



Enhancing Financial Transparency and Communication Through Visual Elements in Finnish Housing Companies

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Abstract

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<p>The purpose of this product-based thesis is to examine the current reporting formats and find a way to improve financial transparency and the comprehension of shareholders in Finnish housing companies, which is done by using visual elements in financial reporting, with emphasis also on sustainability and consumption monitoring. The thesis is commissioned by a Finnish property management company, Myyrmäen Huolto Oy and focuses on housing companies located in the Helsinki metropolitan area. The scope of the thesis is limited to covering the financial and consumption reporting of housing companies, and the aim is not to replace the current form of reporting, but to enhance and support it.</p> <p>The thesis consists of a theoretical section, an empirical analysis, and the development process of the visual toolkit. The theoretical framework covers identifying the operating methods of housing companies in Finland, financial transparency and communication, visualization of data, the theory behind using different forms of data, and sustainability reporting. The empirical section uses qualitative research methods consisting of interviews with property managers from the commissioning company, with the focus on understanding the current reporting practices and challenges shareholders face. This is followed by the analysis of the results and the identification of the main recurring themes. The theory and empirical findings are then combined to be used in the development of the visual toolkit.</p> <p>The product of the thesis is a visual toolkit made for the use of shareholders in Finnish housing companies. The toolkit is made by Power BI, which allows for modification and visualization of the data collected from the reporting software used in the commissioning company. The structure of the toolkit is divided into separate dashboards that feature financial, consumption, and energy project-related information in a clear and understandable format. The toolkit transforms the current data-heavy reporting into visual representations that improve transparency, shareholder comprehension, and provide tools for increased decision-making.</p> <p>The toolkit was used in an annual meeting of one of the housing companies, and feedback was collected from the shareholders using an anonymous survey. The results indicate that the toolkit was found useful and relevant among the respondents. The answers showed that visual reporting improved the understanding of data, especially the key financial and consumption figures. Respondents also found it easier to notice deviations in the data when presented in visual form. The dashboards solved many of the challenges found in current reporting, and the results indicate that value was added to the shareholders by improving clarity and decision-making.</p>
Key words Financial reporting, financial transparency, data visualization, housing companies, sustainability reporting

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1 Introduction

1.1 Background and Context

This thesis is a commissioned work for Myyrmäen Huolto Oy, a property management company where the author has been employed for one year as a real estate accountant as part of the finance team. The main focus is on handling the monthly finances of each housing company, which includes accounting, billing, handling loans and other finance-related matters. In addition to this, the duties include preparing financial statements at the end of each financial year. During this time, observations of the current state of reporting and visualizations have impacted the topic of this thesis and given it a foundation.

Myyrmäen Huolto is a mid-sized property management company with approximately 160 housing companies as clients at the time of writing this thesis. The company offices are in Vantaa, and the housing companies are located in the Helsinki metropolitan area. The project was initiated to address a real-world need observed within the company: improving the clarity and accessibility of financial reports provided to housing company shareholders.

Understanding financial figures and monthly statistics of housing companies in Finland is crucial for the residents and individuals who own apartment shares. Despite the importance of these reports, the reality is far from this when it comes to analyzing and making decisions based on the reports that are provided to the shareholders by the property managers. The reports are often dense with numerical data and pages full of text; this leads to shareholders feeling overwhelmed, which affects their decision-making process. The lack of clarity and financial transparency ultimately impacts the financial health and sustainability of the housing company (Fernandes et al., 2013).

Living in an era where data visualization is transforming the way information is conveyed and reported among industries, housing companies have yet to fully embrace and adapt these tools. Meanwhile, large Finnish companies such as Neste, Kone and Fortum have integrated visualization into their financial reporting practices for many years (Sofigate, 2023), while the smaller housing companies rely on traditional reporting formats. This presents an opportunity to modernize financial communication and reporting practices inside the housing sector. Overall, better-informed shareholders make more meaningful and accurate decisions. The use of visual tools helps process data efficiently, and studies show that visual elements improve comprehension and retention (Plaff et al., 2012; Eberhard, 2023).

In addition to financial data, sustainability has become increasingly important in housing companies, which ties into monitoring consumption figures and making smart energy-related investments. Consumption costs relate to over 25 percent of the overall yearly expenses of housing companies

(Hausvise, 2026), which makes it crucial to optimize these figures. Despite the availability of the data, the reporting is limited for shareholders to fully interpret the deviations and actions required. This creates a need for improving the reporting through visual elements and creating more accessible reporting tools.

1.2 Problem Statement

The problem addressed in this thesis focuses on financial transparency and shareholder comprehension regarding housing company reporting. Financial transparency refers to the availability and disclosure of financial data in housing companies. This information includes budgets, maintenance costs, loan balances, deficit/surplus amounts, and other key figures. The current reports are technically complete and compliant; however, their presentation often lacks clarity for the average shareholder to know which numbers are the necessary ones to focus on.

Shareholder comprehension refers to the ability to accurately interpret and apply the information presented in the reports and make future decisions based on them. When the data is not understood, this leads to disengagement and misinformed decisions. In this situation, financial transparency does not guarantee comprehension, meaning that despite having advanced reporting with a visual and clear presentation, if the data is not correctly comprehended, the outcome fails to engage shareholders meaningfully. This concerns many shareholders, since their apartment is often the most significant financial asset they own and control (Tilastokeskus, 2025).

1.3 Purpose and Objectives and Methods

The primary objective of the thesis is to enhance the financial transparency and clarity of reporting of housing companies in Finland. This is done through the development of a visual reporting toolkit with interactive dashboards. The toolkit is done primarily through Excel and Power BI, with the final reporting being a PDF attachment added to the current financial and yearly reports.

The contributions of this thesis are both academic and practical. Academically, it explores the intersection of financial transparency, data visualization, and shareholder engagement inside housing companies. Practically, the thesis delivers a usable product, which can be implemented into the reporting practices of Myyrmäen Huolto and provide more value to the shareholders of housing companies. The final product is presented in the form of a Power BI dashboard, which features all the key financial figures of the housing company on one page and focuses on the sustainability aspect on another page. This tool benefits the commissioning company by providing easily understandable materials for the shareholders in yearly meetings and giving a more professional appearance of the company. Having this tool in use gives an advantage for Myyrmäen Huolto when housing companies compare different management companies and choose the best one for them.

Inside the company, the benefits are also seen as the dashboards can highlight key figures of each housing company at a glance, which makes following and adjusting to them much easier for the property managers.

The methods used in this thesis include a qualitative research approach, combined with a case study with practical development regarding the toolkit. Data is collected through interviews with property managers and by analyzing the existing reporting practices. The interview data is analyzed using thematic analysis to identify the recurring themes related to financial communication, shareholder understanding, and the need for visual reporting. Based on these findings, the visual toolkit is then created using mainly Excel and Power BI.

This toolkit includes tailored dashboards with key figures for each housing company. By integrating dynamic but clear design and data visualization principles, the target of the toolkit is to close the gap between transparency and understanding, thereby promoting informed decision-making and shareholder engagement. The visual dashboards include customizable templates for presenting financial data such as budgets, maintenance costs, loan balances, and reserve funds status. In addition to this, there is a page that highlights the consumption data and also focuses on the effects of energy projects. This can be modified based on what the most crucial figures are that each property manager wants to present. There are around 160 housing companies that Myyrmäen Huolto manages; this means that the dashboard needs to be easily adjusted to match the demands of each client. The final product also has to be accessible and optimized so that it is effortless to add to existing reports by all individuals who conduct financial reporting.

The thesis is divided into four project tasks, which guide the process of understanding the theory and applying it to the final product. These tasks also help divide the thesis into clear sections and phases for the author and reader. Each project task is mentioned later on in the thesis, linked with the phase of that task.

Project Task 1 Gaining understanding of the topic and current situation

Gain understanding of the topic through completing and writing the theory covering financial communication, transparency and data visualization. In addition, understand the current reporting practices used in the company and what are the main difficulties with them.

Project Task 2 Interviews

Conduct the interviews with the property managers from Myyrmäen Huolto to identify the pain points and difficulties in financial reporting.

Project Task 3 Visualization toolkit

Create the initial dashboard concepts based on the information gathered from the interviews. Also, take into account the best practices in visual reporting.

Project Task 4 Develop and refine the visual dashboard

Focus on developing a functional visual dashboard based on the information gathered from the previous tasks. Pilot the dashboard with one selected housing company. After the dashboard has been tested with the housing company, gather feedback through Google Forms and make a refinement plan for the dashboard based on the given feedback to achieve the best possible outcome for future use inside Myyrmäen Huolto.

By achieving these objectives, the thesis aims to modernize the financial reporting and communication inside Finnish housing companies. This leads to a better understanding of finances in housing companies and increased transparency among shareholders, which eventually improves the sustainability and financial future of housing companies.

1.4 Scope and Demarcation

The thesis focuses on two interconnected components: the development of a visual financial reporting toolkit and comprehensive research to inform and support the development of the toolkit. The scope is defined to ensure that all the elements are achievable within the outlined timeframe, while maintaining academic guidelines and practical relevance. The toolkit component focuses on creating visual dashboards of the financial and other key figures of housing companies. Sample dashboards are included in the thesis to demonstrate how visual reporting enhances comprehension and clarity.

The thesis is applied with several limitations to maintain a clear and manageable scope. Regarding the toolkit, it does not include software development or automation tools, since the focus is on the design and usability of the dashboards. The scope is limited to the housing companies managed by Myyrmäen Huolto, the range of distinct companies is broad, with over 160 housing companies managed. The research does not include large scale quantitative surveys or statistical modeling. The study relies on qualitative insights from interviews and document analysis. While the thesis covers existing financial reporting and sustainability directives, it does not propose any legal or regulatory revolutions.

The research component covers the current state of financial communication in housing companies in Finland. The main focus is on financial transparency, shareholder engagement, data visualization, user-centered design and behavioral economics. In addition to the academic sources, empirical research is conducted through interviews with the property managers working at Myyrmäen Huolto. These interviews provide an insight into understanding the current reporting practices and

identify the common challenges faced by shareholders. Additionally, the thesis analyzes the existing reports from selected housing companies managed by the commissioning company. The areas assessed from the reports are their clarity, way of presentation, and effectiveness for decision-making. These findings are integrated into the final toolkit with comparisons between the current reporting style and the contemporary one.

These boundaries ensure that the thesis remains focused on its core objective around improving shareholder understanding and financial transparency through visual enhancements and integrations. Supported by a solid theoretical foundation and practical insights from the field of study.

1.5 Use of AI in the Thesis

Artificial intelligence is used in this thesis to help organize the structure and support throughout the thesis process. The language is refined in some sections of the thesis with AI, and it is mainly used in refining the transcripts for the interviews. The use of AI does not replace the author's own analytical work, the collection of data, or interpretations of the empirical data. All the research and theory is designed by the author, and the toolkit is created based on the findings from the interviews, the theory around visualization, and the observations the author has made while working as a real estate accountant in the commissioning company.

1.6 Structure of the Thesis

The thesis consists of the introduction, theoretical framework, empirical section, discussion, and sources with appendices. The theory is tied to the empirical section, and together they make the foundation for designing the final toolkit. This toolkit is presented at the end of the empirical part with feedback collected from the shareholders. The discussion part ties the whole process together with the evaluation of the final outcome and the author's own reflection on learning and development.

2 Literature review and Theoretical framework

The theoretical framework of this thesis defines how housing companies operate in Finland and how the financial statement is conducted. This section also integrates aspects of financial communication and transparency, data visualization, shareholder understanding, sustainability reporting and behavioral economics. Together, these frameworks provide the foundation for designing the financial reporting toolkit for housing companies. This section is tied to project task one.

2.1 Housing Company (Asunto-osakeyhtiö)

In Finland, a housing company (asunto-osakeyhtiö) is a distinct legal form of a limited liability company established under the Finnish Housing Companies Act (Asunto-osakeyhtiölaki 1599/2009). The primary purpose is to own and manage a residential building or buildings, with shareholders owning specific apartments in these buildings. According to the Act, a housing company is defined as a limited liability company whose articles of association require that the company's objective is to own at least one building in which more than half of the total floor area is counted with apartments controlled by shareholders as residences (Asunto-osakeyhtiölaki 1599/2009 & Similä, 2018, p. 7).

Each shareholder in a housing company holds shares that provide them with the right to possess and use a specific apartment. The housing company itself usually owns the building, land and other shared facilities, while the shareholders collectively make decisions that affect the financial management, maintenance and long-term planning through the general meeting, which is held once per fiscal year. In addition to this the board can meet as many times necessary during the fiscal year to make decisions that need immediate focus, such as deciding whether to renovate the façade or the need for collecting an extra maintenance charge (yhtiövastike). Shareholders are responsible for paying the maintenance charge each month, which finances the housing company's operating expenses, maintenance and renovations, however larger projects are often funded with bank loans that then lead to shareholders paying a capital charge (pääomavastike) in addition to the maintenance charge (Isännöinnin käsikirja 2015).

Unlike regular limited liability companies, Finnish housing companies are not seeking to maximize the yearly profit. Their primary financial focus is to cover costs and preserve the property's condition and value for the benefit of all the shareholders. Revenue is mainly generated through maintenance charges, other usage fees and in some companies, rental income. Profit is rarely, if ever, distributed as dividends. When there is a financial surplus at the end of a fiscal year, the balance is generally reinvested into maintenance, repairs or reserve funds are created to hold the capital (Similä, 2018, p.8). A housing company collects fees and user compensation payments from its

shareholders, with which it covers the costs incurred in maintaining the property and satisfying the housing needs of its residents. (Asunto-osakeyhtiölaki1599/2009 3:2 §.) The key financial principle is that the financial statements are aimed at resulting in a zero profit each year, which thereby leads to avoiding any tax liabilities. (Heinonen, M. 2017.)

The governance structure of a housing company typically includes a board of directors and a property manager (Isännöitsijä), together they operate and manage the housing company. The board oversees administrative and financial affairs, approves budgets and ensures compliance with legal and accounting standards. The property manager focuses on handling day-to-day operations and acts as an intermediary between the shareholders and the board. These topics are then covered in board meetings and decisions made are then reflected to the shareholders. The board and property manager are bound by fiduciary duties to act in the company's best interest, ensuring transparency, accountability and clear communication in financial decisions (Similä, 2018, p.8).

