or renovating structures on a piece of real property, such as residential or commercial buildings, homes, apartment complexes, office buildings, and various types of infrastructure. In the real estate industry, construction is a crucial component of property development and plays a significant role in bringing real estate projects to fruition. Thus, construction in real estate refers to the practical implementation of plans and designs to create or modify buildings and infrastructure on real property. It is an integral part of the overall real estate development process, and successful construction is essential for bringing real estate projects to market and maximizing their value (Ball, 2006).

In this kind of business, the investments are very high and the main objective of the developers is to reduce the costs and the value of the project is reached on the phase of the delivery to the customers (Keegan and Turner, 2001).

1.2 the theory of services

1.2.1 History of services

Through history, it was always hard to draw a clear line to separate goods from services. When the industrial era starts and with the new technologies and machines that were developed, some business were more good dominants than service dominant. For some type of business, like health care, legal services it goes without saying that customized services were a necessity. For others, the technologies, the scarcity of raw material and competencies at that time allowed mass production but not customization the way we know it now. But even in this case the notion of services was present, the quantity of different types of goods manufactured and sometimes the after services provided to the top customers underline the direction that the companies providing those goods were taking (Charles and Martin, 1999).

The mass production pushed the managers to think more about production effectiveness and efficiency, the back office of mass production is characterized then by Labour productivity, Mechanized assembly line, the economic order quantity model, Set up costs, Standardization of products and best practices and Economies of scale – low costs (Vargo and Lusch, 2007).

This is explained by the starting investment and oriented companies to trying to reduce the costs of production. We need to underline here, that the production costs are dependent on the costs of raw material, the cost of workforce and among others the costs of changing a tool from one kind of product to another that represent the time when the production will be stopped and then it is translated by lost productivity.

1.2.2 New perception from goods dominants to service dominant

Nowadays, and with the intensive competition between companies, the notion of services gained a bigger place in the way the companies manage their business. The manufacturers embraced more the strategy of service dominant logic than goods dominant logic. This helps company to develop a competitive advantage that allows them to make a distinction from their competitors. Then the strategy of services, driven by a financial or market needs, seems necessary to be implemented and followed (Baines et al., 2009a). Many companies oriented their offers from goods-dominant to a service-dominant logic. By doing this the companies are putting the market need in the centre of their strategies. The internal competencies are oriented to achieve this role in the back office and in the front office by integrating the final customers in the different phases of the company's processes.

In the last decades, the concept of services has been highlighted and defines as:

- Services are intangible: services cannot be touch or exactly described, or given an exact value.
- Services are heterogenous: they can't be repeated; each service is a unique experience and vary from a service provider to another and from a customer to another.
- Services are Perishable: a service is consumed as soon as it is produced. Unlike products, the service cannot be stored for later use. Perishable services are such as airline flights, auto repair, theatre entertainment.
- Services are Simultaneous/inseparable: a service characteristic relating to businesses that can only provide services while a consumer is present and actively consuming them.

1.2.3. The customers role

The customer holds a new role in the service dominant logic theory, because he becomes a co-creator of value and he is who determines it. Indeed, the service is valued only when he uses it. As this use varies among individuals, the value of the service also varies. Then the customers hold different roles:

- The customer participation: it refers to the active engagement and collaboration of customers in various aspects of a business, product, or service development, delivery, or improvement. It is a strategy that encourages customers to play an active role in shaping their own experiences and the offerings of a business
- The customer satisfaction: The goal of customer participation is to create a sense of ownership and co-responsibility in the customer experience. It can lead to better customer satisfaction, a deeper understanding of customer needs, increased innovation, and improved brand loyalty. A positive

feedback not only encourage and confirm the strategy and approving the expectations and performance of the companies

- The customer company identification: is establishing a social relationship between the company and its customers. When a customer identifies with the company, they will become ambassadors and strong advocate of the company. It will be translated to a long-term commitment and establishing the company in the long term in the market. This will allow the company to creates positives results (Reichheld and Sasser, 1990)

- The customer loyalty: conserving the loyalty of the customers is one of the most vital mission of a company. The loyalty of the customers expresses the will of a customers to repeat the purchase from the same company rather than the company competitors. Loyal customers may be willing to repurchase and spread a positive word of mouth (Zeithaml, Berry, and Parasuraman, 1996).

1.3 Sustainability

1.3.1 Historical introduction

Sustainability is how to satisfy the current needs without compromising the needs of next generations. The concept of sustainability finds his foundation in the Brundtland Report of 1987 and it consists on finding a balance between the economic growth, the availability of resources and the well-being of humans. It means that sustainability has 3 axes that are economic, environmental and social.

2.3.2 The different type of sustainability

- The environmental sustainability is how to preserve the biodiversity without relinquishing the economic growth or the well-being of the people. It is the way to interact with the planet responsibly without depletion of the resources and without threatening the future of the next generations. It refers to the practice of utilizing natural resources and managing the environment in a way that preserves and enhances ecological balance, safeguards the planet's biodiversity, and ensures the long-term viability of natural systems. It involves responsible and mindful stewardship of the Earth's resources to meet the needs of the present without compromising the ability of future generations to meet their own needs. Overall, environmental sustainability aims to maintain the health and resilience of natural systems while meeting the needs of the present and future generations.

- The social sustainability refers to the long-term maintenance of social well-being and the overall quality of life within a community or society. It involves strategies and initiatives aimed at creating and maintaining a harmonious, inclusive, and equitable society where people can lead fulfilling lives without compromising the well-being of future generations. Social sustainability encompasses various aspects like equity and Inclusion, community and cultural Preservation, Access to Basic Services...

- The economical sustainability is how a company can manage its resources and revenue to ensure a responsible growth in the long term without impacting the social, environmental, and cultural aspects of a community. It encourages long-term thinking and planning in economic policies, including investments in infrastructure, technology, and human capital. Economic systems should be designed to be resilient and adaptable over time. Economic sustainability also relates to the stability of financial systems, including the avoidance of excessive debt, speculation, and financial crises. A stable financial system is considered essential for long-term economic health.

1.3.3. Why sustainability is important for companies

For companies, sustainability is more than a moral duty. It is the way to approach business in the perspective to create long term value taking in consideration the environmental, social and economic factors.

It is a strategy that ensure growth without scarifying profits and ensuring the viability of the resources in terms of competencies and natural resources (Reim et Al. (2015)). There are many advantages for the companies to embrace sustainability:

- Building customers loyalty: More and more customers are aware of the importance of sustainability. It becomes a key factor for a customer to decide from which company he wants to buy. Thus, sustainability become a differentiation that helps the company to build a competitive advantage over the competitors
- Reducing costs, increasing revenues: Many sustainability initiatives, such as energy efficiency, waste reduction, and sustainable sourcing, can lead to cost savings. By using resources more efficiently, companies can lower their operational expense.
- Attracting investments: Like for customers, many investors and funds are more interested by investing in sustainable companies.
- Innovation: Focusing on sustainability often drives innovation. Companies that seek more sustainable solutions may discover new products, processes, and technologies that can create a competitive edge.
- Employee Engagement: Sustainability initiatives can boost employee morale and engagement. Employees often take pride in working for a socially responsible company and may be more motivated to contribute to sustainability efforts
- Reducing the employees turn over: One of the aspects of sustainability is the social factor. Then employees are more likely to stay in companies that take this factor in account. Providing an environment where inclusion and difference is important

- Stakeholder Expectations: Customers, investors, and other stakeholders are increasingly demanding transparency and accountability regarding a company's sustainability practices. Meeting these expectations is essential for maintaining strong relationships with stakeholders.

- Global Trends: Sustainability is a global trend, and companies that do not adopt sustainable practices may face reputational damage and backlash from consumers and activists. (Galera-Zarco and Campos, 2021)

1.4 The intersection between the real estate industry, services and sustainability

1.4.1 Sustainability in real estate:

in 2021 US\$ 6,883 Billion was the value reached by the global real estate market and this industry contributed by €452 billion to the EU economy in 2019 (INREV).

