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**CRISTIANO DE
QUEIROZ FONSECA**

**DATA-DRIVEN DESIGN:
THE BOOSTER OF PRODUCT-LED GROWTH**

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THE BOOSTER OF PRODUCT-LED GROWTH**

Dissertation presented to IADE - Faculty of Design, Technology and Communication of the European University, in order to fulfil the necessary requirements for the obtention of the master's degree in Design Management, held under the guidance of Doctor Carlos Guilherme Vieira Alves da Rosa, Professor at IADE, and Doctor Bruna Ruschel Moreira, Joint Supervisor at IADE.

Keywords

Data analysts, Product designers, Product-led growth, Digital products

Abstract

This dissertation explores the dynamic interplay between data analysts and product designers within the product-led growth methodology. It asserts that merging these roles optimizes the design process, contributing to the success of digital products. The research employs qualitative and quantitative methods to highlight the significance of their collaboration and identify trends impacting their workload. Despite challenges associated with integrating data and design teams, the synergistic flow of activities can enhance the user experience and product performance. To refine the methodology, the text recommends an in-depth exploration of strategies employed by successful companies, potentially involving case studies and interviews. Additionally, the study introduces the concept of self-evolving products and the role of a data product designer. These trends should mark a milestone in the evolution of product-led growth.

Palavras-chave

Analistas de dados, Designers de produto, Crescimento liderado pelo produto, Produtos digitais

Resumo

Esta dissertação explora a interação dinâmica entre analistas de dados e designers de produto dentro da metodologia de crescimento liderada pelo produto. Afirma-se que a fusão dessas funções otimiza o processo de design, contribuindo para o sucesso de produtos digitais. A pesquisa utiliza métodos qualitativos e quantitativos para destacar a importância da colaboração entre esses profissionais e identificar tendências que impactam sua carga de trabalho. Apesar dos desafios associados à integração de equipes de dados e design, o fluxo sinérgico de atividades conjuntas pode melhorar a experiência do usuário e o desempenho do produto. Para refinar a metodologia, o texto recomenda uma exploração aprofundada de estratégias empregadas por empresas bem-sucedidas, possivelmente envolvendo estudos de caso e entrevistas. Além disso, o estudo introduz o conceito de produtos autoevolutivos e o papel de um designer de dados de produto, tendências que devem criar um marco na evolução do crescimento liderado pelo produto.

Table of contents

Chapter 1 - Introduction	3
1.1 Context and problem identification	3
1.2 Research framework, questions, and goals	4
1.3 Investigation plan	5
Chapter 2 - Literature review	11
2.1 Interconnection among topics	11
2.2 Fundamentals of product-led growth	11
2.3 Product design process applied to product-led growth	15
2.4 Data analysis process applied to product-led growth	20
2.5 Becoming a product-led growth company	27
2.6 The bridge to product success	30
2.7 Data-driven design trends	33
Chapter 3 - Research	37
3.1 Methodology	37
3.2 Data collection	37
3.3 Sample details	38
Chapter 4 - Findings and results	43
Chapter 5 - Discussion	52
Chapter 6 - Conclusion	54
6.1 Contributions	54
6.2 Limitations and new research directions	56
Bibliography	59
Appendix - Questionnaire	65

List of figures

Figure 1. Conceptual framework - Venn diagram	4
Figure 2. Prism of product-led growth	13
Figure 3. Phases of product-led growth	13
Figure 4. Software development lifecycle	17
Figure 5. Four phases of user-centered design	19
Figure 6. Process of data analysis	25
Figure 7. Activities in data-driven design	33
Figure 8. Roles	39
Figure 9. Level of seniority	40
Figure 10. Size	41
Figure 11. Sector	41
Figure 12. Tech sub-sectors by company size	42
Figure 13. Use of data analysis in the product design process	43
Figure 14. Benefits of using data analysis in the product design process	44
Figure 15. Challenges in implementing data analysis in product design	45
Figure 16. Expectations for effective collaboration	46
Figure 17. Essential skills required for a data-driven design approach	47
Figure 18. Ways data analysts can support product designers	48
Figure 19. Tools that improve their collaboration	49
Figure 20. Data types that improve design workflow	49
Figure 21. Opinions about the future of data-driven design	51

List of tables

Table 1. Synthesis of the research structure	6
Table 2. Distribution channels for data collection	38
Table 3. Key insights into integrating data analysis and product design	50

Chapter 1 - Introduction

1.1 Context and problem identification

In software development, data analysis and product design are not merely components, but rather integral cogs in the machinery (King et al., 2017). One methodology that exemplifies this harmonious integration is the product-led growth model, which weaves together these crucial elements to enhance the overall development process.

In product-led growth companies, data analysis is a valuable tool that provides guidance for strategic decisions and contributes to the enhancement of overall product performance (Bush, 2023a). It assists companies, especially in the tech sector, in navigating the vast sea of user behavior, preferences, and trends. This collaboration ensures that digital solutions are not just aesthetically pleasing, but also tailored to meet user needs and expectations (Ramaswamy, 2023).