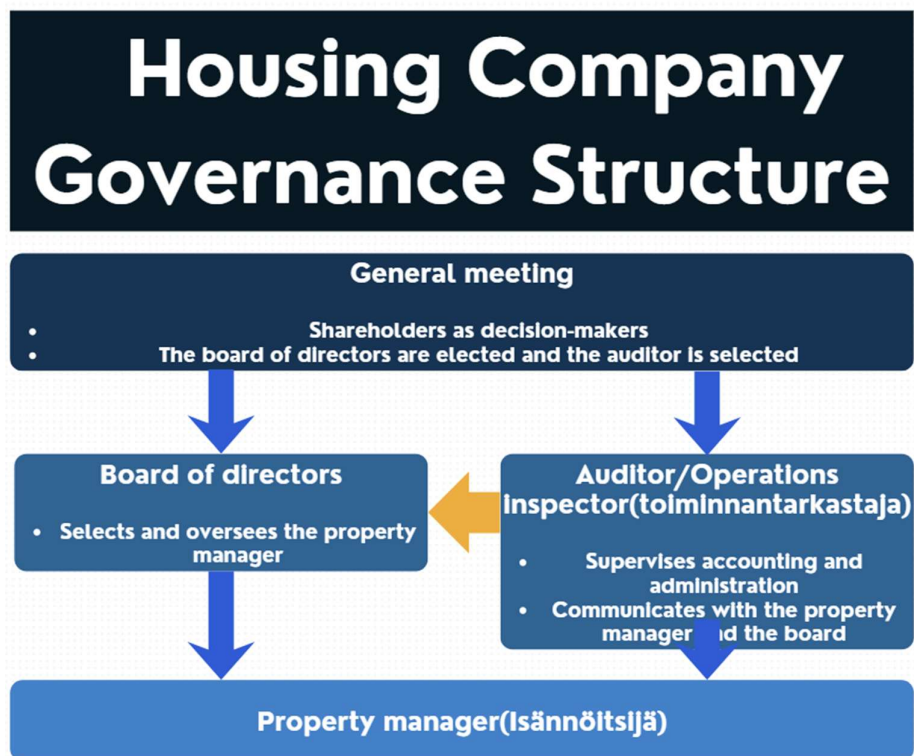


Figure 1. Housing company governance structure (Kiinteistöliitto, 2023)

Understanding the core structure and governance of Finnish housing companies is essential for examining the issues related to financial communication and transparency. It is also necessary to

acknowledge the differences between the operating principles of a housing company and a normal profit-oriented company.

2.2 Financial Statements of a Housing Company in Finland

Limited liability companies, including housing companies, are subject to mandatory bookkeeping obligations under the Finnish Accounting Act (1336/1997) (Finlex, n.d.). This statutory accounting requirement ensures that the financial activities are recorded systematically and transparently each fiscal year. Typically, a fiscal year is 12 months, it can be longer but up to 18 months maximum. For housing companies, the obligation to begin accounting starts from signing of the memorandum of association or completion of any other formal founding procedure. From this point onward, the company must maintain bookkeeping that complies with the Accounting Act and the Housing Companies Act (1599/2009), forming the foundation for the annual financial statements and interim reports. (Suulamo 2016, 2.2)

Accounting records must be retained for ten years from the date the financial statements are completed. This includes the annual report, accounting books, chart of accounts and the register of accounting records and related materials. Supporting documentation for the financial period, correspondence related to business transactions and other accounting materials not mentioned above must be kept for six years (Minilex, n.d.).

Correspondence concerning business transactions may include, for example, minutes of the shareholders' and board meetings. These documents often serve as records of decisions and discussions within the company. However, if such correspondence does not directly result into accounting entries, it is not considered as a part of the formal accounting records and thus does not need to be retained as such records. In cases where accounting entries are based on these documents for instance, when a decision recorded in the board meeting leads to a financial transaction, it must be treated as a supporting document and retained according to the required amount time. This distinction ensures that all relevant financial information is properly documented for auditing and compliance purposes. (Suulamo, 2016, 3.10.1)

The financial statement of a housing company provides a structured overview of its economic performance and financial position. Typically, these documents include an income statement, a balance sheet, supplementary notes to them and a report by the board of directors. Any material information that is not included in the income statement and balance sheet must be disclosed in the notes. Together, these documents present a comprehensive view of the company's finances and serve as important tools for communication and decision-making processes for shareholders, board members, property managers and auditors. Because housing companies operate on a

non-profit basis, this purpose influences both the structure and interpretation of their financial statements (Kiinteistöliitto, 2025). Inside Myyrmäen Huolto the non-profit basis means that the profit for the financial year must be between 0 and 50 euros in order to not be treated as taxable income.

The income statement follows a specific model for real estate operations. It details the company's operating income, which mainly consists of maintenance and capital charges paid by shareholders, and operating expenses, such as heating, waste management, repairs, water usage, administration and financing costs. At the end of the fiscal year, the result is balanced near zero, reflecting the principle that housing companies neither aim to accumulate nor distribute dividends. If there is a surplus, it is commonly allocated to specific reserves, such as renovation reserves, or used to reduce future maintenance fees. This allocation towards future fees is a strategy that supports long-term financial stability and ensures maintenance obligations can be met without significant cost increases (Haapala, 2021).

The balance sheet provides a snapshot of the financial position at the end of the fiscal period, providing essential information about the resources the housing company controls and the obligations it must meet. The asset side typically includes land and building assets, long-term renovation investments, receivables from shareholders or service providers and liquid cash reserves, usually meaning bank accounts. These figures indicate the long-term value tied to the property and the housing company's capacity to meet upcoming immediate expenses. The liabilities side presents the company's financial commitments, such as long-term loans taken for renovations or larger investments, short-term debts related to operating costs, shareholders' equity and finally dedicated reserves including capital, building or renovation reserves. They are used to accumulate funds for future maintenance, renovation needs or major building repairs, such as plumbing renovations, façade refurbishment, or roof replacement. Adequate reserves reduce the need for sudden increases in maintenance charges or new loan-taking when large repair projects arise. Consequently, the structure and sufficiency of reserves are central indicators of the company's long-term financial resilience and its ability to manage its repair obligations smoothly and sustainably (Kirjanpitolautakunta KILA, 2002; Mäntylä, 2014).

Notes to the financial statements (liitetiedot/liitetietotositteet) explain items that are not fully captured in the primary statements for example, repayment schedules, interest rates, guarantees, major repairs carried out during the year, and commitments for future renovations. They also describe the accounting principles used, thereby making cost allocation transparent. Housing corporations also provide a management report (toimintakertomus), which adds narrative context by discussing significant events, deviations from the budget, and the condition of the property and its future repair needs (Kiinteistöliitto, 2017).

Tase		
		30.06.2025
TASE		
VASTAAVAA		
PYSYVÄT VASTAAVAT		
Aineelliset hyödykkeet		
Maa- ja vesialueet		
Omistuskinteistöt	191 681,66	
Rakennukset ja rakennelmat		
Omistusrakennukset ja rakennelmat	8 588 674,41	
Aineelliset hyödykkeet yhteensä	8 780 356,07	
Sijoitukset		
Muut osakkeet ja osuudet	25,23	
Sijoitukset yhteensä	25,23	
PYSYVÄT VASTAAVAT YHTEENSÄ	8 780 381,30	
VAIHTUVAT VASTAAVAT		
Lyhytaikaiset saamiset		
Saamiset kiinteistön tuotoista	13 441,27	
Siirtosaamiset	8 185,84	
Lyhytaikaiset saamiset yhteensä	21 627,11	
Rahat ja pankkisaamiset		
Rahat ja pankkisaamiset	174 071,46	
Rahat ja pankkisaamiset yhteensä	174 071,46	
VAIHTUVAT VASTAAVAT YHTEENSÄ	195 698,57	
VASTAAVAA YHTEENSÄ	8 976 079,87	
		30.06.2025
VASTATTAVAA		
OMA PÄÄOMA		
Osakepääoma		
Osakepääoma	111 054,49	
Osakepääoma yhteensä	111 054,49	
Rakennusrahasto		
Rakennusrahasto	2 619 094,92	
Rakennusrahasto yhteensä	2 619 094,92	
Edellisten tilikausien voitto/tappio	-179 585,88	
Tilikauden voitto/tappio	139 964,97	
OMA PÄÄOMA YHTEENSÄ	2 690 528,50	
VIERAS PÄÄOMA		
Pitkäaikainen		
Lainat rahoituslaitoksilta	5 933 910,97	
Pitkäaikaiset velat yhteensä	5 933 910,97	
Lyhytaikainen		
Lainat rahoituslaitoksilta	295 889,30	
Saadut ennakot	14 357,18	
Ostovelat	33 863,98	
Muut velat	1 683,99	
Siirtovelat	5 845,95	
Lyhytaikaiset velat yhteensä	351 640,40	
VIERAS PÄÄOMA YHTEENSÄ	6 285 551,37	
VASTATTAVAA YHTEENSÄ	8 976 079,87	

Figure 2. Balance sheet for a housing company managed by Myyrmäen Huolto (Hauswise kirjanpito)

Tuloslaskelma

01.07.2024 - 30.06.2025

TULOSLASKELMA

KIINTEISTÖN TUOTOT	
Vastikkeet	
Hoitovastikkeet	465 346,68
Kulutusperusteiset vastikkeet	35 058,88
Erityisvastikkeet	1 512,00
Vastikkeet yhteensä	501 917,56
Käyttökorvaukset	13 353,19
KIINTEISTÖN TUOTOT YHTEENSÄ	515 270,75
KIINTEISTÖN HOITOKULUT	
Kiinteistön hoitokulut	
Henkilöstökulut	-6 030,00
Hallinto	-38 809,39
Käyttö- ja huolto	-70 432,89
Ulkoalueiden hoito	-2 628,86
Siivous	-49 140,20
Lämmitys	-59 176,58
Vesi ja jätevesi	-40 264,85
Sähkö ja kaasu	-21 396,81
Jätehuolto	-15 903,48
Vahinkovakuutukset	-8 657,60
Kiinteistövero	-35 119,78
Korjaukset	-63 666,65
Muut hoitokulut	2 348,34
Kiinteistön hoitokulut yhteensä	-408 878,75
HOITOKATE	106 392,00
Poistot ja arvonalentumiset	
Poistot rakennuksista ja rakennelmista	-305 486,06
Poistot ja arvonalentumiset yhteensä	-305 486,06
Rahoitustuotot ja -kulut	
Korkotuotot	72,44
Pääomavastikkeet	584 165,28
Lainaosuussuoritukset	210 149,82
./ Rahastoidut osuudet	-209 737,10
Korkokulut	-243 474,21
Muut rahoituskulut	-2 117,20
Rahoitustuotot ja -kulut yhteensä	339 059,03
VOITTO/TAPPIO ENNEN TILINPÄÄTÖSSIIRTOJA JA VEROJA	139 964,97
TILIKAUDEN VOITTO / TAPPIO	139 964,97

Figure 3. Income statement for a housing company managed by Myyrmäen Huolto (Hausvise kirjanpito)

The balance sheet (Figure 2) and income statement (Figure 3) from this particular housing company provide an example of using the losses of previous years to balance the result, since the profit for the financial year is over the housing company's non-profit basis limitations.

Together, these elements form a reporting framework that helps shareholders assess the current state of the housing company's financial performance and obligations. Clear financial information is essential for evaluating the company's stability, planning renovation projects, and understanding how resources are allocated across operational and strategic needs (Mäntylä, 2014; Bank of Finland, 2023). However, many shareholders find it challenging to interpret financial statements due to the abundance of technical accounting terminology, the complexity of reserve structures, and the fact that financial literacy among adults varies considerably (OECD, 2020; Vittas, 2019).

2.3 Financial Transparency and Communication in Housing Companies

Financial transparency is a foundational principle when it comes to the governance of housing companies in Finland, where residents are shareholders and have a direct stake in the financial health and future of the company. According to the Cambridge Dictionary, the definition of transparency is "the quality of being done in an open way without secrets" (Cambridge Business English Dictionary).

Transparency in this context refers to the clarity, accessibility, and completeness of financial information shared with shareholders. It is essential for building trust, enabling informed decision-making, and ensuring accountability, since often the residents and board members do not have professional expertise in accounting or finance. Transparency does not only focus on the publication and clarity of the reports but also affects the communication of financial decisions and long-term plans of housing companies in a way that is understandable for all shareholders (Alhola & Lauslahti 2006, s.173).

2.3.1 Dimensions of Transparency

Similar to organizational transparency, transparency in housing companies can be assessed through three interrelated dimensions: disclosure of information, clarity of presentation, and accuracy of reported data (Schnackenberg & Tomlinson, 2016). These dimensions form the basis of meaningful transparency and collectively determine how shareholders identify fairness and trust in the governance of housing companies.

Disclosure refers to the act of making relevant information available in a comprehensive and timely way (e.g., Bloomfield & O'Hara, 1999; Williams, 2008). Prior research consistently identifies

disclosure as a central component of organizational transparency, underlining its role in enabling external evaluation (Bushman et al., 2004; Finel & Lord, 1999). From the perspective of shareholders, transparency is weakened when information is difficult to access or interpret; such limitations restrict the ability to develop an accurate understanding of an organization and its activities (Schnackenberg & Tomlinson, 2016). In other words, disclosure without accessibility and interpretability fails to empower shareholders and can even create a false sense of openness. When it comes to housing companies, disclosure involves not only publishing mandatory documents such as financial statements and budgets but also providing explanatory materials that help shareholders understand the financial position of the company.

Clarity refers to the degree to which information is presented in a way that is understandable and free from unnecessary complexity. It is defined as the perceived level of clarity and comprehensibility of information received from a sender (Schnackenberg & Tomlinson, 2016). In housing companies, this dimension is particularly critical because many shareholders, such as residents and even some board members, lack professional expertise in accounting or finance. Winkler (2000), Street and Meister (2004) argue that organizations must present information clearly, and it has to be understandable for it to be considered transparent.

Accuracy refers to the extent to which information is perceived as correct and reliable, taking into account the relationship and conditions between the information provider and the recipient (Walumbwa et al., 2011). Accuracy guarantees that the data presented is correct, reliable, and consistent with accounting standards. Inaccurate or misleading information undermines trust and can have serious legal and financial consequences (Schnackenberg & Tomlinson, 2016). Accuracy is therefore not only a technical requirement but also an ethical obligation that reinforces the credibility of the housing company's governance.

2.3.2 Financial Communication

Financial communication involves the organized sharing of financial information with stakeholders in a clear, precise, and accessible way. In housing companies, this process is especially crucial because stakeholders include residents, board members, property managers, and regulators, many of whom may lack advanced financial literacy. Transparent communication builds trust, accountability, and supports informed decision-making. Hoffmann and Strauß (2024) argue that financial communication goes beyond simple disclosure, highlighting relationship building and narrative framing, which influence stakeholder perceptions and trust.

Despite its significance, financial communication in housing companies remains challenging. Reports are often complicated and compliance-focused, emphasizing regulatory standards over user-friendliness. According to Statistics Finland, housing companies produce annual financial

statements, but these are mainly tailored for accountants and auditors, not ordinary shareholders (Statistics Finland, 2025). This complexity is impaired by increasing financial risks and liabilities: housing company loans now make up about 15% of household debt in Finland, with rising interest rates adding to repayment uncertainty (Bank of Finland, 2023).