40% of Carbon emission comes from real estate industry and each 1 tonne of concrete produce 900 Kg of carbons. In 2016, 111 million tonnes of clinker were produced what means almost 100 million tonnes of carbon emissions only in Europe (Matemilola and Muraina, 2023).

In other terms, the real estate industry is responsible for around 8% of global energy and process-related CO₂ emissions resulted from the use of fossil fuels plus 19% from the production of electricity and heat used by the properties users and plus another 6% due to the production of cement, steel and aluminium used for the construction (European commission 2018).

For any construction project, we identify two different sources of CO₂ emissions. Direct emission and indirect emission. The first one is the CO₂ generated for the energy consumption at the site and all the construction activities and second one is the CO₂ emission due to the manufacturing and the delivery of the construction material.

Regarding the choice of material used on the construction, we can achieve more sustainable properties that can reduce the carbon foot print for the customers. For example, some material can improve temperature inside the properties, meaning that, for example the houses can be cold in summer and hot in winter and by complementing with the installation of a renewable source of electricity we can reduce the energy bill for the customers (Karlsson et Al., 2021).

Many certifications were developed to address the pressing need for sustainable, environmentally responsible construction practices. They serve as guidelines and incentives for builders, designers, and developers to create structures that are more energy-efficient, environmentally friendly, and conducive to the well-being of occupants. These certifications play a pivotal role in driving positive change in the construction industry and aligning it with sustainable development goals like the LEED

certification, the DGNB certification, The BREEAM certification amongst many others (Hamedani and Huber, 2012).

1.4.2 What are the services provided in real estate?

In this industry, we can define different types of roles and businesses. From the real estate developer to brokers. In this study we will focus on the real estate developers that develop big project, meaning with a big number of units of properties. And the services that they provide:

- brochure, catalogue and mock up model: the developers build a mock up model that will represent what the final products will be. this is needed when the developers sell on plan the properties and it helps the customers to see the final product.
- interaction with the commercialisation team to find the right product, in term of budget, size, number of rooms...in some development company a certain level of customization can be proposed for example the decoration. Most of the time the real estate developers will propose different type of properties, the mock up model will represent the dominant. They can propose also some financial services like how to build a loan file, insurance for the property, law advices ...
- the delivery: it is a process where the commercial and technical team meet with customers to visit the property before delivering it. In this visit, the customer may rise some remarques that can be corrected and solved before delivering, in this case of real estate industry, the keys of the property
- after sell services: it occurs when after the delivery some technical problems need to be solved.

Like we can see the services, for this type of industry, provided are very limited. And it is due to the model followed by the developers Design-Build-Market-Sell (Zighan et Al., 2018). The interaction with the customers occurs in very determined phases of the development of the project. The customers do not participate in the conception of the plans, or the choice of the subcontractor, or the choice of the construction materials. Even though a new segment of customers that cares more about climate change and sustainability can improve, by their participation, the products and the revenues of the real estate companies.

The case is different for a real estate brokerage agency, since the services provided by the realtors is to facilitate the transaction between buyers and sellers of the properties. This implies that the services are:

- helping the sellers to set the exact price for the property. This price depends on the location, the year of construction, the surface of the good, the number of rooms
- helping the buyers to match their needs, in terms of the budget that they are willing to spend for the acquisition of the property with the characteristics that they want

- helping the transaction between the seller and the buyer, sometimes by proposing to help in the construction of the loan file and directing their customers to the best banking agencies

as describe above, the main difference between brokers and developers that the service landscape is different. For the brokers the properties are already built for the second one they are still a project.

The possibility of the customization in the case of a real estate developer is higher than in the case of the brokers agencies. But the interaction of the customers is the same.

Then , in the case of real estate developer, since the mock up model represent the standard offer, the possible customisation for the customers is the choice of , for example, the material for the floor, the painting of the walls , the equipment for the kitchen , sometimes even the change of the layout (size of the rooms, the walls,..)

The existing literature doesn't explain how sustainability, as a service approach, can help stimulating this sector (Galera-Zarco and Campos, 2021). It only explains or that services help building a competitive advantage when a company adopt a service dominant logic or that sustainability is the mega trend and that can be followed if companies want to be more competitive and to achieve durability in this changing market.

In the market, there are real estate companies that are implementing sustainability services strategies in their business, like Sonae Sierra or Colliers. Their main goal is to propose to their customers services that will help reducing energy and water consumption and a better use of waste.

Chapter 2

Methodology

2.1 research problem and assumptions

The overall objective is to define how consumers by involving them from the beginning in the design of the project of their property can impact the performance of this industry and at the same time influence the main actors to choose sustainable methods and sustainable construction materials.

It has become evident throughout the literature review that consumer purchasing decisions made at an early stage of product design play a key role in any industry.

As such, their attitude towards sustainability will have a major impact on the development of a more sustainable real estate industry.

This therefore involves understanding how consumers react to the concept of sustainability, how they define it, do they show an interest in buying sustainable products and in particular in choosing sustainable building materials when designing their projects. What criteria do they use when making these purchases? And finally, to check the possibility of the actors of this industry to adopt a sustainable way of building.

To answer those questions, the following assumptions were put forward and a mixed methodology was used to address this topic by answering the 4 first assumptions and a qualitative methodology to answer the last assumption:

- Assumption 1: The understanding of sustainability by the customers doesn't make them buy sustainable products.
- Assumption 2: When it comes to construction, even if the customers have a good understanding of sustainability, the criteria to purchase sustainable products are not objective.
- Assumption 3: Construction professionals will choose price of material than sustainability of materials.
- Assumption 4: Customers will be satisfied when they will be part of the conception of the property from scratch.
- Assumption 5: construction specialists will show resistance adopting an SDL approach in sustainable construction.

2.2 Survey construction

Building a questionnaire is of crucial importance for several reasons:

- Targeted data collection: A well-designed questionnaire allows to collect data specifically related to the main objectives. Accurate information can be obtained on the attitudes, behaviours, opinions and knowledge of those involved in the real estate industry in relation to sustainability.
- Validation of assumptions: Questionnaires are used to test the assumptions. By asking specific questions, data can be gathered that supports or refute assumptions, which adds credibility to the conclusions.
- Impact measurement: The impact of sustainability initiatives can be gauged in the construction industry by asking respondents for their opinion on topics such as the use of green materials, energy efficiency, and building practices durable.
- Understanding behaviours: The questionnaires help understand the factors that influence the decisions of construction professionals and consumers regarding sustainability. It helps finding out what drives or hinders the adoption of sustainable practices.
- Identifying gaps: A good questionnaire can reveal knowledge gaps or misunderstandings about sustainability in the construction industry. This can help guide awareness and education in this area.
- Database for future analyses: The data collected through the questionnaire constitutes a valuable database that can be used for future analyses, other research and to compare the results with other studies.
- Solid empirical foundation: The results from a questionnaire provide a solid empirical basis to support arguments and conclusions.

To summarize, a well-constructed questionnaire allows to collect relevant data, analyse trends and behaviours, test the assumptions and offer tangible information that enriches this topic of sustainability in real estate.

Therefore, building a questionnaire requires careful planning to ensure that relevant and reliable data is collected. This methodology encompasses several steps, including:

- Clarity of thesis objectives and questions to be explored regarding sustainability in construction.
- Formulation of specific and appropriate questions for each theme identified.
- The appropriate choice of various types of questions to obtain a variety of data.
- The logical organization of the questionnaire, starting with demographic questions.

- Developing clear and objective questions, avoiding technical jargon.
- Testing the questionnaire with a small group to identify possible problems and make adjustments.
- The final revision of the questionnaire to remove any ambiguity and ensure conciseness.
- The distribution of the questionnaire to a representative sample, followed by the analysis of the data collected.