Housing companies operate based on a unique governance structure, where residents are both customers and shareholders. This dual role amplifies the need for clear communication where decisions on renovations, maintenance fees and loan structures affect the household budgets directly (Kiinteistöliitto, 2025). Poor communication can lead to information asymmetry, creating doubt and disengagement among shareholders during annual meetings. When shareholders cannot interpret the financial reports provided, they may make decisions based on incomplete information, which can harm the financial health of the housing company in the future. This ties in with the principal-agent theory, which emphasizes that clear communication reduces costs by aligning the interests of property managers (agents) and residents (principals) (Jensen & Meckling, 1976).

Originating from economics and corporate governance, Principal Agent Theory describes a relationship where the decision-making power is transferred from a principal to an agent, who is expected to act on the principal's behalf (Jensen & Meckling, 1976). The core assumption is that principals and agents have different interests and asymmetric information, which creates the risk that agents may act in their own self-interest rather than in the best interest of the principal. In housing companies, residents and shareholders are the principals, while property managers and board members act as agents.

Residents delegate financial and operational decisions to these agents, trusting them to manage budgets, loans, and maintenance responsibly. However, information asymmetry can arise due to the complexity and inaccessibility of the financial reports, which can lead to an increase in agency costs when there is a need for external auditing or legal oversight. When connecting the Principal-Agent Theory to housing companies' governance, the conclusion is that clear financial communication reduces agency problems by making information understandable and verifiable, leading to aligning interests and building trust. (Jensen & Meckling, 1976)

Financial transparency and clear communication are essential within housing companies, but their effectiveness depends on how the information is presented. The current financial statements of housing companies are accurate; however, they lack engagement and are dense with information. Data visualization addresses this issue by transforming abstract figures into intuitive charts, dashboards, and infographics, making financial information more accessible and actionable (Hasan & Buadi, 2023). For housing companies, visualization is not only aesthetic, but it is also a strategic tool for reducing the cognitive barriers and enhancing informed decision-making.

2.4 Data Visualization

The use of data visualization has become an essential component in modern financial communication, especially in cases where the level of financial literacy varies among shareholders. Housing companies in Finland represent such environments and as a result important decisions related to budgeting, loan management or sustainability measures may be made without full coverage of the financial situation of the housing company. This challenge emphasizes the need for reporting formats that support comprehension and present key figures in an accessible way.

Data visualization offers a practical solution by transforming abstract numbers into interpretable visual structures, thereby increasing transparency and support for comprehension. According to Kelleher & Wagener visualization enhances understanding by leveraging human perceptual strengths, particularly the ability to detect patterns, relationships and anomalies more easily in graphical form than in raw numerical tables. Their findings emphasize that visualizations are not merely decorative additions to reports, but functional tools that improve the accuracy, speed, and confidence with which users interpret data. (Kelleher, C., & Wagener, T. 2011)

The effectiveness of visualization can be understood by the support of several theoretical perspectives, including Cognitive Load Theory, Dual Coding Theory, and behavioral economics as a whole. Together, these frameworks explain the difficulties shareholders encounter when interpreting traditional reports and why visual reporting can improve comprehension and the quality of decisions.

2.4.1 Cognitive Load Theory

Originally developed by John Sweller (1988), the Cognitive Load Theory (CLT) provides a useful framework for the information processing of individuals. The theory is divided into three types of cognitive load: intrinsic load, relating to the natural complexity of the information; extraneous load, which is caused by limited presentation or design of information; and germane load, which is combined with constructing and reinforcing knowledge structures. Learning effectiveness can be improved by reducing the unnecessary extraneous load and supporting germane cognitive processes that contribute towards deeper understanding (Clark, C. & Kimmons, R. 2023). This makes the theory highly relevant to the financial context of Finnish housing companies, where shareholders must interpret complex financial statements and other crucial data.

According to CLT the human working memory has a limited processing capacity and when this capacity is exceeded by information, comprehension declines (Sweller, 1988). In addition to this intrinsic load, when reports are designed poorly with fragmented information and absence of visual structures, the extraneous cognitive load increases, which means that shareholders must devote

unnecessary mental effort to analyzing and comparing key figures (Sweller, Ayres, & Kalyuga, 2011). Visual reporting techniques can reduce the load by organizing information into intuitive graphical formats such as dashboards, comparative graphs and trend charts. The important figures and information can be then highlighted from these visualizations, which allows viewers to process the information more efficiently, accurately and in a shorter amount of time.

2.4.2 Dual Coding Theory

Dual Coding Theory (DCT), introduced by Allan Paivio (1971), explains that human cognition operates through two distinct interconnected systems: a verbal system for processing linguistic information and a non-verbal system for handling imagery processing. This means that when information is presented using both channels, it enhances comprehension and memory retention, since both channels reinforce each other (Clark & Paivio, 1991). This theoretical perspective comes from cognitive psychology and is commonly used in education, showing that individuals grasp and remember information better when it is encoded through several styles.

In the context of financial reporting for housing companies, DCT provides a strong justification for supplementing traditional text with visual representations. The current financial disclosures rely strongly on numerical tables and text-based reporting formats. Presenting clear visual representations with the help of textual summaries enables the activation of both cognitive channels. R.E. Mayer's (2009) multimedia learning principles extend this logic by emphasizing the importance of alignment between text and visuals. Comprehension is improved when information is presented using both visual and verbal elements that are conceptually aligned. According to the *coherence* and *redundancy* principles, visuals and text should reinforce the same core message rather than introduce competing or unnecessary elements, because irrelevant or duplicated information increases cognitive effort and weakens comprehension. When visuals and explanatory text work together, they support the integration of information across the verbal and visual processing channels, leading to more stable mental representations and improved recall (Mayer, 2009).

This principle is relevant to financial reporting in housing companies, where the shareholders need to interpret financial indicators and make decisions based on them. Currently, in existing financial statements the explanatory paragraphs and numerical tables are presented separately, which requires readers to mentally combine fragmented pieces of information and can cause additional cognitive burden. On the contrary, when a visual representation such as a line graph is combined with concise explanatory labels, which highlight the key points, trends and comparisons, the visual and verbal elements collectively communicate the same financial narrative. This way Mayer's multimedia learning allows shareholders to see not only what is happening in the figures, but also why it matters regarding the financial position of the housing company.

2.4.3 Behavioral Economics

Behavioral economics is a field of economics that studies how individuals actually make economic decisions by taking into account psychological factors and cognitive limitations. This differs from traditional economic theory, which assumes that individuals always make decisions in a fully rational and objective manner, behavioral economics recognizes that decision-making is often influenced by limited information, restricted attention and habits (Rabin, 1998; Mullainathan & Thaler, 2000).

A key idea in behavioral economics is that fluctuations from rational behavior are systematic rather than completely random. Individuals tend to rely on mental shortcuts, simplified decision templates when faced with complex information. These habits can lead to predictable biases, especially in situations where uncertainty is present and unfamiliar financial concepts are involved (Camerer, C. F., & Loewenstein, G., 2006). Such conditions are commonly met in housing companies among shareholders when decisions are made based on the current reports provided to them.

Visual financial reporting interacts directly with these behavioral habits. When financial information is provided in the current form of dense tables with separate textual explanations, this leads to the focus of shareholders disproportionately on a limited set of figures, such as total costs or annual figures, while overlooking the broader trends and long-term direction of the housing company. Behavioral research shows that individuals tend to immediately embellish visible or easily interpretable information and undervalue abstract or delayed outcomes, such as future maintenance liabilities or reserve fund balances (Thaler & Sunstein, 2008). By modifying the form of the data into clear visual formats, the attention of shareholders can be driven toward relevant figures and patterns that are otherwise demanding to comprehend.

From the perspective of behavioral economics, an important concept for visualization is the framing effect, which refers to the way identical information, when presented differently, can lead to different interpretations and decisions (Tversky & Kahneman, 1981). A solid example of the framing effect would be the way a product is presented to the customer; individuals are more likely to choose a product that is said to contain 85% lean beef rather than having 15% fatty beef written on the product (Newristics, 2025). This same logic applies to housing company reporting; framing may influence how shareholders recognize financial stability or risk. For example, presenting maintenance costs only as absolute euro amounts may raise concern or resistance among shareholders; showing these costs in the context of long-term asset preservation or against benchmark comparisons might lead to a more measured assessment.

Behavioral economics additionally emphasizes the need for responsible design of visual financial information. Color is one of the most powerful visual variables in data visualization, since it directs the attention of the viewer and supports pattern recognition. When color is used in any form of visual presentation, it is perceived almost instantly, which makes color especially useful for highlighting key figures and trends inside financial data. (Ware, C. 2013) This makes the use of color vital for presenting the financial figures of housing companies, but making sure to highlight only the most necessary numbers and changes in value, rather than having all the negative values in red. The color red is commonly associated with decline or danger, while green gives the viewer a feel of stability and improvement; these can lead to unnecessary perceptions by the shareholders if applied carelessly (Few, 2013; Tversky & Kahneman, 1981).

2.5 Sustainability Reporting and Consumption

2.5.1 Sustainability Reporting

Sustainability reporting refers to the act of companies disclosing information about their environmental, social and economic performance. According to Kolk, A. (2005) this form of reporting has evolved from social reports in 1970s into a more vast environmental reporting system in the late 1980s, which eventually expanded into today's comprehensive sustainability reporting that integrates social, environmental and financial aspects (Kolk, 2005). Companies use these reports to enhance the ability to track progress towards specific targets, improve credibility by being more transparent and respond to shareholder expectations. Most investors also consider sustainability reporting highly useful when making professional evaluations and expect such disclosures to be a standard way of reporting (Pleon, 2005 cited in Kolk, 2005 p.34).

Throughout the years sustainability reporting has become more structured and standardized. They have been influenced by government regulations, different guidelines and international frameworks such as the Global Reporting Framework (GRI). Many companies now rely on GRI to guide their selection of indicators and improve credibility of their reporting (Kolk, 2005). According to the *KPMG Survey of Sustainability Reporting* more than half of the Fortune Global 250 companies are referencing GRI standards in 2022 (GRI, 2026). This highlights the rising recognition of sustainability reporting as an essential tool for transparency and accountability.

The Global Reporting Initiative (GRI) standards support organizations in identifying, measuring and reporting their impacts on the economy, environment, and society (GRI, 2026). The standards are designed to increase transparency on the organization's contributions towards sustainable development, which makes them highly relevant to shareholders. (GRI, 2026)

In housing companies, these sustainability metrics are important for achieving transparency among the shareholders, since environmental performance is closely tied to operating costs such as energy consumption, maintenance activities and material choices when it comes to renovations. These all affect cash flow and the future financial figures of housing companies, making sustainability reporting a crucial addition to traditional financial reporting for achieving a wide and transparent reporting system for the shareholders.

2.5.2 Sustainability in Housing Companies

Sustainability regarding Housing companies focuses on measuring and controlling the building's major energy usage, which includes electricity, water, gas and heating. In order to make better decisions and to control these figures, they first need to be measured. An example of this can be seen in the requirements of metered accountability in water usage (Valtioneuvosto, 2010), which means from having previously paid a fixed amount of water usage per resident, to now having apartment level meters that lead to billing based on actual consumption. In Finland, the installation of apartment specific water meters has been mandatory in new buildings since 2011 and in older buildings in connection with pipe renovations since 2013; in addition, consumption-based billing has been made mandatory through national energy efficiency legislation (Valtioneuvosto, 2010). According to research made by Motiva in 2020, the water usage per resident has been on average 10 liters less in housing companies with billing based on usage than in fixed price billing housing companies (Kiinteistöliitto, 2020). This highlights the importance of measuring key indicators and how it affects the total figures of consumption.

Sustainability in housing companies is not a single act or measure; it must be embedded across all operations and activities. This means that it has to be taken into the long-term planning and the housing company's core strategy in the board meetings with shareholders. The Finnish Housing Association's (Isännöintiliitto, 2024) energy and climate guide highlights that energy efficient measures and frequent technical maintenance lead to savings in both energy consumption and the life cycle costs of the building. An example of this sort of action is optimizing the heating system, utilizing automation features and conducting timely inspections to extend the life of the systems and reduce the risk for repairs. (Isännöintiliitto, 2024)

Renovations are a common way to reduce the compulsory consumption of housing companies. The economic benefits of the renovations should always be assessed through the investment needed for them, but also taking into account the life-cycle perspective of them. According to studies conducted in Finnish housing companies, having geothermal and heat pump systems can provide significant savings, however there is a difference between forecasts and actual consumption.

This is why housing companies need to understand the realistic savings potential on a yearly basis and the long-term impact on the maintenance costs. (Kiesilä, 2025).

Property managers play a key role in promoting sustainability and energy efficiency. According to Kuivalainen, M. (2021) from Aalto University, property managers can be called “middle actors”, who collect information and interpret policy measures for housing companies, then guide the shareholders towards long-term energy efficient decisions. This means that sustainability should be seen as a part of a core strategy among the housing companies, not as an isolated part. (Kuivalainen, M. 2021)

Sustainability actions are clearly visible in the housing company's financial figures throughout the fiscal period. The value of the property and the maintenance fees are directly affected by energy renovations and efficiency improvements. Residents are much more motivated to take sustainable actions when the influence is clear to them and the benefits are shown through concrete figures, such as saving in maintenance costs or improving living comfort (Tähkänen, M. 2024). This leads to defining the key sustainability metrics in housing companies.

2.5.3 Key Sustainability Metrics

The key sustainability metrics are important to define, since they are the figures that affect the decisions of shareholders when it comes to finances and the future life cycle of the building. These metrics are implemented in the final toolkit within a separate page along with the key financial figures.

The most crucial indicators for housing companies include energy consumption, water usage, heating, and the impacts of renovation projects on the environment. Together, these combine to approximately 35 percent of the total recurring yearly expenses of housing companies (Hauswise, 2026). These metrics also affect the energy performance rating (E-luku) of the building, which provides another concrete and comparable way for shareholders and board members to assess the housing company. The importance of energy efficiency of housing companies in Finland is reinforced by public policy instruments, such as the Housing Finance and Development Center of Finland (ARA). They have granted subsidies and supported housing companies in the past years in renovation projects aimed at improving energy efficiency by at least 32 percent (Ympäristöministeriö, 2023). This emphasizes the importance of smart decisions regarding renovations and the importance of following energy performance metrics.

Other key indicators include renovation-related data, such as projected energy savings, project lifecycle, and reduction in emissions (Papangelopoulou, M. 2025). Together, this data helps shareholders evaluate if a project is worth the immediate cost compared to the future benefits and

potential savings. For housing companies, these metrics are closely linked to financial transparency as the budgeting is often connected with the environmental performance of the past years, which makes presenting consumption figures crucial for enhancing shareholders' trust and allowing for smarter decisions for the future of the housing companies.

3 Empirical Study and Findings

The chapter covers the methodological approach used in this thesis to gather information from the research method chosen and how it has been applied in the data collected for the thesis. The purpose is to clearly outline the research design, data collection methods, and how the data is analyzed. By presenting these procedures in an organized way, this part shows how the information was gathered and how the contents of it support the final product of the thesis.

After the methods used have been defined, the analysis of the interview findings is presented along with the state of the current reporting practices inside Myyrmäen Huolto.

This part of the thesis is tied to project task two.

Project Task 2: Interviews

Conduct the interviews with the property managers from Myyrmäen Huolto to identify the pain points and difficulties in financial reporting.

The collection of data for this product-based thesis was done through conducting interviews with property managers who work in Myyrmäen Huolto and exporting data of selected housing companies from the software Hausvise (Hausvise, 2026). The interview participants were selected using purposive sampling with the focus on having property managers with differing work experience in managing housing companies. This allowed for several perspectives and experiences on the themes covered. The interviews were conducted as semi-structured interviews, allowing for consistency across participants with a preset interview plan, while also having the opportunity to cover emerging topics in the interview with open-ended questions. The exported materials from Hausvise included all the financial reports and visual materials needed for research and building the final toolkit. These documents were also selected because they represent the current tools through which financial information and other key data are communicated to the shareholders. The data was exported in the form of PDFs and Excel files, to allow for optimal use in the final toolkit and dashboard.

A total of six interviews were conducted between December 2025 and January 2026 using the Microsoft Teams app. The interviews were done in Finnish, since this is the language used in the office among the property managers. Each interview was recorded with the built-in recording software in Teams and later transcribed with AI assistance. After this translation was made from Finnish to English, maintaining the original meaning and context. The interviews were centered around 15 questions (Appendix 1.) divided into five themes: background and experience, current practices in financial reporting, challenges in communication, visualization and improvement of reporting,

and economic future and environmental sustainability. Together, these themes provided a deep understanding of the current state of financial reporting and shareholders' understanding of the reports.

The research is conducted with a qualitative research approach, since the aim is to gain a deeper understanding of the current reporting practices and methods inside housing companies from the property managers. Qualitative research is designed to explore and understand the meanings of individuals' views towards a certain topic. It focuses on collecting data that is detailed and contains quality information, typically through interviews and observations, to help assess the phenomena in as natural a setting as possible (J. W. Creswell, 2014).

The research design of this thesis can be characterized as a case study. This type of research is one of many methods used in scientific research, including surveys, histories and analyzing archival information. A strength of case study research is the use of multiple different data sources, such as interviews, documents, and other materials. This leads to triangulation (U. Flick, 2018), which improves the overall credibility of the findings. (Robert K. Yin, 2003) Case studies also focus on examining current and ongoing situations instead of past events; this is why they are suitable for analyzing organizational systems and practices. This applies to the study related to the thesis and exploration of financial practices in housing companies.

The overall research process follows a simple and logical progression where the main challenges with financial reporting are identified through the interviews conducted. In addition to this the reports from Hausvise are analyzed to understand the form of current reporting. Through these stages the key metrics are found with the visualization requirements for the final product. Finally, the insights gathered are applied towards the development and design of the final dashboard and toolkit. This approach ensures that all the data collected is taken into account in the final product and it is aligned to serve the needs of the users, who are mainly the property managers and the shareholders of the housing companies.

Thematic analysis is used for the collected data from the interviews conducted. This method of thematic analysis is used with qualitative research to analyze and identify patterns among the data collected and it can be seen as a foundational method for qualitative analysis. In simple terms, thematic analysis is used to organize and describe the data set in detail. One main advantage of thematic analysis is the flexibility to handle a wide variety of data through its theoretical freedom, which makes it a useful research tool. The objective of the analysis is to find recurring themes within the data. A theme is a feature of data that captures something meaningful related to the research question and is represented by some sort of patterned response or meaning across the dataset (Braun & Clarke, 2006). Importantly, the identification of a theme is not based on the

frequency of its appearance in the dataset in order to be considered thematically significant (Braun & Clarke, 2006). This means that if some evidence appears in two of the six interviews conducted does not mean that it cannot be a theme if it otherwise relates to the main topic and research problem.

3.1 Interviews

3.1.1 Data Management Plan

The data collected for the use of this thesis from the commissioning company include the interview transcripts and the extracted reports from Hausvise software. This data is handled in a proper manner and with respect for the information it contains. The interview process was done anonymously, and no personal data was used or stored anywhere.

The interview transcripts are used in the empirical part of the thesis as a source; the names of the property managers interviewed are replaced with letters, e.g. Property Manager A. This ensures that all the content covered in the interviews is fully anonymous. The transcripts are stored in separate Word files, which are saved on the cloud server of the commissioning company. Access to this server is only possible through the network of the company, which belongs to employees only, making this a secure location for storing the data.

The reports extracted from Hausvise are used for developing the toolkit. There are two housing companies selected as example companies. These companies have been given names such as Company A and Company B. For these the necessary financial and consumption reports are collected from Hausvise software in Excel form. The data is then be imported to Power BI, where the final toolkit is designed. During this process, all the saved Excel and Power BI files are stored in the same cloud storage of the commissioning company.

After the data has been used for the thesis it is disposed. This means that all the files saved in the cloud storage are deleted and only the necessary content is added into the appendices of this thesis report. This makes sure the data is only in the locations it should be in the end.

3.1.2 Interview Analysis and Empirical Findings

The interviews conducted with the property managers were analyzed using mainly thematic analysis. This lead to identifying the main themes and needs for improvement in the current state of reporting, which guided the process of designing the toolkit in Power BI. The interviews have been transcribed into Word files from the Teams meetings with the help of AI. The work of AI has been

around cleaning the text and finding the main themes that appear most often, without changing the content or tone of the interviews. The findings have been divided into four main themes that have emerged from the data. These are similar to the four themes used to divide the interview questions into separate sections. To support the findings, there are citations taken from the actual interview transcripts from the property managers.

3.1.3 Current Financial Reporting

According to the interviews the current form of financial reporting is heavily based on the necessary practices guided by the legislation and software used in the company (Hausevise). This means that financial information is shared in the traditional form of balance sheets, income statements and budget comparisons (Property Manager A). Overall, the reporting is clearly directed towards the board of directors rather than all the shareholders in each housing company. According to Property Manager A, the regular shareholders and residents receive the financial materials only before the general meeting, which is once a year. Finances are discussed regularly in board meetings, and boards have continuous access to monthly reports through the property management system Hausvise. The frequency of these meetings varies considerably based on the housing company, which affects the timeliness of the financial monitoring. Some companies may only have one meeting during the fiscal year, while others may have meetings each month (Property Manager A). Based on the interview findings, financial reporting is focused on supporting the board of directors in the housing company, while the rest of the shareholders rely on the annual general meetings for getting deeper insight.

These reports are not delivered to residents except with the invitation to the general meeting and to the board when they have a meeting. So it varies from housing company to housing company, with some housing companies having board meetings once a month and others every two months, and there are also companies that don't really hold meetings except in connection with the financial statements meeting and the board's organizational meeting. (Property Manager A)

The way of providing the reports currently is to send PDF files via email, using the property management software, and oral presentations in meetings. According to Property Manager D, the PDFs provide a solid overview of the expenses and income sources, however they are not enough alone. The main problem with the PDFs is that you cannot dive into a specific account to see what it contains. This is why the Hausvise software is usually open in all the meetings to help in providing a deeper understanding of the accounts (Property Manager D). The method of having a shared screen in the board and annual meetings is used with all the property managers interviewed. This means that visual elements can be used and presented in meetings with ease.

...Usually in a meeting, I open Hausvisen for the background, because you can't dive too deep into those PDF prints if you want to investigate what an account contains. (Property Manager D)

Property Managers A, B and D pointed out that the same reports are sent to the board members and all the rest of the shareholders. The main reason for this is that all the information given is the same for everyone, up to date and according to the legislative rules. The issue with this is that the needs of users differ, meaning that the figures that interest the average shareholder might not be the same as the content the board members want to focus on. There are no tailored versions of the data shared. (Property Manager B and D)

Property Manager E also mentioned that the background of the shareholders affects how they interact with the reports and what they focus on among the numbers. This means for example, the profession they are in and what they value in their personal life. This is an external factor that cannot be determined solely by the quality and characteristics of the reporting. (Property Manager E)

A small number of shareholders understand the reports very well, because there are financial professionals involved in some companies. For some reason, there are also those on the boards who understand more about finance because of their jobs. If it's just the average shareholder, they unfortunately don't understand much of those reports. (Property Manager E)

In summary, it can be stated that the current reporting of housing companies meets the formal and legal requirements, but it is not oriented towards different groups of shareholders or adjusted in any other way. The reporting focuses solely on the past performance of the housing company and contains detailed account information when the software only when Hausvisen is used, otherwise the reporting relies on PDFs. This means that understanding the overall financial picture and then trying to make decisions based on it requires additional explanation from the property managers and background knowledge in finance for the shareholders to truly understand. The table below (Table 1) summarizes the current themes around reporting based on the key findings from the interviews.

Theme	Description	Key Findings from the Interviews
Accounting-based reporting structure	Content of the current reports	Traditional accounting reports (balance sheet, income statements and budgets)
Lack of group-based reporting methods	Target group orientation	Same reporting materials for all the shareholders (board members and all other residents)
Reporting frequency	Shareholder reporting	Mainly in the general meeting
Lack of visual reporting formats	Reporting formats	Tables in PDF form and the reports from the Hausvise system
Retrospective nature of reporting	Timeliness of reporting	Financial figures are mainly assessed based on historical data, rather than looking in the future
Decision for the future of each housing company	Future predictability	Minimal, with the main focus on actual figures
Property managers' role with reporting	Manual work in explaining reports for shareholders	Excel is needed for calculations and supplementing reports

Table 1. Themes Identified from the Interviews

3.1.4 Shareholder Understanding and Challenges

The next section and theme of the interviews focus on the comprehension of the reports among the shareholders. Based on the interviews, the level of understanding varies a lot among the shareholders. Especially between the board members and the rest of the shareholders, the differences are noticeable, these include the level of financial knowledge, experience and the context in which the reports are viewed. This is an important aspect since all the major decisions are made among all the shareholders by voting, which is why it is beneficial for people to understand what is being decided.

Among the board members, the level of comprehension improves over time and is overall at a good level (Property Manager D). Many property managers mentioned that the reason for the good understanding of board members is partly based on the fact that they look at the reports more often than the rest of the shareholders and the same reports are used in the board meetings, which allows them to compare the numbers almost on a monthly basis (Property Managers D and E). Property Manager E also mentioned that in the housing companies he manages, the boards often include individuals whose profession is related to finance or closely related to it. This is only a notice he made, based on around 20 housing companies as a sample.

Unfortunately, based on the interviews, the comprehension of shareholders outside the board is at a lower level. Property Manager B stated that the boards can manage well with the numbers; however, the rest of the shareholders feel overwhelmed by a large amount of numbers (Property Manager B). This is related to the previous finding that the current reports from Hausvise cannot be easily modified to be in a simpler and more readable form. This means that understandability is not a property of the current reports, but it has to be created by the property manager through explanation and experience.

Once or twice I have properly explained them to the shareholders, so that they understand what the reports contain. But it is of course a little more difficult for the so-called basic shareholders to always understand all the figures at the general meeting.

Partly because of this, it is difficult to understand when a large number of figures appear before their eyes. After this, you have to explain them to them and act as a so-called interpreter, so that the shareholders can grasp the meaning of the figures.
(Property Manager B)

Property Manager F mentioned that often, the most difficult aspect to understand is the housing company's carryover surplus or deficit. This roughly means the amount of maintenance fees collected monthly from the shareholders minus the expenses. The result is either a surplus or a deficit. The complexity of this is to understand that if the previous fiscal year resulted in a surplus and therefore there carryover surplus, the next fiscal year can be intentionally budgeted to be in a deficit. Most shareholders look at the surplus or deficit of only the ongoing fiscal year. (Property Manager F)

Often the biggest challenges in understanding come with the fees and how much surplus needs to be in the account for the housing company to survive each month, because sometimes we just see that there is money in the account and continue with the same fees, and then the following year we wonder if there is not enough money.
(Property Manager F)

There are sometimes challenges with surpluses because the focus is only on the result of the past financial year and do not take into account the accumulation of previous years. (Property Manager A)

The property managers have a big responsibility in clarifying and explaining the reports for the shareholders; the format of the report can make this task a lot easier. This can be seen in loan calculations when there is a renovation finished and the loan is divided for each apartment based on stocks, square footage or some other unit (Property Manager C). The format used for these figures is Excel with the data collected from Hausvise. Excel helps in calculating precise figures for loans, which need to be correct to the last cent. If there are issues with the loan amounts or loan payments, all the miscalculated money will be the responsibility of Myyrmäen Huolto (Property Manager C).

Project calculations, i.e. if some renovation is planned, I do the calculations in Excel and then extract the data from the system into an Excel report, because that way I only get the necessary information and it is easy to present it in meetings.

You have to be careful with loan invoices, because otherwise the consequences can be large financially and our company will be held responsible. (Property Manager C)

Overall, the understanding of shareholders is affected largely by the presentation skills of the property managers and the tools that they use for presenting data. It can be identified from all the managers interviewed that the software Hausvise is currently not flexible enough for the needs of the shareholders or the managers using it. Some managers mentioned in this part of the interview that some visual form of reporting would support and clarify the data.

The way we currently communicate things to residents is mainly that we go through things with them at the general meeting. Currently, there are some diagrams and other things in that system that can be downloaded, but they have not been used yet. I would like to see more of these types of models and it would certainly support the comprehensibility of the shareholders. (Property Manager D)

I have shown these figures on the screen for all reports, but I have not used any charts. They could be useful for presenting some figures, e.g. consumption figures and loan information. (Property Manager A)

Together, these findings support the need for some visual reporting. To note that these findings were collected before there were any questions in the interview regarding the need for visual aspects in the reports.

3.1.5 Need for Visual Reporting

As mentioned by property managers in the previous section, the need for visual reporting has clearly emerged from the interviews. The next questions in the interviews focus on this theme and the insights of property managers regarding the visualization needs. The identified need for visual

reporting comes from the challenges related to presenting figures, understanding the data, and the lack of effective communication between the property managers and the shareholders.

When asked about the use of visual reports in the past, 4 out of 6 property managers interviewed have not used any form of visual representation when covering the financial statements in meetings. The two managers who had used them were only trialed in a few housing companies and were only used to demonstrate some figures in more detail.

I would have done a lot more visualizations if I knew better. I don't know how to do it myself, but I had a ready-made pie chart that I've copied into the rest of the budgets, so I've sometimes used it to support the presentation. (Property Manager C)

According to the interviews, the main reasons for not using these visuals in the past has been the lack of skill among the property managers and the hectic schedules at the end of the fiscal year. The majority of the housing companies' fiscal period is a calendar year, which means that the financial statements need to be prepared at the same time for the meetings. This means that reports need to be created quickly and in an easy way to bring value to the property managers. Property Manager E mentioned that the creation of these visual elements cannot overwork anyone and take up too much time from other tasks, however they felt that these visual elements would bring value and clarity into reporting (Property Manager E). Another mention from Property Manager E was on not converting every single figure from the financial statements into visual form, but focusing on the key numbers that truly matter to the shareholders and the overall finances of the housing company.