To conclude, a well-designed questionnaire ensures the collection of relevant data, validates assumptions, explores behaviours and reveals gaps, thus strengthening the credibility and validity of the thesis on sustainability in construction. The figure 1 shows the survey used to verify the four assumptions formulated above:

Figure 2.1 : survey used to collect data

Questions	Answers
What is your gender	1- Female 2- Male
What is your age	1- <18 2- 18-27 3- 28-40 4- 41-60 5- >60
What is your degree	1- Basic or high school level 2- Bachelor 3- Master
What do you understand by "sustainability"	1- Preservation of resources 2- Recycling 3- Energetic efficiency 4- Environmental action 5- Economic Action 6- Socially responsible and fair action. 7- All
When buying, do you consider the sustainability of the products	1- Always 2- Never 3- sometimes
What is generally important to you in terms of sustainability when buying products	1- regional production 2- Recyclability of the product 3- Production under fair working conditions 4- Low energy and CO2 emissions in production 5- Proportion of recycled material in the product.
What attribute is most likely to indicate that these criteria are being met?	1- Certificates/Labels 2- External appearance 3- Detailed product information.
Where do you get your product sustainability information?	1- Social media 2- Scientific articles and magazines 3- Product manufacturer

	<ul style="list-style-type: none"> 4- Friends and acquaintances 5- Daily newspaper 6- Info events and trade fairs.
In your opinion, what is the importance of a sustainability assessment in the construction sector?	<ul style="list-style-type: none"> 1- Important 2- Rather important 3- Neutral 4- Rather unimportant 5- Unimportant.
Do you have any experience in the construction industry, and if so, what kind?	<ul style="list-style-type: none"> 1- Yes, through higher education studies 2- Yes, through the profession 3- Yes, through a real estate purchase 4- Yes, through regular private engagement 5- I have no experience until now
What criteria are most relevant to you when making a purchase decision for a specific construction product?	<ul style="list-style-type: none"> 1- Price 2- External appearance 3- Durability 4- Sustainability of materials 5- Energetic efficiency 6- Consultation by experts
What do you understand by sustainability in the construction sector?	<ul style="list-style-type: none"> 1- Recyclability at the end of the product's lifetime; 2- Durability 3- Cost saving construction 4- Optimized use of energy and resources 5- Low environmental footprint 6- Fair working conditions 7- Proportion of recycled material in the product.
Which of the following construction sector sustainability certificates do you know?	<ul style="list-style-type: none"> 1- DGNB 2- BREEAM 3- VinylPlus 4- LEED 5- None
If you intend to buy a property from a real estate developer and you are involved from the beginning in drawing up the plans, will you opt for durable materials?	<ul style="list-style-type: none"> 1- Yes 2- No
If you are involved in the development of the plans, you will be	<ul style="list-style-type: none"> 1- Satisfied 2- Faithful to the developer 3- None of this

2.3 Sample size

In quantitative research, the sample size refers to the number of subjects or observations included in a study. It represents a subset of the population from which data is collected to make inferences about the entire population. The sample size is a critical consideration in quantitative research because it can have a significant impact on the reliability and generalizability of study results.

To verify the minimum needed of surveyed persons needed to be able to give a better understanding to this phenomenon, we used the formula bellow:

$$n = \frac{N}{1 + \left(\frac{(N-1) \times e^2}{z^2 \times p \times (1-p)} \right)} \quad (1)$$

In this formula:

- n is the required sample size.
- e is the error margin that can be accepted. It reflects how much it is allowed the estimate to vary from the true population proportion
- z is the Z-score corresponding to the desired confidence level. For example, with a 95% confidence level, the Z-score would be approximately 1.96 and for a confidence level of 90% , the Z-score is 1,65.
- p is the standard deviation

The population of Portugal is 10 million and the population over 18 years is 8 Million. To determine the sample size, we used this equation and the obtained result is 324 with an error margin of 5%.

To analyse the data collected, the program SPSS was used. SPSS stands for "The Psychological Statistical Package." It is a free and open-source software application used for statistical analysis of data. We used the χ -square test that is used to analyse the relationship between categorical variables. It assesses whether there is a significant association or difference between the observed frequencies in a contingency table and the frequencies that would be expected if the variables were independent

2.4 Interview construction

The interview is centred around Service-Dominant Logic (SDL) principles in a sustainable approach with a construction specialist holds significant merit within the context of this study. As the construction industry experiences a transformative shift towards customer-centric approaches, understanding how SDL concepts intersect with construction practices is essential. By engaging in an in-depth conversation with a construction specialist, this interview aims to uncover insights into the integration of service-oriented perspectives within the traditionally product-focused construction domain. The specialist's expertise will provide invaluable perspectives on how the principles of value co-creation, customer engagement, and sustainable service offerings can be harnessed to shape the future landscape of construction practices. This interview serves as a means to bridge the gap between service-dominant theory and its practical implementation within the construction industry, offering a unique lens through which to explore the convergence of customer-centricity and construction excellence. That last assumption was verified through an interview with a specialist.

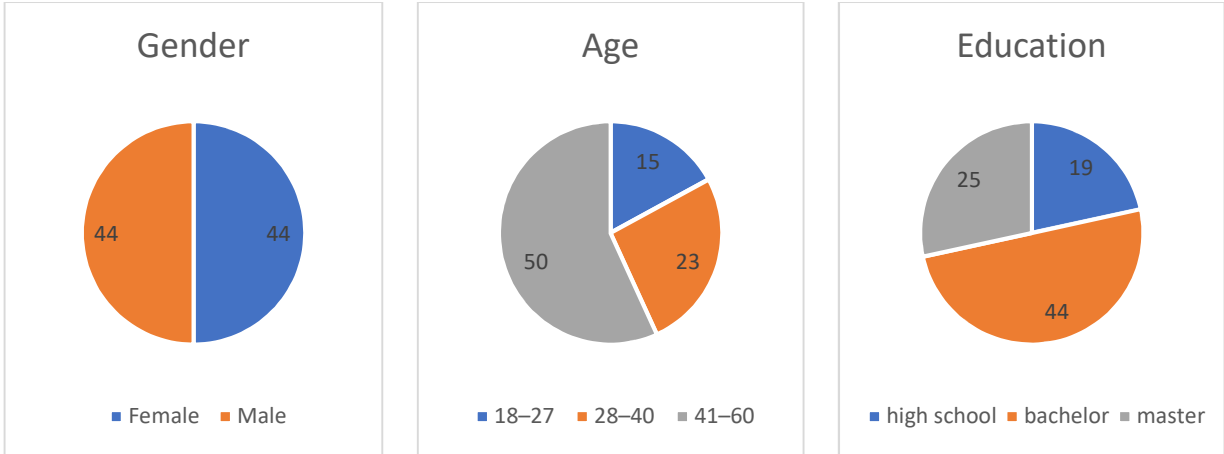
Chapter 3

Results and discussion

the survey was lunched to collect quantitative data, through the different social media, Facebook, Instagram, WhatsApp and LinkedIn. We collected 88 answers and it is smaller than the sample size calculated. This number of answers is higher than a sample size calculated with an error margin of 10% and then a Z-score of 1,65.

The gender composition was equal between females and males, we received 44 answers from females and 44 answers from males. 56,2% of this population are aged between 41-60 years followed by 25,8% that have an age between 28 and 40 and the remaining 18% have more than 18 and less than 28 years. 50% of the respondent have a bachelor degree, flowed by 28% that have a master degree and the remaining have a basic or secondary degree.