Yes, I would see the most significant figures as the most important ones, and of course, as I said, I would at least open them up in the annual report anyway. So, you don't have to put everything in a visual format, just the ones that really matter. (Property Manager E)

Well, some graphics and diagrams could be quite sensible if they could be obtained from somewhere. It would be important that they could be created or printed quickly and easily, especially so that they could be presented at the general meeting. With the board of directors, you might be able to get by with just the reports you get from the program. (Property Manager B)

The need for visual elements has been identified clearly from the interviews. Among these, several interviewees noted that the current reports require extensive explanation to achieve the required level of understanding in meetings. This affects the workload of the property managers, and also the skill level needs to be high, which is not the case with new managers who are just starting out in the field of work. The need for visuals was particularly noticeable in the annual general meetings, when large amount of numerical data was presented to shareholders, whose expertise and understanding vary the most when it comes to financial literacy (Property Manager C). Most property managers emphasized that in this situation, visual elements and summaries could help in

highlighting the key figures and financial situations without requiring extensive accounting knowledge from the shareholders.

Often, a diagram or pie chart would have easily helped to get more out of the process and given shareholders a better understanding. It also made it easier to explain things yourself. (Property Manager C)

The interviews indicated that the difficulties with the current table style reporting were that the shareholders' interest is focused on specific figures, and the lack of focus when all of them were presented at the same time. The concentration goes automatically towards certain figures, such as maintenance costs, how much money is in the bank account, and when the next renovations are coming (Property Manager D). Visual reporting could solve this in a way that the data could be presented in a clearer and more direct way, without the need for shareholders to go through the full income statement and balance sheet. Several managers pointed out that providing all the possible figures and data of the housing company does not automatically improve the understanding of shareholders, but actually can make it even more difficult to know what information to focus on when making smart decisions (Property Managers E, B and D).

Often, the focus is always on how much money is in the account, whether repairs are coming, and what the previous year's expenses look like, before going through the agreed-upon matters. (Property Manager D)

Property Manager F mentioned that using visual elements to show how much a renovation project is going to cost for each apartment would provide value and perspective. Currently, the shareholders focus only on the overall cost of a project and ignore the true cost for each apartment and the effect on their monthly fees. In cases when a renovation is estimated to cost 500 000 euros, most of the shareholders can feel startled. If the numbers are presented in a way that each apartment will be paying an extra 100 euros per month, the thoughts and perceptions change. This change of perspective could help in making more reasonable and profitable decisions, and visual tools could play a big role in this development. (Property Manager F)

That sometimes we get stuck on something, that some project, some investigation or some repair costs an amount of x. This sounds like a lot of money, but then if it were to be seen somewhere that hey, we're talking about an increase of y for your apartment, the idea is completely different. (Property Manager F)

Visual elements are clearly linked to improving the accessibility, usability and overall awareness of shareholders in housing companies. Visual reporting was not described as a replacement for the current form of reporting, but rather an addition to support communication and improve understanding. This identified need provides a solid foundation for creating and examining visual solutions for reporting.

3.1.6 Financial Resilience and Sustainability of Housing Companies

The last section and theme of the interviews focus on the consumption and sustainability aspects of housing companies. As mentioned in the theory, measuring and evaluating the sustainability figures and actions is crucial for the longevity of housing companies and the shareholders. Sustainability is also heavily linked to the financial side of the housing companies, and the decisions made by the shareholders influence both. In the six interviews, sustainability was discussed in connection with the resilience of financials in the long term, the effects of energy efficiency investments, and the ability to justify and explain environmentally oriented decisions to shareholders using the financial benefits as an argument. This way, sustainability was an integrated element of economic planning and financial comprehension, not as a fully separate objective for the housing companies.

The first theme that was identified from the interviews for this section was the amount of cash reserves for managing unexpected expenses and ensuring a sustainable future for the housing companies. All of the property managers emphasized that they focus on maintaining an appropriate level of cash reserves, depending on the size of the housing company and the age of the buildings. Usually, the amount of cash in the bank account is measured by the housing company's monthly expenses (Property Managers F and B). This leads to making calculations to figure out the average fixed monthly expenses. Based on the interviews, a solid liquidity buffer was described as being around 2-5 months of expenses stored up. Having the buffer in the housing company allows to not having to charge for additional monthly care fees from the shareholders. The main difficulty with the whole financial buffer is that, in order to accumulate a healthy balance, usually the monthly care fee has to be raised at some point (Property manager F). This can be difficult for some shareholders to comprehend, since they might look solely at the yearly expenses and then divide that amount by the number of shareholders to obtain the price of the maintenance fee (Property Manager C). This situation leads to an accumulated fiscal year residue of zero without having any buffer for unexpected expenses or financial sustainability for the future.

Almost all of my companies have quite solid buffers, because the shareholders are used to it. However, I sometimes remind the shareholders that a housing company is not a bank, and that more money can be raised when needed. There have also been companies where the money has run out every few months because the fees have not been raised enough. The amount of buffer you should keep depends on the company, but it would be good to have about 3-6 months of expenses. (Property Manager F)

Sometimes people don't understand that there needs to be a buffer in the account and that the fees must be large enough to accumulate a small surplus. (C)

It is not advisable to keep too much money in the company's account, especially since investor shareholders may object to the housing company acting as a bank. (Property Manager E)

The final planning comes when the budget is made for each year. The presentation of the budget is the responsibility of the property manager, and the final seal of approval comes from the shareholders. Most often, there are minor alterations to the budget from the shareholders, with the most common ones being the size of the monthly maintenance fee (Property Manager A). The budget's effects on the accumulated residue are often ignored, and if it is looked at, usually it is only the current fiscal year's residue that makes sense for most of the shareholders (Property Manager A). The issue with this is that in some cases there can be an accumulated surplus of a hundred thousand euros from previous years, and the current budget is made on purpose to be in a deficit, which can be difficult to grasp for some shareholders (Property Manager B). There are also other disadvantages of having a surplus that is too large; these include the false image regarding the size of the maintenance charge, having too much money sitting in the housing company's bank account, gaining zero percent interest, and there can be questions from the auditors for having too much money lying around (Property Manager B). These findings emphasize that the uncertainties of the shareholders can be solved with clear visual reporting of the accumulated residues and account balances.

When budgeting, very few of my housing companies have ever made a zero budget or a negative budget, and sometimes they have had to do one, but they do take that into account and then adjust the monthly fee accordingly so that there is a surplus. (Property Manager A)

Too much maintenance surplus is bad because it distorts the real need for maintenance fees and the shareholders' money is unnecessarily sitting in the company's account at so-called zero interest. (Property Manager B)

The next question in the interview was related to energy efficiency projects and their benefits towards the consumption figures and the financial side of the housing company. According to the interviews the common energy projects usually include solar panel installations, window replacements, improving heating systems and other energy-saving measures. The benefits of these projects are justified to the shareholders mainly through financial arguments that relate to the expected cost savings, reduced energy consumption, and investment payback periods (Property Manager A). Property managers pointed out that almost every time these calculations are presented verbally, with traditional style tables, and with minimal visual presentation. This way of presenting the figures can make it challenging for the shareholders to fully grasp the benefits of a project and convince them to believe that it is worth investing in (Property Manager E).

The payback period of a project is also important information, as to when it will start to produce even more for the housing company. These are things that have to be done and justified to the shareholders nowadays, otherwise the decision will not go through, and the shareholders will not understand the benefits of the project for the housing company. (Property Manager E)

The last section covered the importance of monitoring energy and consumption data. The question was about how important the property managers consider the visual presentation of consumption figures along with traditional financial reports. Property managers emphasized that consumption figures are crucial and they need to be presented efficiently, which provides understanding related to the actions of shareholders and the financial outcomes of these actions (Property Manager A). By only looking at the financial numbers of consumption data, the shareholders can only see the realized costs, but not the reasons why these costs change over time (Property Manager E). This makes consumption monitoring an essential element for clarifying the drivers of energy expenditure. Several interviewees also noted that without clear and visible consumption data, it is difficult for shareholders to see where the cost changes come from, whether it is from price fluctuations, usage amounts, or something else.

It is very important to present consumption figures because it creates an understanding of how residents' activities affect financial figures. We have a bit of a problem monitoring this consumption, because usually we only start reviewing those figures when the financial statements are ready, which is too late. (Property Manager A)

Shareholders only look at financial figures and don't always understand the reasons for them and why a certain number is rising. (Property Manager E)

The property managers highlighted the importance of visual elements when communicating consumption information to shareholders. The current forms of presenting this data are with the use of raw consumption figures and technical tables; these are difficult to interpret and require a lot more time and knowledge to get a grasp of the bigger picture (Property Manager C). When asked about the use of visual tools to highlight consumption figures, all the property managers felt that it would make monitoring accessible to shareholders without the need for expertise on energy figures, supporting the overall goal of transparency and engagement. Property Manager B mentioned that when the consumption figures are monitored more frequently and precisely, this usually leads to lower consumption because we are more aware of what we are consuming. This same effect can be seen with the housing companies that have updated apartment-specific water meters, after which the average water consumption has decreased significantly (Property Manager E).

Electricity, heat and water have been monitored previously through lists and these are the most important figures. It would be good if these were put in graphical form. (Property Manager B)

Once the apartment-specific water meters were installed, water consumption dropped to about 100 liters per day from 120 liters. Sometimes even a little less, so there's a noticeable difference. (Property Manager E)

Overall, the final question reinforces the theme around the visualization of key data. The role of consumption monitoring is important and benefits all the shareholders, and it needs to be a part of financial reporting, not as a separate section. Based on the interviews, the monitoring gets more

efficient and precise through visual tools, and this leads to more aware shareholders who make smarter decisions in the future. These findings provide a clear justification for implementing visually presented consumption figures into the final toolkit.

3.2 Toolkit Development Process

This part describes the process of taking the key findings from interviews and the theory to develop the final reporting toolkit. The purpose of the toolkit is to find solutions for the main difficulties found from the empirical data related to the current state of financial reporting, comprehension of shareholders, the need for visualizations, and the awareness of environmentally sustainable decisions in housing companies. The main goal for the toolkit is to improve the shareholders' understanding of all the key figures in the housing company's finances and why sustainable energy projects matter in terms of consumption figures and financially. Also, the idea is to help the property managers in their jobs, since the toolkit makes it easier and faster to explain and highlight the figures that matter most to the shareholders. The section is structured in a way where first the development and creation of the toolkit is explained, followed by the explanation of the key indicators chosen for the toolkit, and the final part covers the feedback of the shareholders regarding the features of the toolkit. The creation of the toolkit uses Mayer's (2009) principles of multimedia learning, with certain principles mentioned throughout the process.

This section is tied to project task three.

Project Task 3: Visualization toolkit

Create the initial dashboard concepts based on the information gathered from the interviews. Also, take into account the best practices in visual reporting.

3.2.1 Creation of the Toolkit

The creation process of the toolkit started with identifying what data would be presented in the dashboards and where this data could be collected in the most efficient way. The first step was to look at the current form of financial data and reporting, which was in the PDF format shown in Figures 2 and 3. From these reports, the plan was not to show all of the accounts and numbers in the dashboard, but the ones that actually matter regarding the interest of the shareholders and that benefit the housing company. This is connected with Mayer's (2009) coherence principle, which emphasizes eliminating non-essential information in order to reduce the cognitive load.

The dashboard needed to provide solutions for the themes identified in the empirical part of the thesis. When designing the toolkit, the idea was never to replace the current reporting formats, but to support them and enhance certain information. The data for the current reports were formed by

the software Hausvise used at Myyrmäen Huolto. The reports follow a standard and common accounting-based balance sheet and income statement form, which is due to the legislative and regulatory rules that need to be followed in order to achieve proper and continuous accounting.

The software selected for the dashboard was Microsoft Power BI, which is commonly used for visualizing different data and allows importing from other software and transforming raw data into interactive dashboard designs. Power BI supports data modeling and a wide range of visual elements that can be chosen for the presentation of data, such as bar charts, trend lines, and information cards. The use of visual elements aligns with Mayer's (2009) multimedia principle, where the combination of words and graphs help individuals learn better instead of just using words alone.

The starting point was to collect all the necessary data from Hausvise reports and export them into Microsoft Excel, where the data was processed, and figures that were not wanted in the final dashboard were deleted. This made it efficient to collect information from different parts of the Hausvise software, since all of it could be exported through Excel. All of the data in Excel was modified to be in a chart format where the account names were on each row and the numerical data was in the columns. After the data was handled in Excel, it was then imported into Power BI, where the final modifications could be made before storing it in the database. The figure below (Figure 4) illustrates the exported data, regarding the income and expenses for Housing Company A, from Hausvise after it has been modified in Excel and is ready to be moved into the Power BI database for visualization.

Housing Company A	01.01.2025 - 31.12.2025	Budjetti 2025
Kiinteistön tuotot		
Vastikkeet		
Hoitovastikkeet yhteensä	223 120,80	223 121,00
Kulutusperusteiset vastikkeet yhteensä	34 890,00	35 712,00
Erityisvastikkeet yhteensä	5 522,40	5 522,00
Vastikkeet yhteensä	263 533,20	264 355,00
Vuokrat	26 056,60	25 290,00
Muut kiinteistön tuotot	10 435,18	6 800,00
Kiinteistön tuotot yhteensä	300 024,98	296 445,00
Kiinteistön hoitokulut		
Henkilöstökulut	-4 450,00	-3 600,00
Hallinto	-31 012,47	-29 170,00
Käyttö ja huolto	-37 912,85	-25 788,00
Ulkoalueiden hoito	-368,81	-7 550,00
Siivous	-20 466,98	-17 100,00
Lämmitys	-44 453,24	-47 000,00
Vesi ja jätevesi	-28 429,29	-28 000,00
Sähkö ja kaasu	-16 461,43	-21 000,00
Jätehuolto	-7 960,76	-8 400,00
Vahinkovakuutukset	-5 883,11	-5 930,00
Vuokrat	-28 661,91	-28 600,00
Kiinteistövero	-37 858,84	-38 000,00
Korjaukset	-27 811,10	-22 200,00
Kiinteistön hoitokulut yhteensä	-291 730,79	-282 338,00
HOITOKATE	8 297,69	14 107,00

Figure 4. Income Statement Compared to Budget 2025 for Housing Company A

Once all the necessary data was imported into Power BI, the modeling and designing of the dashboard layout started. The focus was on providing all the key information to be available at a quick glance, but with the dashboard not being too heavy on the eye. This meant having balances, such as bank accounts, accumulated residue, loan information, and financial residue to be presented as info cards. The comparison figures, including the income and expenses compared to the budget and the development of the loan amounts, were presented with more advanced visual tools. The consumption figures were presented with comparison to an average housing company using bar charts. Presenting the data this way connects with Mayer's (2009) spatial contiguity principle, where individuals understand better when similar data is next to each other on the same page rather than separately.