Figure 3.1: general statistics of gender, Age and education level of the surveyed

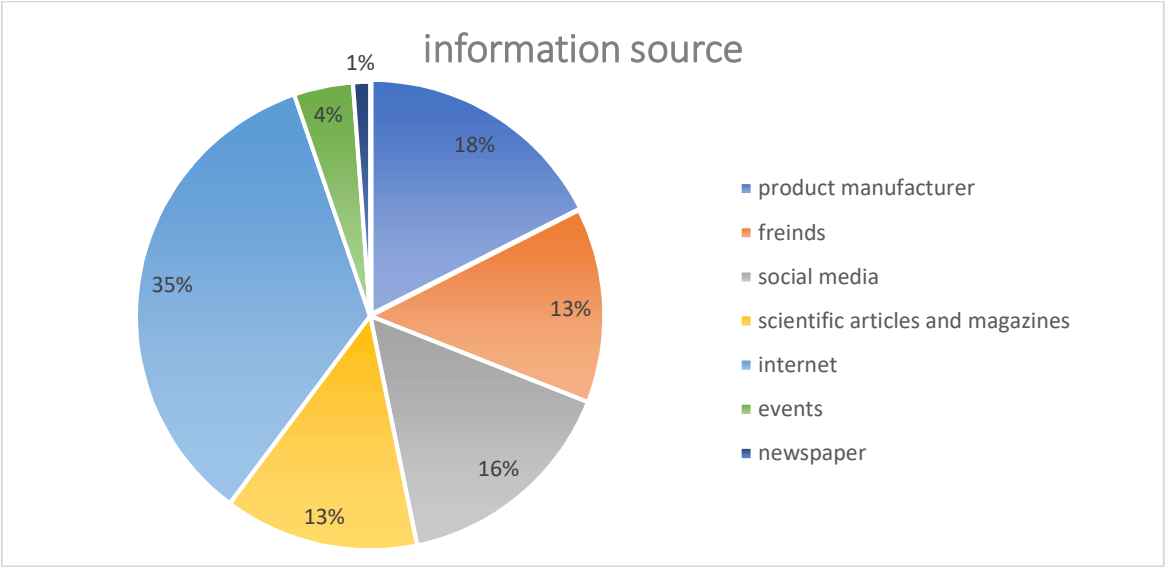


When asked what does mean sustainability, 70% of the respondents said that sustainability is the preservation of the resources, the recyclability of the products, the energy efficiency, the environmental action, the economic action and the socially responsible and fair action. The second most significant answers were the definition of sustainability as the preservation of the resources, the energy efficiency, the environmental action and the socially responsible and fair action.

37% of them say that, to know if a product is sustainable according to their definition of sustainability, they refer to the detailed information appearing on the product. 31% of respondents say they refer to product certificates. 5% say they base themselves on the external appearance of the product and 25% say they base themselves on all these criteria to know if a product is sustainable.

When asked from where they get the information to know if a product to be purchased is sustainable, 35% said through the internet, 18% from the product manufacturer, 16% from social media, 13% from friends, 13% from scientific articles and the remaining 5% from events and fairs.

Figure 3.2: source of sustainability information



About the importance of the sustainability in the construction, 48% of the respondents said that is very important, 38% said that is important and the 14% left are divided between neutral and not important.

3.1 Assumption 1

Using the χ -square test from SPSS, we crossed the answers of defining sustainability with the everyday behaviour when the respondents buy products. The results are shown in the table below figure 2. This test shows that even if the respondents understand the meaning of sustainability, it does not mean necessary that they will choose to buy sustainable products in their everyday purchases. Through the data that was collected we can see that 21,3% define sustainability as preservation of the resources, recyclability of the products, energy efficiency, environmental action, economic action and socially responsible and fair action and said that when buying a product, they always consider buying sustainable products. Meanwhile we have 53,9% of the respondents with a complete understanding of sustainability sometimes consider buying a sustainable product.

Figure 3.3: First assumption simulation results

► Crosstabs

/STATISTICS=CHISQ
/CELLS=COUNT ROW COLUMN TOTAL.

Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
sustainabilidade × produtos	89	100,0%	0	,0%	89	100,0%

sustainabilidade × produtos

		produtos				Total
		3	5	7		
sustainabilidade	Count	1	0	0	0	1
	Row %	100,0%	,0%	,0%	,0%	100,0%
	Column %	100,0%	,0%	,0%	,0%	1,1%
	Total %	1,1%	,0%	,0%	,0%	1,1%
6	Count	0	0	5	1	6
	Row %	,0%	,0%	83,3%	16,7%	100,0%
	Column %	,0%	,0%	7,8%	4,3%	6,7%
	Total %	,0%	,0%	5,6%	1,1%	6,7%
1	Count	0	0	6	0	6
	Row %	,0%	,0%	100,0%	,0%	100,0%
	Column %	,0%	,0%	9,4%	,0%	6,7%
	Total %	,0%	,0%	6,7%	,0%	6,7%
8	Count	0	0	4	3	7
	Row %	,0%	,0%	57,1%	42,9%	100,0%
	Column %	,0%	,0%	6,3%	13,0%	7,9%
	Total %	,0%	,0%	4,5%	3,4%	7,9%
9	Count	0	0	1	0	1
	Row %	,0%	,0%	100,0%	,0%	100,0%
	Column %	,0%	,0%	1,6%	,0%	1,1%
	Total %	,0%	,0%	1,1%	,0%	1,1%
7	Count	0	1	48	19	68
	Row %	,0%	1,5%	70,6%	27,9%	100,0%
	Column %	,0%	100,0%	75,0%	82,6%	76,4%
	Total %	,0%	1,1%	53,9%	21,3%	76,4%
Total	Count	1	1	64	23	89
	Row %	1,1%	1,1%	71,9%	25,8%	100,0%
	Column %	100,0%	100,0%	100,0%	100,0%	100,0%
	Total %	1,1%	1,1%	71,9%	25,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Sig. (2-tailed)
Pearson Chi-Square	93,30	15	,000
Likelihood Ratio	17,11	15	,312
N of Valid Cases	89		

To verify this assumption, the T test was used to be without any doubt sure that even if the customers are fully aware of what mean sustainability, their behaviour when purchasing products will not push them to purchase sustainable products.

The assumption was tested with a significative level of 10%, since the sample size is of 88 responds. That means that the degree of freedom is 87 and from the T table we have a Tc equal to 1,291

$$H_0(\text{nulle hypothesis}) = \mu_d < 2 \quad (2)$$

$$H_a(\text{alternative hypothesis}) = \mu_a \geq 2 \quad (3)$$

$$\bar{X}_d = 2,25 \quad (4)$$

$$S_d = 0,46 \quad (5)$$

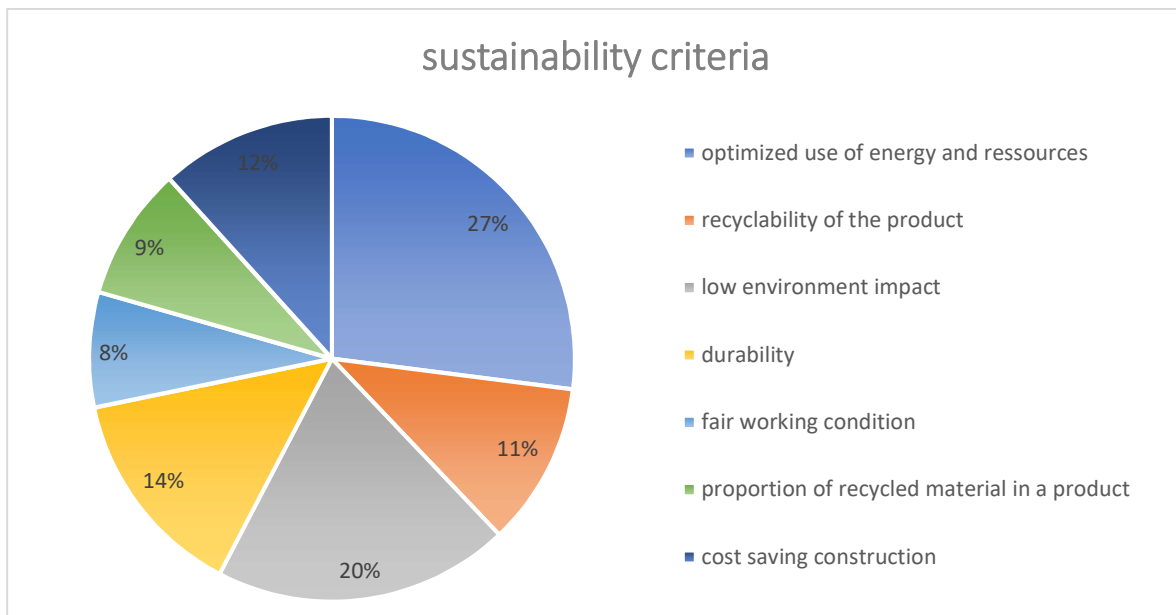
$$T_{critic} = 5,09 \quad (6)$$

Consequently, T_{critic} is superior to 1, 291 and this means that null assumption is rejected with a significative level of 10%. The assumption then is fulfilled and we can say that even if the customers understand very well what is sustainability, they don't systematically buy sustainable products.

3.2 Assumption 2

When the respondents were asked what are the criteria that are important for them regarding the sustainability in construction, optimized use of energy and resources appeared 67 time in the answers collected, followed by low environment impact that appeared 49 time, durability 35 time, cost saving construction 29 time, recyclability of the product 27 time, the proportion of recyclable material in a product 22 time and finally faire working condition that appeared 19 times. The percentage of appearance of each answer are shown in the figure below:

Figure 3.4 : sustainability criteria in construction



Using the χ -square test from PSPP, we crossed this data with the one stating from where the respondents verify if a product is sustainable or no, we had 40 % that said that all the criteria showed in the figure 4.5 are important and that to verify if a product respect all those criteria they use internet, social media, their friends, events and fairs, scientific magazines and newspaper. For the respondents for whom the recyclability of the products is the most important, 18% said that like the first group, they use all the channels to verify if the product they are purchasing is sustainable.

Figure 3.5: Second assumption simulation results, sustainability criteria versus sustainability source of information

▶ Crosstabs		Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
importancia × onde		89	100,0%	0	,0%	89	100,0%

		importancia × onde								
		onde								
		4	2	6	3	7	1	8	Total	
importancia	Count	1	0	0	0	0	0	0	1	
	Row %	100,0%	,0%	,0%	,0%	,0%	,0%	,0%	100,0%	
	Column %	100,0%	,0%	,0%	,0%	,0%	,0%	,0%	1,1%	
	Total %	1,1%	,0%	,0%	,0%	,0%	,0%	,0%	1,1%	
4	Count	0	0	0	1	1	1	0	3	
	Row %	,0%	,0%	,0%	,0%	33,3%	33,3%	,0%	100,0%	
	Column %	,0%	,0%	,0%	12,5%	11,1%	9,1%	,0%	3,4%	
	Total %	,0%	,0%	,0%	1,1%	1,1%	1,1%	,0%	3,4%	
1	Count	0	1	0	0	3	2	0	9	
	Row %	,0%	11,1%	,0%	,0%	33,3%	22,2%	,0%	100,0%	
	Column %	,0%	50,0%	,0%	,0%	37,5%	22,2%	,0%	10,1%	
	Total %	,0%	1,1%	,0%	,0%	3,4%	2,2%	,0%	10,1%	
3	Count	0	0	0	0	2	0	0	3	
	Row %	,0%	,0%	,0%	,0%	66,7%	,0%	,0%	100,0%	
	Column %	,0%	,0%	,0%	,0%	25,0%	,0%	,0%	3,4%	
	Total %	,0%	,0%	,0%	,0%	2,2%	,0%	,0%	3,4%	
5	Count	0	0	0	0	0	0	1	1	
	Row %	,0%	,0%	,0%	,0%	,0%	,0%	100,0%	100,0%	
	Column %	,0%	,0%	,0%	,0%	,0%	,0%	9,1%	1,1%	
	Total %	,0%	,0%	,0%	,0%	,0%	,0%	1,1%	1,1%	
2	Count	0	0	1	1	0	3	8	29	
	Row %	,0%	,0%	3,4%	3,4%	,0%	10,3%	27,6%	100,0%	
	Column %	,0%	,0%	100,0%	100,0%	,0%	33,3%	72,7%	32,6%	
	Total %	,0%	,0%	1,1%	1,1%	,0%	3,4%	9,0%	32,6%	
6	Count	0	1	0	0	2	3	1	43	
	Row %	,0%	2,3%	,0%	,0%	4,7%	7,0%	2,3%	100,0%	
	Column %	,0%	50,0%	,0%	,0%	25,0%	33,3%	9,1%	48,3%	
	Total %	,0%	1,1%	,0%	,0%	2,2%	3,4%	1,1%	48,3%	
Total	Count	1	2	1	1	8	9	11	89	
	Row %	1,1%	2,2%	1,1%	1,1%	9,0%	10,1%	12,4%	100,0%	
	Column %	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	
	Total %	1,1%	2,2%	1,1%	1,1%	9,0%	10,1%	12,4%	100,0%	

Chi-Square Tests			
	Value	df	Asymptotic Sig. (2-tailed)
Pearson Chi-Square	148,53	42	,000
Likelihood Ratio	62,98	42	,020
N of Valid Cases	89		

We crossed the data regarding from where the respondents get the information to verify the sustainability of a products with what attribute they use and the results were the following as shown in the figure 4.6:

- 22 respondents using all the verification channels (internet, social media...) uses the information appearing on the product
- 19 respondents that uses all the verification channels uses the information on top of the products, the appearance of the product and the product certificate to verify the product sustainability
- 12 respondents that uses all the verification channels said that the appearance of the product is enough to know if the product is sustainable or no.

Figure 3.6 : Second assumption simulation results, sustainability attribute versus sustainability source of information

Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
atributo × onde	89	100,0%	0	,0%	89	100,0%

atributo × onde										
		onde								Total
		4	2	6	3	7	1	8		
atributo	Count	1	0	0	0	0	0	0	0	1
	Row %	100,0%	,0%	,0%	,0%	,0%	,0%	,0%	,0%	100,0%
	Column %	100,0%	,0%	,0%	,0%	,0%	,0%	,0%	,0%	1,1%
	Total %	1,1%	,0%	,0%	,0%	,0%	,0%	,0%	,0%	1,1%
2	Count	0	0	0	0	0	0	2	3	5
	Row %	,0%	,0%	,0%	,0%	,0%	,0%	40,0%	60,0%	100,0%
	Column %	,0%	,0%	,0%	,0%	,0%	,0%	18,2%	5,4%	5,6%
	Total %	,0%	,0%	,0%	,0%	,0%	,0%	2,2%	3,4%	5,6%
1	Count	0	2	1	1	6	5	1	12	28
	Row %	,0%	7,1%	3,6%	3,6%	21,4%	17,9%	3,6%	42,9%	100,0%
	Column %	,0%	100,0%	100,0%	100,0%	75,0%	55,6%	9,1%	21,4%	31,5%
	Total %	,0%	2,2%	1,1%	1,1%	6,7%	5,6%	1,1%	13,5%	31,5%
3	Count	0	0	0	0	2	2	7	22	33
	Row %	,0%	,0%	,0%	,0%	6,1%	6,1%	21,2%	66,7%	100,0%
	Column %	,0%	,0%	,0%	,0%	25,0%	22,2%	63,6%	39,3%	37,1%
	Total %	,0%	,0%	,0%	,0%	2,2%	2,2%	7,9%	24,7%	37,1%
4	Count	0	0	0	0	0	2	1	19	22
	Row %	,0%	,0%	,0%	,0%	,0%	9,1%	4,5%	86,4%	100,0%
	Column %	,0%	,0%	,0%	,0%	,0%	22,2%	9,1%	33,9%	24,7%
	Total %	,0%	,0%	,0%	,0%	,0%	2,2%	1,1%	21,3%	24,7%
Total	Count	1	2	1	1	8	9	11	56	89
	Row %	1,1%	2,2%	1,1%	1,1%	9,0%	10,1%	12,4%	62,9%	100,0%
	Column %	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
	Total %	1,1%	2,2%	1,1%	1,1%	9,0%	10,1%	12,4%	62,9%	100,0%

Chi-Square Tests			
	Value	df	Asymptotic Sig. (2-tailed)
Pearson Chi-Square	119,76	28	,000
Likelihood Ratio	43,14	28	,034
N of Valid Cases	89		

It means that from the 52 respondents that said they use all the verification channels only 19 respondents use the right attribute to verify the sustainability of the products.