To keep the dashboard clear and not too data-heavy, it was divided into three different info pages: one with financial data, one for the consumption figures, and one for the energy project analysis. The division of pages is supported by Mayer's (2009) segmenting principle, where the information is processed more efficiently when it is divided into logical sections.

To illustrate the toolkit development process, below is a flowchart that shows the different steps and decisions made within the process.

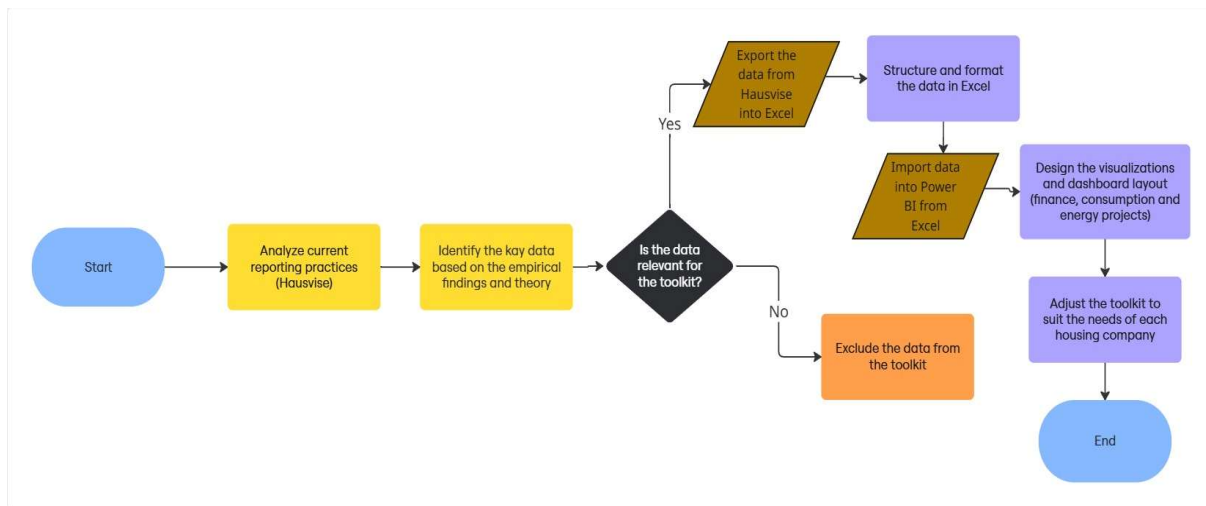


Figure 5. Toolkit Development Process Flowchart

3.2.2 Selection of Key Indicators and Figures

The selection of key indicators and figures was guided by the empirical findings in the previous section and aimed to improve the comprehension and usability of financial and other key information for the shareholders. Instead of replicating full financial statements, the toolkit focuses on a limited set of indicators that were repeatedly identified in the interviews by the property managers as the most relevant ones for achieving improved decision-making, financial communication, and long-term sustainability of the housing company.

The toolkit is divided into three pages as mentioned above. The first page (Figure 6) focuses on the financial data. The selection of each indicator and how they are presented in the toolkit is explained in the list below, with the image of page one.

Account Balances (Tilin saldo ja jäämät)

The bank account balance with the residues can be seen at the top of the page; this makes it so that the viewer notices them immediately, compared to having to find them in the financial statement booklet. The bank account balance is presented as a simple numerical info card, which reflects the interview findings where shareholders feel that liquidity is one of the most important aspects of the housing company.

The operational and financial residue can be found at the top next to the bank account balance. These are also presented as info cards, so that the data is easily noticed. The residues are presented separately, because this avoids confusion between the regular operations and the loan-related transactions of the housing company. Together, these balances establish a clear financial snapshot and baseline for the rest of the dashboard.

Loan Information (Lainatiedot)

This section can be seen at the left side of the dashboard, and it aims to visualize the housing company's debt status in a clear way. A meter-type visual is used to show the amount of loan that is left compared to the original amount. This is also the largest visual, since it is the most commonly asked question when it comes to loans, according to the property managers. The visual chosen helps comprehend the long-term perspective of the loan, which is often missing from the regular financial statements.

To support the loan balance, there are color-coded information cards that present the other commonly asked key information. This includes the upcoming yearly payments and interest amounts as numerical info cards, with the calculated debt amount per square meter, which helps the shareholders to figure out the remaining debt they have. With the current reporting, none of this data is easily accessible, and it takes time even if you know where to find it. The last info in this section is the interest percentage, when it changes, and which Euribor it is tied to. Based on the interviews, these are often asked in the meetings, and this information cannot be found in the financial statements at all. By presenting a vast amount of data in the dashboard, it lightens the workload of the property managers, since they do not have to do any additional research.

Expenses and Income (Kulut ja tuotot)

The last section on the page is the visual representation of the yearly expenses and income compared to the budget made for the fiscal year. The use of bar charts makes the deviations from the budget and trends immediately visible. The approach for having a visual comparison was chosen based on the interviews, which highlighted the difficulties in identifying differences between the budgets and actual figures in the traditional PDF reports. The charts group the income and expenses into the same general categories that are in the current reports. This helps the viewer to focus on the most relevant accounts of the income and expenses, while still maintaining transparency. The reason for the expense chart being larger is due to the number of accounts and the fact that the income a housing company receives always consists of maintenance fees, rents, and other small incomes. The main possible deviations are always on the expense side.

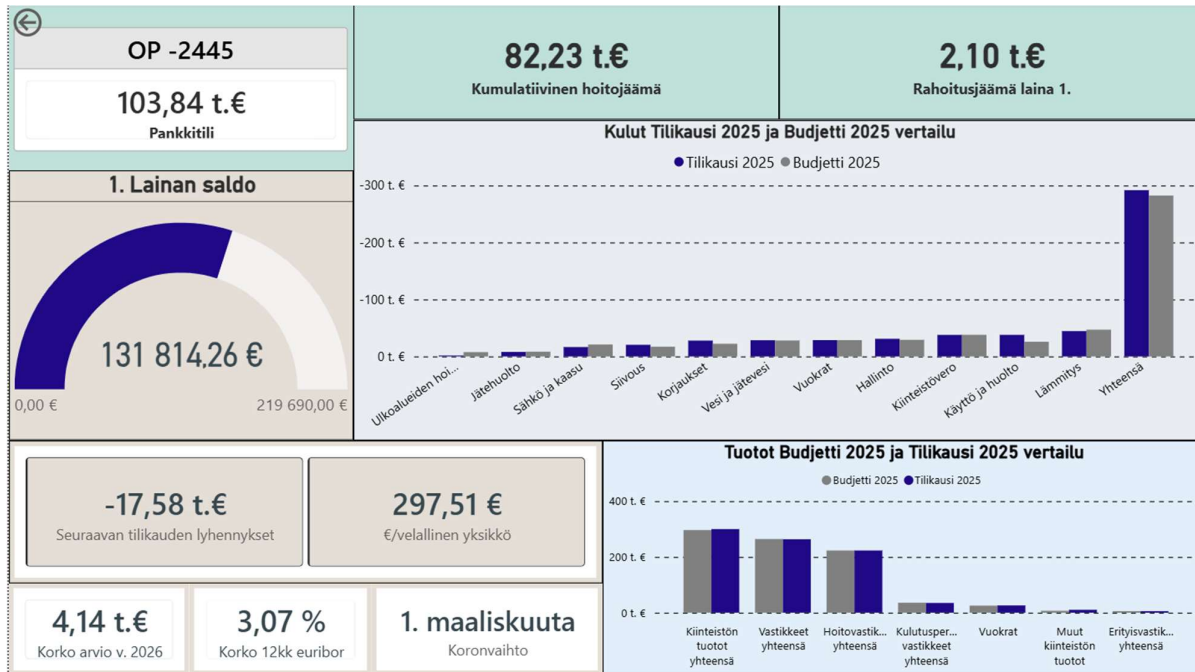


Figure 6. Financial Information of Housing Company A in Toolkit

The next page contains the consumption figures of the housing company (Figure 7). This ties in with the awareness of shareholders in making sustainable and beneficial decisions for the future of the housing companies.

Water Consumption (Vedenkulutus)

The water consumption visualizations are at the top part of the page, and they are color-coded to be easily recognized from the other data. The left side presents the annual water consumption in cubic litres, with the amounts highlighted for each year and the right side compares the housing company's usage of water per resident per day to a model housing company that represents the average numbers for housing companies in the metropolitan area (HSY, 2025). The information is presented as bar charts and clearly shows year-to-year development, allowing the viewer to identify trends, since the time span shown is longer. This follows the interview findings highlighting the importance of understanding and following consumption figures over time.

The reasoning for combining the realized consumption figures with the benchmark housing company is to provide context for shareholders and to see where the housing company currently ranks against the average figures. This allows for shareholders to assess their consumption and

potentially discuss about behavioral changes or larger water-saving measures in the housing company.

Electricity Consumption (Sähkökulutus)

The consumption of electricity figures are presented with the yearly consumption compared to the benchmark housing company; this visual can be found in the bottom left corner of the dashboard. The benchmark values show the average amount of electricity used by a housing company yearly in Finland (Kiinteistöliitto, 2026). The visual chosen for this data is the bar chart, since it easily highlights the differences between the values and makes deviations easy to identify.

Having the benchmark addresses one of the interview findings, which implies that shareholders are not only interested in consumption amounts but also how reasonable these numbers are in a broader context. The visual presentation supports the understanding of energy usage and links to the operational behavior of the shareholders.

Heat Consumption (Lämmitys)

The last visual on this page covers the heat consumption of the housing company. The bar chart is simple, with the presentation of the annual heat consumption in the housing company, with the data presented additionally in numerical form. Heating consumption is shown separately without any benchmark comparisons, since the numbers depend strongly on many external factors, such as weather conditions, heating format, and the energy efficiency of the building. Based on the interviews, the shareholders value the opportunity to follow the trend of annual consumption figures, and they provide important reference points when evaluating the benefits of energy projects, where reducing the heating demand is often a central objective.

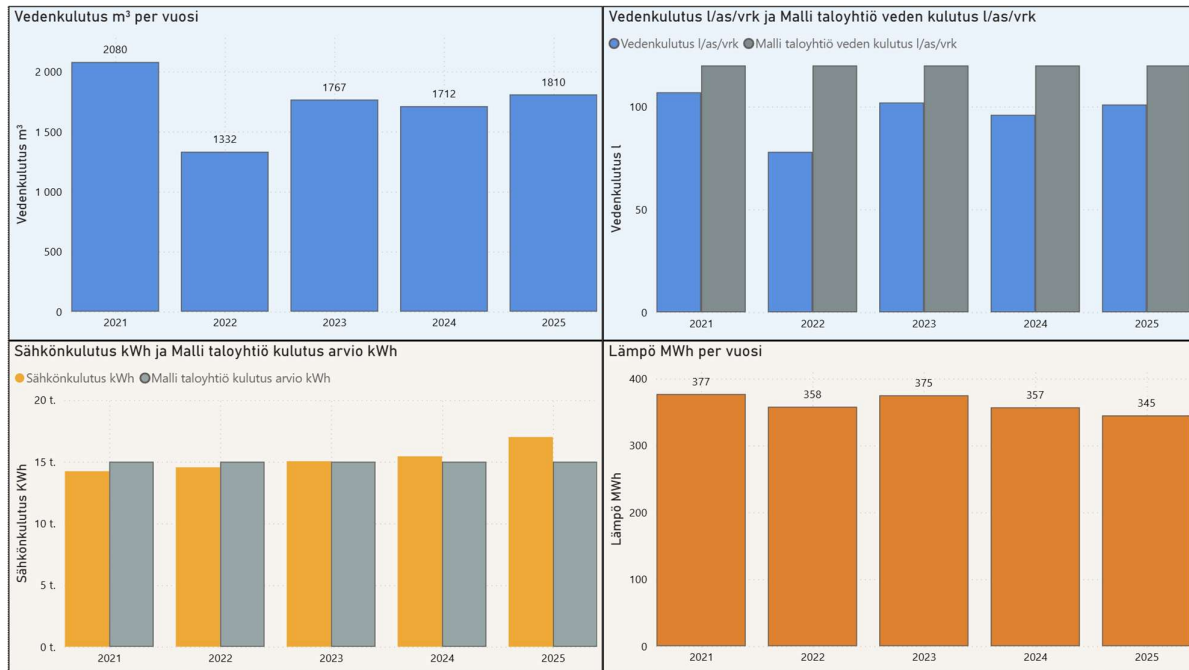


Figure 7. Consumption Figures for Housing Company A in Toolkit

The last page of the toolkit (Figure 8) covers the benefits and measures the profitability of energy projects, and aims to make their effects more transparent to the shareholders. The page presents a comprehensive overview of the financial and sustainability impacts of an energy investment using a solar panel installation project (Aurinkovoimalan asennus projekti) as an example. The visual combines the basic project information, cost comparisons, potential savings, and payback analysis into one single dashboard.

At the top of the page, the dashboard presents the background information of the project, such as the project cost, the number of solar panels installed and what is the lifetime estimate of the panels. This provides the important information clearly and in a simple manner for the shareholders to understand. Based on the interviews, the current difficulties were around the project reports being unnecessarily long and complex.

The bar chart in the middle, left side shows the current annual energy costs in the housing company, which is compared to the costs after the project is complete. This way, the shareholders can easily see the cumulative savings over the financing period generated by the project. To support this on the right side of the dashboard, there are info cards that highlight the amount of savings (Vuositteiset säästöt) during the financing period and the total cost of the project when

financed over ten years (Vuosittaiset kulut yhteensä). Presenting these indicators separately helps avoid the shareholders in conflating the operational savings with the loan expenses.

The graph at the bottom of the page explains the payback period (Investoinnin takaisinmaksuaika), visualizing how the cumulative savings are allocated towards the initial investment over time. This demonstrates the payback time and the break-even point of the project, which helps show the shareholders whether a project is profitable and worth starting. In this example, the dashboard indicates that the payback time of the project is approximately seven and a half years, which is clearly less than the lifespan of the solar panels. As a result, the project can be considered financially viable.

From a sustainability perspective, the energy project page aims to provide clear data on how an energy investment reduces consumption figures and what the economic outcomes of this are. Lowering the operating costs of housing companies and improving long-term stability supports financial sustainability, while also reducing energy demand and environmental impact. The toolkit combines these perspectives into one visual narrative, which allows for informed and balanced evaluation of energy projects in the future as a part of sustainable housing company management.

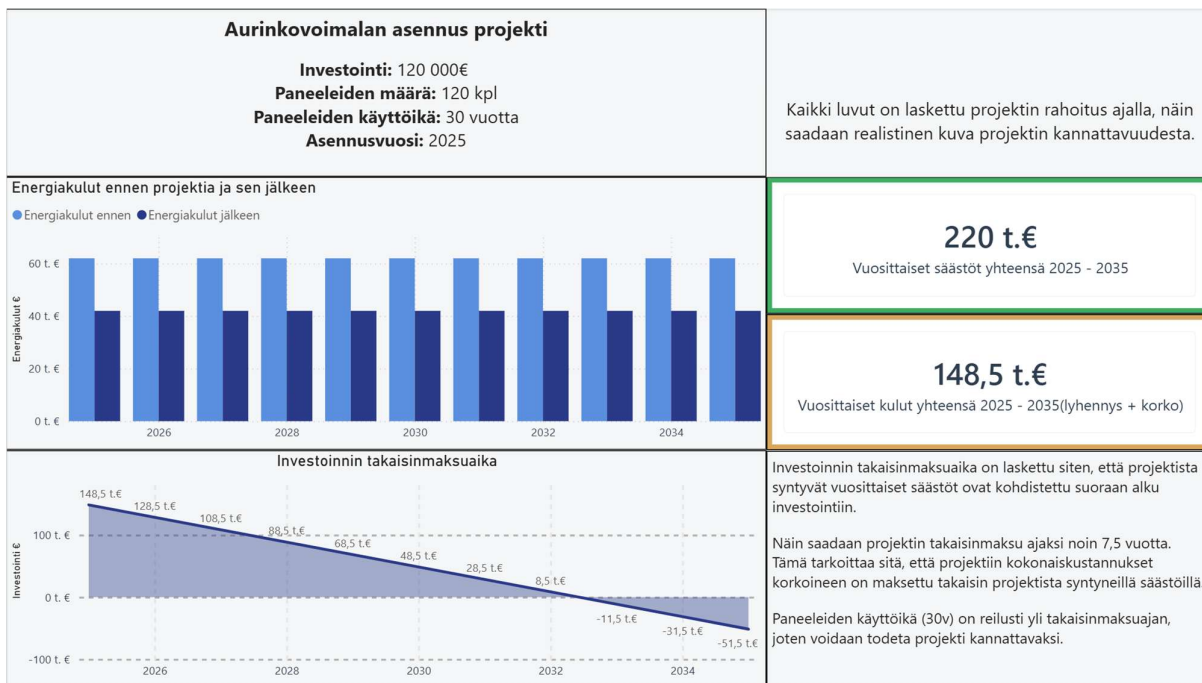


Figure 8. Hypothetical Energy Project for Housing Company A in Toolkit

3.2.3 Evaluation and Feedback of the Toolkit

The evaluation of the toolkit is made from a technical perspective regarding its creation process and the feedback of shareholders collected through a Google Forms survey conducted at an annual meeting of a housing company. The survey aims to assess how well the toolkit addresses the challenges identified in the interviews conducted. This section is tied in with project task four.

Project Task 4: Develop and refine the visual dashboard

Focus on developing a functional visual dashboard based on the information gathered from the previous tasks. Pilot the dashboard with one selected housing company. After the dashboard has been tested with the housing company, gather feedback through Google Forms and make a refinement plan for the dashboard based on the given feedback to achieve the best possible outcome for future use inside Myyrmäen Huolto.

During the development of the toolkit, the main challenges were related to the structure of data and its availability. Overall, the financial data was available and only required some modifications to fit the requirements of Power BI. The difficulties came with the consumption figures, since part of it is in a different software than Hausvise. The reason for this is the change of the software used inside Myyrmäen Huolto that occurred two years ago, and due to this, not all of the data has been transferred to Hausvise. In addition to finding the data, another challenge was balancing the simplicity of the dashboards and the accuracy of the data, meaning that the overall visuals needed to provide the necessary information at a glance, but also have detailed data that provides value for the shareholders. The solution for this was dividing the data into several Power BI dashboard pages, which allowed for presenting all the data needed, but without making one page too crowded and difficult to follow.

Power BI proved to be the best possible platform for making this toolkit, since it had the feature of importing data straight from Excel, and more than enough visual tools for presenting data. The challenges with the visualizations were around finding the appropriate visuals to best suit each data set. This meant scaling the elements to be easily seen and fitting the mutually essential data into the same dashboard page. Addressing this challenge required refining the layout and having a visual hierarchy, with the more crucial and often asked data being shown with a larger scale visual. These design choices strengthened the usability of the toolkit and enabled a diverse presentation of information relative to the size of each dashboard page.

The toolkit is made for the use of property managers, but above all, it is aimed at the shareholders. To evaluate the toolkit from the user perspective, a survey was conducted with the use of Google Forms. The survey was conducted at the annual meeting of a housing company managed by

Myyrmäen Huolto. The survey consists of eight statements and one open-ended question (Appendix 2), with the focus being on the clarity, usability, and understanding of the key financial and consumption data in a housing company presented with the toolkit. All the questions were answered using a scale from one to five, with one reflecting “Totally disagree” and five being “Totally agree”. This format enabled the survey to be answered without taking too much time, and the answers remained of high quality. The open-ended question at the end was also optional. The results with analysis are featured below.

Results from the Survey

The results (Appendix 3) indicated that the overall reception of the toolkit was consistently positive. The majority of the respondents agreed that the visual dashboard helped in understanding the financial well-being of the housing company in a better way than the traditional reports. This could be seen from the first question (Figure 9), with 90 percent of the respondents choosing four or five. The shareholders felt that the financial figures could be interpreted more easily and clearly in visual form, with all the answers being four or five for question two. This aligns with the interview results, where property managers mentioned that shareholders needed support in understanding the current reports and having difficulties with finding the necessary data.

Visuaalinen työkalu auttaa ymmärtämään taloyhtiön taloudellista tilannetta paremmin kuin perinteiset raportit.
10 vastausta

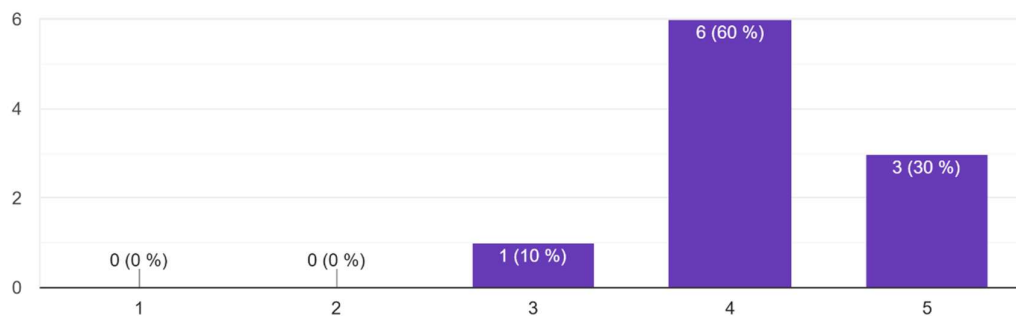


Figure 9. First Survey Question

According to the survey, the shareholders felt that the dashboard genuinely highlights the most important figures and helps identify the issues in housing companies. The toolkit also helps recognize the housing company’s financial situation and liquidity for future investments. This is important because shareholders need to know whether they have a sufficient financial buffer and how secure

the housing company is. This helps the property manager also, since they have to follow the finances in any case and make adjustments based on the figures.

Survey question five (Figure 10) emphasized the dashboard's ability to showcase the deviations on the expense side of the housing company, with all the answers being four or five. Based on the answers to question six (Figure 11), most respondents felt that financial discussion and making decisions would be easier in the annual meetings if such a toolkit were in use, confirming the value of the toolkit towards communication and serving as support for the existing reports. This ties in with the cognitive load theory and dual coding theory, where visual elements that are paired with text reduce cognitive burden and increase understanding of the data.

Visuaalinen esitys auttaa erottamaan taloyhtiön normaalin taloudenpidon poikkeuksellisista kustannuksista.
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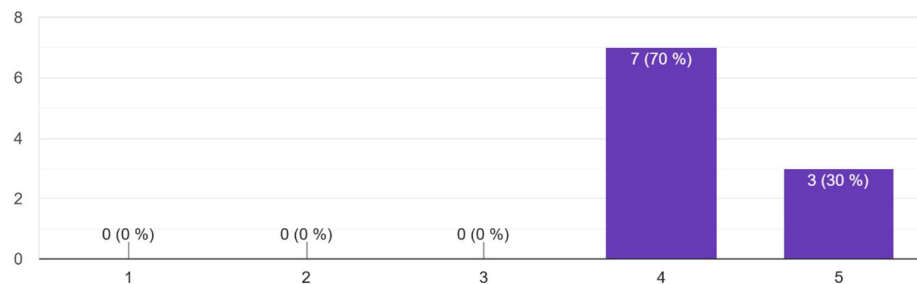


Figure 10. Survey Question Five

Taloudellisten asioiden käsittely olisi helpompaa, jos visuaalinen työkalu olisi käytössä yhtiökokouksissa.
10 vastausta

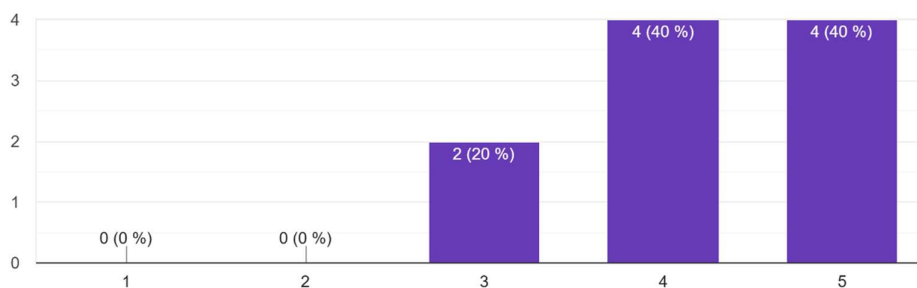


Figure 11. Survey Question Six

The last two assessment questions were focused on the consumption part and the overall usefulness of the toolkit. Most of the respondents felt that the toolkit provided useful data and helped them understand and see the consumption figures (Figure 12). This is beneficial for the housing companies since, based on the theory and empirical sections, conscious shareholders tend to consume less. This is enhanced by the fact that, in visual form, larger differences are more noticeable and eye-opening for the residents. The one answer for the open-ended question also highlighted that the visualizations helped to show the development over time in both financial and consumption figures, which is beneficial for the economic sustainability and environmental impacts of the housing companies.

Työkalu auttaa hahmottamaan kulutuslukemia paremmin.
10 vastausta

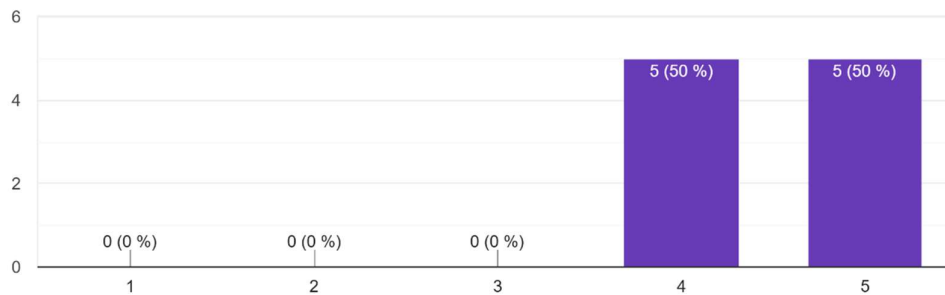


Figure 12. Survey Question Eight

Overall, the survey results indicate that the toolkit solves and effectively tackles most of the difficulties found in the interviews with the property managers. The visual elements help distinguish deviations from the normal operational figures and allow for shareholder-friendly dashboards. The dashboards also support the core argument of the thesis: visual reporting improves comprehension, transparency, and helps with decision-making in housing companies among shareholders when covering financial and other recurring reports.

4 Discussion

4.1 Summary of Key Findings

The main objective of the thesis was to examine how visual tools can improve the financial transparency and overall comprehension of residents in Finnish housing companies and create a toolkit aimed at the shareholders of these housing companies. The theory explained the current reporting formats and legislations housing companies must follow in Finland. With research around the benefits of visual presentations and identifying key figures. After the theoretical part, the property managers working at Myyrmäen Huolto were interviewed to collect data on the current state of reporting and what the housing companies' financial sustainability and environmental issues look like. The empirical findings from the interviews identified the struggles shareholders face in understanding the current reports and data. This meant that the property managers had to routinely explain and clarify the reports, which effectively increased their workload.

To address these challenges, the visualization toolkit was developed and created. The main task for it was to collect all the key data regarding financials and consumption, then combine it into a powerful, clear, and visual dashboard for the use of property managers in meetings. The goal was to support the current reporting practices and not to replace them at any point. The toolkit was created by collecting data from the software Hauswise into Excel, where it was modified and exported into Power BI for the final adjustments and visualization. The final product was a three-page Power BI dashboard.

The toolkit was then presented at an annual meeting of a housing company managed by Myyrmäen Huolto, with a Google Forms survey aimed at the shareholders. The results from this survey indicated that the visual tool increased the comprehension of shareholders, highlighted essential data in a better way compared to the traditional reports, and simplified the consumption figures and benefits of future energy investments of the housing company.

4.2 Future Development

Although the value of the dashboards was recognized and many issues have been solved with the integration of the toolkit, there is still room for future development and adjustments. The first key modifications come with the integration of different-sized housing companies and how the layout adapts to the data. Some of the companies may have several loans or different account structures, which require adjustments to the page layout. Another visual note is the use of colors in the graphs and charts, since the financial statements package is often printed out. The prints are black and

white, which means that the dashboard pages must feature colors that are distinguishable enough to be recognized even when featured without color.

Future development could focus on having role-specific dashboard views inside the toolkit. This means that there would be a separate view for the property manager, board members, and auditors. These different views could present similar data, but adjusted to the level of detail needed, depending on the viewer, which would support the idea of targeted financial communication from the empirical findings. Adding to the role-specific dashboard views, there could also be an interactive scenario and forecasting feature. This would allow for showing how a certain action or change in the data would affect, for example, the maintenance fees, energy figures, or loan interest. Allowing the toolkit to be a powerful tool in the strategic planning of the housing companies.

Another concrete development involves the creation of a user guide for the use of the toolkit. This would allow all the accountants and property managers to use and modify the tool to their needs and reduce the author's liability as the sole capable user. Overall, the implementation of the guide would improve the usability of the dashboards.

4.3 Future Research

When it comes to future research, the main objective would be to gather feedback and analysis from different housing companies to assess the toolkit's effectiveness in organizations of different sizes. A larger sample size would allow for identifying the necessary improvements regarding usability, shareholder understanding, and other general considerations. In addition to this, the research in the future could focus on examining the effectiveness of the toolkit over time. Studying the longitudinal effects of housing companies using the toolkit could provide answers to the real-world benefits of it. This would allow for seeing if the difficulties identified by the property managers would be solved, and the improvements seen in the areas targeted.