We used the T test to verify this assumption and those were the results in the figure 4.7:

$$H_0(\text{nulle hypothesis}) = \mu_d < 4 \quad (7)$$

$$H_a(\text{alternative hypothesis}) = \mu_a \geq 4 \quad (8)$$

$$\bar{X}_d = 2,56 \quad (9)$$

$$S_d = 1,18 \quad (10)$$

$$T_{critic} = -11,45 \quad (11)$$

Figure 3.7 . Second assumption: T test results

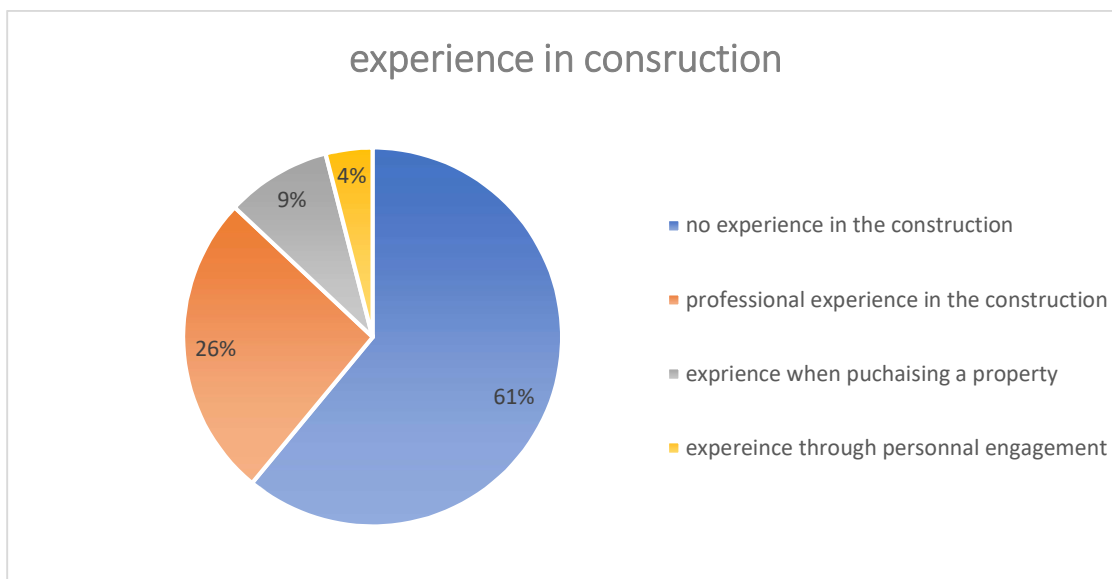
Output — P						
File Edit Windows Help						
▶ T-Test	T-TEST /TESTVAL=4 /VARIABLES= atributo /MISSING=ANALYSIS /CRITERIA=CI(0.95).					
One-Sample Statistics						
	N	Mean	Std. Deviation	S.E. Mean		
atributo	88	2,56	1,18	,13		
One-Sample Test						
Test Value = 4						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
atributo	-11,45	87	,000	-1,44	-1,69	-1,19

In the sample that answered the survey, we have a majority that said that they based themselves on knowing if a product is sustainable from the detailed product information. then the assumption is rejected. Customers know very well from where to get and verify if the construction materials respect the sustainability criterions.

3.3 Assumption 3

In term of experience in the construction, 61% of the respondents said that have no experience. The second group that represent 26% said they have experience in construction through their profession. And 9% of the respondents said they have some experience with construction when they bought a property.

Figure 3.8: relevance of experience in construction



We asked the respondents about what are the most relevant criteria to purchase a specific product in construction, and their answers were the following

- The price: appeared 50 times
- Durability: appeared 45 times
- External appearance: appeared 21 times
- Consult specialist appeared: 19 times
- Sustainability of the material appeared: 40 times
- Energetic efficiency: appeared 39 times

26% of the respondent said that they have experience in the construction, and those are the most relevant criteria that consider in purchasing products

- The price: appeared 14 times
- Durability: appeared 10 times
- External appearance: appeared 5 times
- Consult specialist appeared: 4 times
- Sustainability of the material appeared: 9 times
- Energetic efficiency: appeared 9 times

In this same group, it was interesting to see how many criteria they use, and the results were the following

- 1 criteria : 11 respondents, we had 4 respondents giving the price as the main reason to choose a material to be purchased, for 3 respondents the main criteria was the durability of the material, followed by 2 respondents that the sustainability of the material was the most important and finally it was efficiency energy and specialist consultant.
- 2 criteria: 6 respondents did choose 2 criteria at the same time and in the first place, the price was the most dominant criteria followed by material sustainability, energetic efficiency, durability and finally external appearance
- 3 criteria: 0 respondents
- 4 criteria: 3 respondents did choose 4 criteria and the most relevant criteria was the price, the energetic efficiency, durability, external appearance, specialist consultant and material sustainability
- 5 criteria: 2 respondents that give the criteria of price, durability, energetic efficiency, sustainability of material first followed by specialist consultant and external appearance
- 6 criteria: 1 respondent

For those who said that they don't have any professional experience in the construction, the price appeared 36 times, the durability 35 times, the sustainability of material 31 times, energetic efficiency 30 times, external appearance 16 times and consultant specialist 15 times.

When the respondents were asked what they understand from sustainability in construction, the optimized use of energy and resources appeared 67 times, low environmental impact 49 times, durability 35 times, optimised cost construction 29 times, recyclability at the end of the lifetime of a product 27 times, the proportion of recycled material in a product 22 times and finally the fair working conditions 19 times

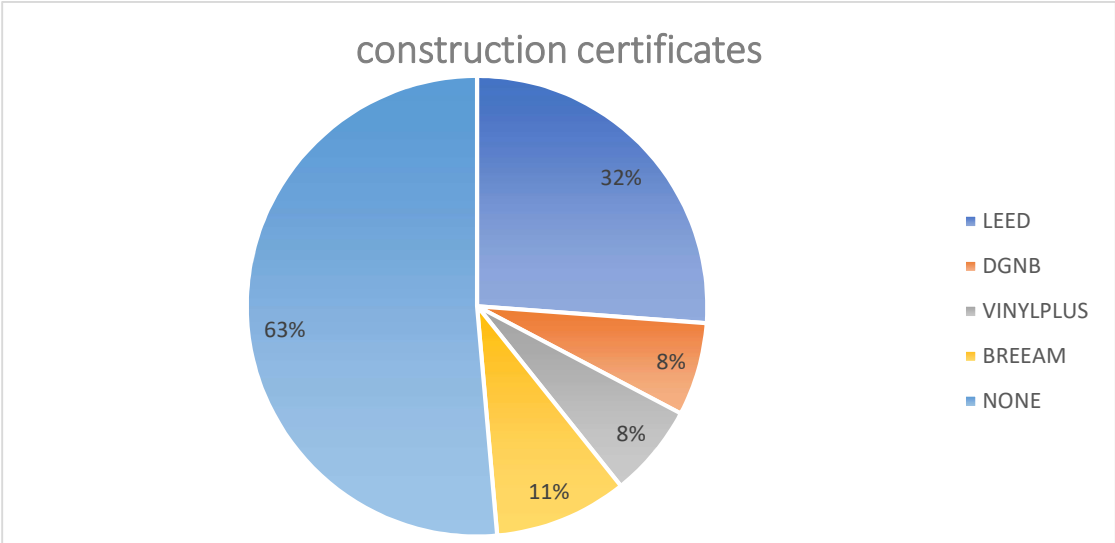
For the respondents that have experience in the construction, the optimised use of energy and resources was given as a definition 16 times, followed low environment impact 12 times, durability and recyclability at the end of the life time products 6 times each, followed by optimised cost construction and proportion of the recycled material in a product 4 times each and at the end the fair working conditions appeared 3 times.

The respondents had the possibility to choose more than one answer to define sustainability in the construction and for the ones with experience in construction we had the following results:

- 1 definition: was given by 8 respondents, for 5 of them the optimised use of energy and resources was the definition, 2 of them they gave the answer of recyclability at the end of the lifetime of a product and 1 respondent said that durability is the definition of sustainability in construction
- 2 definitions: was given by 5 respondents, the optimised use of energy and resources and the low environmental impact both were the prominent definitions that appeared 4 times each
- 3 definitions : was given by 8 respondents , the low environmental impact appeared 7 times, followed by the optimised use of energy and resources that appeared 5 times, the optimised cost construction, the durability and recyclability at the end of the lifetime of a product appeared 3 times each, the proportion of recyclable material appeared 2 times and finally fair working conditions appeared 1 time
- 4 definitions: was given by 1 respondent and the definition that was missing was the the optimised cost construction
- 5 definitions: was given by 1 respondent

The respondents were asked if they know any of the sustainability certificates in the constructions sector and 63% of them said that they don't. from the ones that have professional experience in the construction 30% of them said also that they don't know any sustainability certificates.

Figure 3.9: relevance of the surveyors 's knowledge about sustainability certificates



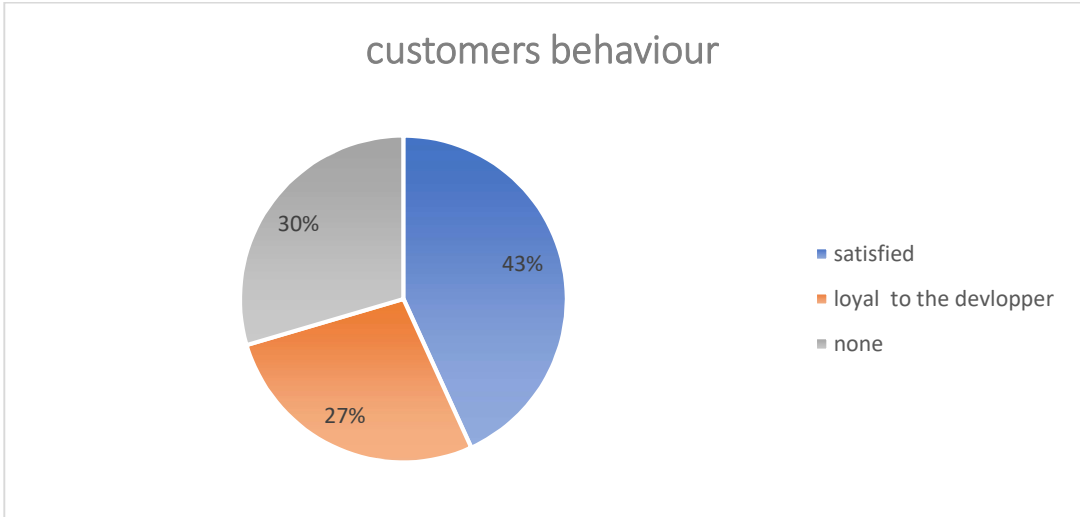
While construction specialists may possess a deep understanding of sustainability principles and a genuine commitment to environmentally responsible practices, they are not immune to the economic realities of their projects. The cost of materials remains a fundamental determinant in the decision-making process.

3.4 Assumption 4

All the respondents, when asked if they will choose sustainable materials if they are part of the process of developing a property from scratch gave a yes answer.

When asked if they are going to be satisfied or loyal to the real estate developer, 43% said that they will be satisfied, 27% said that they will be loyal to the developer and 30% said that none of those two choices.

Figure 3.10: customers behaviour regarding services in real estate12



Participating in a construction process from its inception brings a profound sense of satisfaction to the respondents. Starting from the ground up, being part of the journey from conception to completion offers a unique opportunity for involvement and engagement that resonates deeply.

3.5 Assumption 5

In the pursuit of exploring the intersection of service-dominant logic and sustainable real estate services, an interview was conducted with experts from the real estate sector. The aim was to gain first-hand insights into the application, challenges, and potential future directions of integrating these concepts. The interviewees' responses provide valuable perspectives that shed light on the dynamics of this evolving landscape.

-Question: How familiar are you with the concept of service-dominant logic and its application in the real estate sector?

-Response: The concept of service-dominant logic is recognized, although its application in the real estate sector remains limited. Customization within this business context is constrained due to certain inherent factors.

-Question: How do you define a "sustainable real estate service" within the context of your work?

-Response: A sustainable real estate service, in my view, encompasses offerings that align with customers' demands for renewable energy and energy certificates. However, the scope of sustainability-related services is relatively narrow.

-Question: In your opinion, how does the concept of sustainability integrate with the idea of providing services in the real estate sector?

-Response: Sustainability is a response to modern construction practices aimed at addressing environmental concerns. While integration with services is feasible, demand primarily centers around renewable energy solutions. Some apprehension exists due to potential price escalation.

-Question: From a service-dominant logic perspective, how do sustainable real estate services contribute to value co-creation with customers?

-Response: By involving customers in construction processes, they become integral to the business. This co-creation model enhances value generation.

-Question: Could you share an example of how a customer-centric approach is manifested in the delivery of sustainable real estate services?

-Response: A customer-centric approach involves offering green solutions, such as solar panels, energy-efficient walls, or geothermal energy options, enabling customers to customize energy sources.

-Question: How has the real estate industry transitioned from a goods-dominant logic to a service-dominant logic, particularly in the context of sustainable services?

-Response: The transition towards service-dominant logic within the real estate sector is limited in scope.

-Question: What challenges or opportunities have you encountered while adopting a service-dominant logic approach in offering sustainable real estate services?

-Response: While demand exists for energy-efficient solutions, some clients perceive them as expensive.

-Question: How do sustainable real estate services engage customers in sustainability initiatives? Can you provide specific strategies or practices?

-Response: Customer engagement involves raising awareness about available sustainability measures, such as certificates for energy efficiency.

-Question: How does involving customers in sustainability efforts align with the principles of service dominant logic?

-Response: Allowing customers to choose renewable energy sources or engage in community sustainability programs aligns with service dominant logic's emphasis on customer co-creation of value.

-Question: In what ways do sustainable real estate services contribute to building long-term relationships with clients and stakeholders?

-Response: Long-term relationships are nurtured through services such as maintenance, energy-efficient upgrades, and resources for sustainable living.

-Question: How does the service experience in sustainable real estate differ from traditional approaches, and how does it affect customer loyalty?

-Response: The service experience in sustainable real estate centres around maintenance for property owners. Positive experiences can lead to customer advocacy.

-Question: How does the service-dominant logic approach encourage innovation and continuous improvement in sustainable real estate services?

-Response: Service-dominant logic promotes innovation by seeking new green solutions, architecture enhancements, and even electronic features for energy management.

-Question: Can you share examples of innovative practices or service offerings that have been driven by this approach?

-Response: Examples such as the LEED certification demonstrate industry interest in energy efficiency.

-Question: How does service-dominant logic promote collaboration and engagement with various stakeholders in sustainable real estate projects?

-Response: Collaboration with clients, communities, regulatory bodies, and partners ensures alignment with sustainability goals and stakeholder needs.