4.4 Conclusion

The visual toolkit developed in this product-based thesis demonstrates that implementing visual elements into reporting can significantly improve the comprehension and transparency of housing company reporting. The design choices were made based on providing relevant information in a clear and powerful way for the shareholders. This led to the dashboards having key financial, consumption, and sustainability-related information as visual charts and figures, improving understandability and simplifying the data. As identified in the feedback gathered from shareholders, the final toolkit is usable and ready for implementation into the housing companies managed by Myyrmäen Huolto, which makes the end product a practical tool that can be modified to fill different needs. The toolkit achieved its intended objectives by reducing the cognitive load, highlighting the

key data, and supporting the communication and decision-making of shareholders, while supporting the existing statutory reporting practices and allowing for future development.

The reliability of the thesis is supported by a strong practical foundation from the author's working experience and studies in the field of finance and accounting. To strengthen the credibility of the thesis, interviews, document analysis, and shareholder feedback were conducted, providing multiple viewpoints on the same reporting challenges. Other main strengths of the work are the integration with the existing software and reporting formats. Also, the way that the empirical findings molded the base for the visual elements and final design of the dashboard, with the real-world testing of the product with actual shareholders, supported the objective.

However, limitations and deficiencies are acknowledged throughout the work and in the different stages. These include the size of the interview group, while together the property managers manage almost 80 housing companies, the number of Managers interviewed could have been larger. In the development of the toolkit phase, limitations relate to the technical and practical aspects of the toolkit. The data for the toolkit is accessible and efficient to collect from Hausvise, but it requires manual work when formatting the data for Power BI, which could limit the scalability and allow for inconsistencies in the data of the toolkit. When it comes to the feedback collection phase, the sample size could have been larger to draw broader conclusions. Also, the feedback was based on only the visual presentation of the data and could not measure the behavioral changes and long-term impact of using the toolkit within the housing companies.

4.5 Personal Reflection

Writing this thesis has served as a great learning experience for the author, and writing in English provided a suitable challenge, since the author's native language is Finnish. Throughout the thesis process, the author developed a deeper understanding of the limitations in the reporting formats used daily through his work, and the lack of visual elements used in the whole industry when it comes to presenting data for the shareholders. The theory covered in the thesis has given the author new perspectives and helped apply them to the toolkit creation process. The author's practical skills have been strengthened through the use of Excel and Power BI when modifying the data collected from Hausvise software into a visual form. In addition, the empirical process of identifying themes within the interviews and making visual design choices based on them has enhanced analytical thinking and the ability to provide solutions for the actual needs of the users. The overall writing process has taught the author to manage a large project from start to finish and improved his time management skills.

The challenges the author faced at the start of the thesis process came from defining the scope of the research and limiting the information relevant to the topic. Also, the title for the thesis was modified several times in order to fit the content. One of the continuous practical challenges was the fact that the author was working full-time in the commissioning company while writing the thesis. This brought difficulties with finding the time slots for when to write, conduct research, and build the toolkit. Especially at the beginning of the year, during the period of conducting the financial statements in almost 100 housing companies, which resulted in more accumulated working hours than normal. Another practical challenge the author faced was with the toolkit creation and balancing between having too much detail and being too simple with the dashboard designs, with some of the first versions being too complex to follow and requiring a lot of manual work in Excel and Power BI. As a whole project, the challenging part was to avoid repeating facts and ideas mentioned already in the thesis while trying to support the arguments and follow a logical thesis structure.

Overall, the feelings the author had when writing remained positive throughout the whole process, and he even started enjoying writing longer texts, which was not the case before. The author feels that the final result fulfilled the expectations and objectives set in the beginning. The process taught a lot regarding writing, interviewing, handling data, and much more. The author feels that this process has prepared him for larger projects in the future, given valuable lessons in time management, and helped him notice that having a structured plan makes the final project easier to approach. The goal for the author is to integrate the toolkit for use by the commissioning company, develop it over time, and eventually change the way reporting is done in the whole industry. This will make the work of the author help thousands of shareholders in Finnish housing companies and provide true value to them.

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Appendices

Appendix 1. Interview Questions

Haastattelukysymykset: Taloyhtiöiden taloudellinen raportointi ja kestävyys

Kysely suoritetaan Teamsin välityksellä joulu- ja tammikuun aikana.

Tausta ja kokemus

1. Voisitko lyhyesti kertoa roolistasi ja vastuistasi taloyhtiössä?
2. Kuinka monta taloyhtiötä hallinnoit tällä hetkellä ja kuinka kauan olet ollut alalla?

Taloudellisen raportoinnin nykykäytännöt

3. Miten taloudellista tietoa tällä hetkellä jaetaan asukkaille ja hallitukselle?
4. Millaisia taloudellisia raportteja yleensä toimitetaan ja kuinka usein?
5. Mitä ohjelmistoja tai työkaluja käytätte taloudelliseen raportointiin?

Ymmärrettävyys, viestintä ja niiden haasteet

6. Kuinka hyvin asukkaat mielestäsi ymmärtävät taloudellisia raportteja? Millaisia palautteita olet saanut raporttien selkeydestä tai vaikeaselkoisuudesta?
7. Mitkä ovat suurimmat haasteet taloudellisen tiedon viestimisessä asukkaille?
8. Onko olemassa lainsäädännöllisiä tai teknisiä rajoitteita, jotka vaikeuttavat läpinäkyvää ja selkeää raportointia?

Visuaalisuus ja raportoinnin kehittäminen

9. Oletteko käyttäneet visuaalisia työkaluja (esim. kaavioita, infografiikkaa) taloudellisen tiedon esittämiseen?
10. Jos olette, miten nämä työkalut ovat vaikuttaneet asukkaiden ymmärrykseen tai osallistumiseen?
11. Millaisia parannuksia toivoisit taloudellisen tiedon esittämiseen tulevaisuudessa?

Taloudellinen tulevaisuus ja ympäristön kestävyys

12. Miten taloyhtiöissäsi huomioidaan taloudellinen kestävyys pitkällä aikavälillä?
 13. Näkyvätkö kestävyteen liittyvät investoinnit (esim. energiatehokkuus) taloudellisessa raportoinnissa?
 14. Miten viestitte tai toivoisitte viestivän kestävyshankkeiden taloudellisista vaikutuksista asukkaille? (Esim. aurinkovoimalan vaikutus energiakuluihin.)
 15. Miten koet kulutusseurannan tärkeyden taloyhtiössä?
-

Appendix 2. Google Forms Survey Questions

Raporttien visualisointi - palautekysely osakkaille

* Pakollinen kysymys

Visuaalinen työkalu auttaa ymmärtämään taloyhtiön taloudellista tilannetta paremmin kuin perinteiset raportit. *

Täysin eri mieltä 1 2 3 4 5 Täysin samaa mieltä

Esitetyt talousluvut ovat helpommin hahmotettavissa visuaalisessa muodossa. *

Täysin eri mieltä 1 2 3 4 5 Täysin samaa mieltä

Visuaalinen työkalu tuo esiin taloyhtiön talouden kannalta olennaisimmat asiat. *

1 2 3 4 5

Täysin eri mieltä Täysin samaa mieltä

Taloyhtiön maksuvalmius ja rahatilanne on helppo hahmottaa visuaalisen työkalun avulla. *

1 2 3 4 5

Täysin eri mieltä Täysin samaa mieltä

Visuaalinen esitys auttaa erottamaan taloyhtiön normaalin taloudenpidon poikkeuksellisista kustannuksista. *

1 2 3 4 5

Täysin eri mieltä Täysin samaa mieltä

Taloudellisten asioiden käsittely olisi helpompaa, jos visuaalinen työkalu olisi käytössä yhtiökokouksissa. *

	1	2	3	4	5	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Kokisin visuaalisen työkalun hyödylliseksi osakkaana. *

	1	2	3	4	5	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Työkalu auttaa hahmottamaan kulutuslukemia paremmin. *

	1	2	3	4	5	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Muita huomioita tai palautetta työkaluun liittyen.

Oma vastauksesi

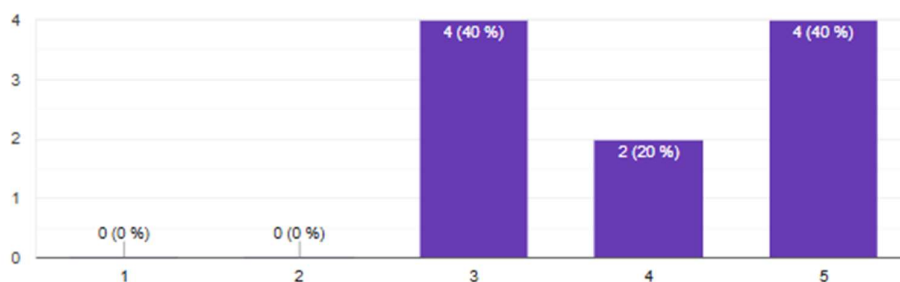
Appendix 3. Google Forms Survey Answers





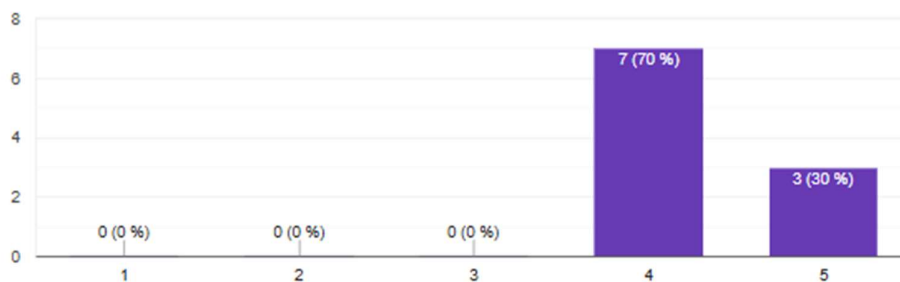
Taloyhtiön maksuvalmius ja rahatilanne on helppo hahmottaa visuaalisen työkalun avulla.

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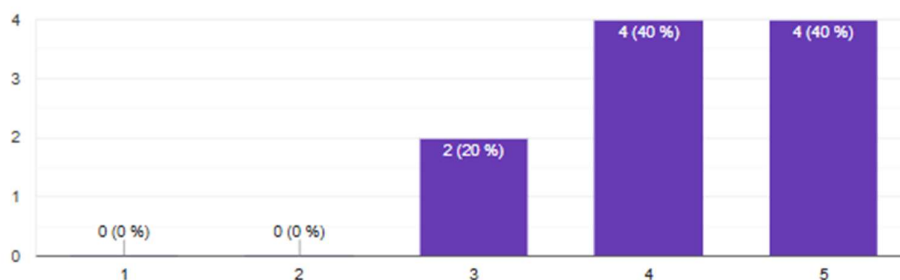

Visuaalinen esitys auttaa erottamaan taloyhtiön normaalin taloudenpidon poikkeuksellisista kustannuksista.

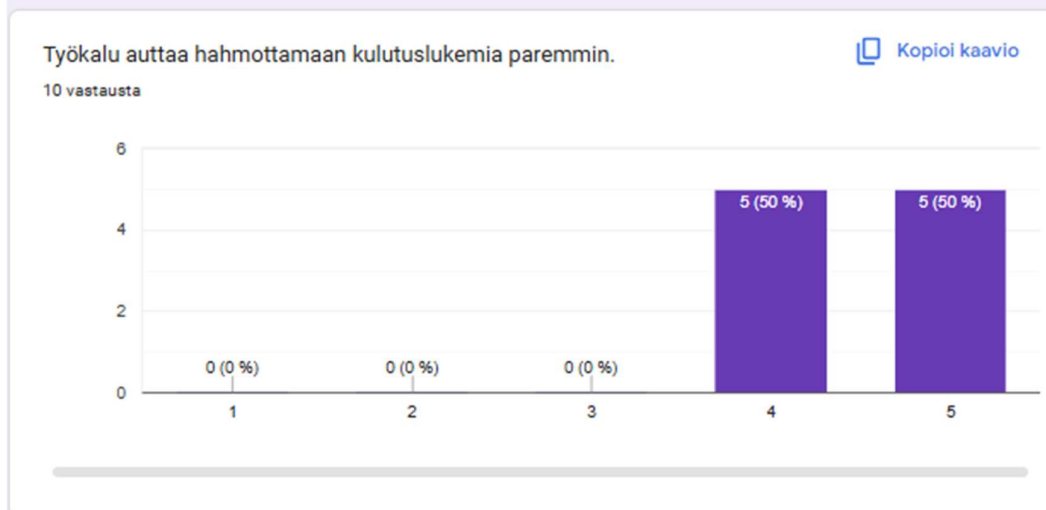
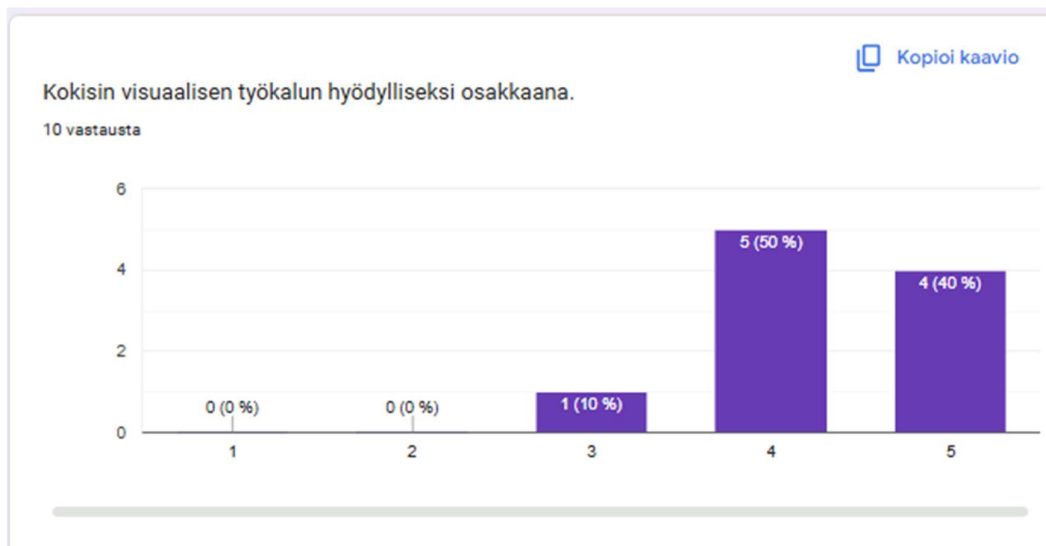
10 vastausta




Taloudellisten asioiden käsittely olisi helpompaa, jos visuaalinen työkalu olisi käytössä yhtiökokouksissa.

10 vastausta





Muita huomioita tai palautetta työkaluun liittyen.

1 vastaus

Visuaalisuus auttoi hahmottamaan etenkin kehitystä ajassa, siinä iso hyöty. Hieman lisää kontrastia olisi toivonut käytettyihin väreihin yms, näin kirkkaalla säällä oli hiukan vaikealukuinen valkokankaalta.