-Question: What metrics or indicators do you use to measure the value generated by sustainable real estate services?

-Response: Measuring value involves assessing both tangible benefits like energy savings and intangible benefits such as improved quality of life.

-Question: How do you effectively communicate this value to clients and the market?

-Response: Transparently sharing data, case studies, and success stories communicates the positive impact of sustainable practices.

-Question: What do you foresee as the future direction of sustainable real estate services in terms of adopting and enhancing service-dominant logic principles?

-Response: The future holds promise for customized sustainable solutions aligned with individual client preferences, integrating technologies like smart homes and renewable energy.

-Question: What factors may lead to resistance from construction specialists in adopting a service-dominant logic approach?

-Response: there are many, one of them is the quantity of different properties depending of the customisation asked by the different customers and also, many of the construction engineers think that their work is finished when the properties are delivered but in SDL logic, there is no end to the relation between the customers and the developer.

From this interview, the assumption 5 is verified, it shows that specially the specialists that evolve more on the technical side like engineers shows more resistance to the concept of service in real estate industry.

Chapter 4

Conclusions and Recommendations

The preceding chapters of this thesis have delved into the intricate interplay between service-dominant logic (SDL) and sustainable real estate services, seeking to uncover the symbiotic relationship between customer-centricity and environmental responsibility. Through a combination of theoretical exploration, empirical analysis, and expert insights gathered from interviews, this study has shed light on the multifaceted dynamics that underlie the integration of these concepts. As the real estate industry navigates the complexities of contemporary environmental challenges and shifting consumer expectations, the synthesis of SDL and sustainability principles emerges not only as a viable path forward but as a necessary paradigm for shaping the future of real estate services. In this concluding chapter, we distil the findings of this research into key insights and offer recommendations that illuminate the way forward for practitioners, policymakers, and stakeholders invested in the sustainable evolution of the real estate landscape.

We tested 4 assumptions through a survey to understand how customers interact with sustainability, in their everyday life and in construction in particular, to understand the SDL approach in the real estate field and how the specialists of the constructions see a sustainable SDL construction. This last point was verified through an interview

The first conclusion, is that the gender, the age and the level of education does not have a big impact regarding sustainable SDL construction.

Assumption 1: what the customers understand about sustainability and their behaviour when they purchase products. And the results were the existence of discrepancy between their understanding of sustainability and their reluctance to purchase sustainable products. This can be attributed to many factors that are often interconnected and can vary based on individual beliefs.

Assumption 2: the customers when purchasing construction materials know where to get the right and objective information to verify the sustainability of the product

Assumption 3: they are at the forefront of knowledge and know-how of the latest methods and the necessary certificates in this field, they will prioritize the price on sustainability

Assumption 4: the customers if they are part of the process, they will be more satisfied than loyal to the developer brand.

And at the end, the behaviour of the construction specialist was verified through an interview with a specialist. During this interview it was clear that sustainable housing through an SDL approach is the future. There are many possible and interesting ways to develop houses or properties that are

sustainable with the integration of the customers from the beginning in this process but there is also barriers to the adoption of this different way to build.

Here are some points that need to be explored and verified to understand the behaviours of the customers and the construction specialist:

a. Regarding the customers behaviour when purchasing products

- **Cost Considerations:** Sustainable products sometimes come with a higher price tag due to the use of eco-friendly materials, ethical labour practices, and other environmentally conscious features. Consumers might prioritize immediate cost savings over long-term environmental benefits.

- **Limited Availability:** Sustainable products might not be as readily available as their conventional counterparts, making it challenging for consumers to choose them consistently.

- **Lack of Awareness:** While consumers might understand the concept of sustainability, they might not be fully aware of the sustainable options available to them in the market.

- **Inconvenience:** Sustainable products could involve changes in behaviour, such as recycling routines, energy-saving practices, or altering consumption patterns, which some consumers might find inconvenient.

- **Conflicting Priorities:** Consumers often have multiple priorities when making purchasing decisions. Sustainability might take a back seat when compared to other considerations such as quality, brand loyalty, or immediate needs.

- **Greenwashing:** Some companies use misleading marketing tactics, known as "greenwashing," to present their products as more sustainable than they actually are. This can lead to consumer scepticism and confusion.

- **Cultural and Social Norms:** Cultural values and societal norms play a significant role in shaping consumer behaviour. If sustainable choices are not aligned with prevalent norms, consumers might resist making those choices.

- **Lack of Trust:** Consumers might be sceptical about the authenticity of sustainable claims or doubt the actual impact of their choices on environmental issues.

- **Limited Information:** Consumers might not have enough information to compare the environmental impact of different products accurately.

- **Instant Gratification:** Sustainable choices often emphasize long-term benefits, which might be overshadowed by consumers' desire for immediate gratification.

- Psychological Distance: Environmental issues can sometimes feel distant from consumers' immediate lives, leading to a lack of urgency in making sustainable choices.

b. Regarding the construction specialist behaviour when adopting a SDL approach

- Traditional Mindset: Many construction specialists are accustomed to a product-centric mindset where the focus is on delivering physical structures and tangible outcomes. Shifting to a service dominant logic requires a fundamental change in perspective, which some specialists might resist due to familiarity and comfort with the traditional approach.

- Risk Aversion: The SDL approach often involves a higher level of engagement with customers, co-creating value, and accommodating customization. Construction specialists who are risk-averse might perceive this as introducing uncertainty and complexity into projects, potentially affecting timelines, budgets, and outcomes.

- Skill Set and Training: Embracing SDL requires a different skill set, including strong communication, collaboration, and customer relationship management. Construction specialists who are primarily trained in technical aspects of building might be hesitant to develop these new skills or adapt to a more client-oriented role.

- Lack of Awareness: Some construction specialists might not fully understand the principles and benefits of service dominant logic, especially within the context of sustainable real estate services. Lack of awareness or misconceptions about SDL's potential advantages could lead to resistance.

- Perceived Incompatibility: Construction professionals might perceive SDL as incompatible with the technical nature of their work. They might believe that focusing on services and customer experience could detract from their core competencies in designing and building structures.

- Market Demand Mismatch: In certain markets, there might be a perception that customers prioritize the physical attributes of a property over service-related aspects. If the demand for service-oriented real estate solutions is not strong, construction specialists might see little incentive to shift their approach.

- Resource Constraints: Transitioning to SDL requires investments in training, technology, and changes in business processes. Construction specialists, particularly those operating on tight budgets, might view these changes as resource-intensive and may hesitate to allocate resources away from traditional practices.

- Industry Norms and Culture: The construction industry has established norms and practices that have evolved over time. Adapting to SDL might be seen as challenging industry norms or disrupting established routines, which some specialists may find uncomfortable.

- Limited Incentives: If there are limited regulatory or market incentives for adopting SDL in sustainable real estate services, construction specialists might see little motivation to change their current approach, especially if they believe they can continue operating successfully with their existing practices.

- Perceived Complexity: Construction projects can be complex and involve numerous stakeholders, regulations, and technical challenges. Some specialists might perceive the SDL approach as adding complexity to an already intricate process.

But overall, government-imposed taxes wield significant potential to catalyse the adoption of sustainable construction practices among both customers and specialists within the industry. By strategically structuring tax policies to favour environmentally friendly construction approaches, governments can effectively incentivize a shift towards sustainable building methods. Higher taxes on non-sustainable materials, energy-intensive practices, and carbon emissions can prompt customers to reconsider their choices, steering them towards greener alternatives. Simultaneously, construction specialists are driven to explore sustainable techniques to minimize tax liabilities, leading to a surge in demand for eco-conscious materials and practices. These taxes not only contribute to environmental conservation but also drive innovation in sustainable technologies, as specialists seek tax-efficient solutions. Consequently, this synergy between governmental fiscal policies and construction stakeholders paves the way for a more sustainable and ecologically responsible built environment.

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