However, when this integration is missing, the consequences can be detrimental. The user experience may fall short of expectations, leading to stagnation in product growth. Companies that fail to acknowledge this may risk losing their competitive edge (Garrett, 2020).

They could be overtaken by competitors who consistently introduce new features, improve functionality, address customer feedback, or even expand their range of products. However, an organization's success hinges on the strategic application of design and data to develop a product that resonates with users and stands out in the marketplace.

In their study, Chhabra and Williams (2019), an associate partner at the global management consulting firm McKinsey¹ and the co-founder of QuantumBlack², a data science agency, suggest that the fusion of data and design can significantly enhance a company's performance. The potential improvements range from ten to thirty percent. This finding has direct implications for data analysts and product designers. It suggests that the blend of these two topics could potentially lead to the creation of better products.

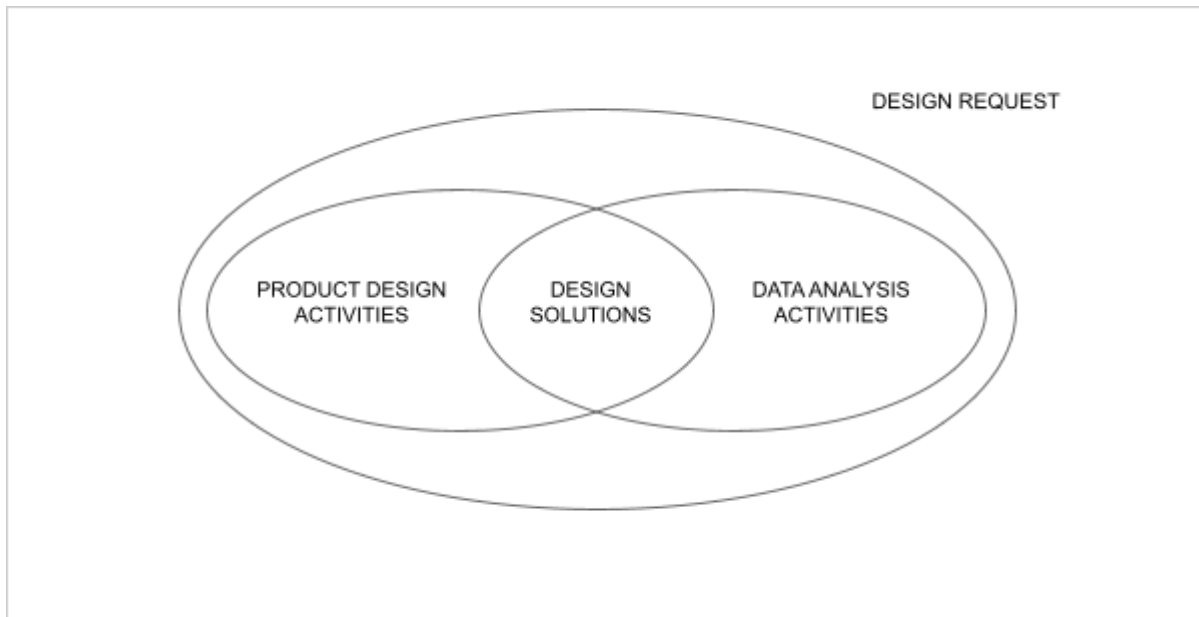
¹ <https://www.mckinsey.com/>

² <https://www.mckinsey.com/capabilities/quantumblack/>

1.2 Research framework, questions, and goals

The motivation behind our research framework, as depicted in Figure 1, is to foster a more effective collaboration between product design and data analysis tasks. This is intended to enhance the management of design requests, thereby facilitating the growth and evolution of digital products.

Figure 1. *Conceptual framework - Venn diagram*



We believe that this intersection can steer businesses toward greater success, serving as the driving force behind our study. Building on this premise, the main objective of this research is to understand how the relationship between data analysts and product designers happens in companies led by product growth. In alignment with this objective, we outlined the following specific objectives:

- Investigate the tasks and activities that data analysts and product designers undertake to assist in the user-centered design process.
- Explore how companies can integrate data analysis into product design decisions.
- Understand the benefits and challenges of incorporating data analysis in the design process.
- Gather feedback on the skills and tools that can enhance the collaboration between product designer and data analyst.

- Identify approaches in which data analysts can more effectively support design challenges.
- Gather insights from participants regarding the potential fusion of data and design departments, as well as expected trends in collaboration.

To address the main objective, we formulated the following research question: *Within the product-led growth methodology, what are the key factors that stimulate active collaboration between product designers and data analysts during the design process?* This consists of the following sub-questions:

- What are the common and distinct tasks performed by data analysts and product designers?
- What are the benefits and challenges of integrating data analysis into product design decisions?
- How do data analysts and product designers see the impact of data analysis in design teams?
- What skills do data analysts and product designers need to develop to enhance their collaboration?
- How can emerging technologies affect these roles?
- What are the current data-driven design trends shaping product development?

With these questions, our intention was to gain an in-depth understanding of the topic, which assisted us in providing practical advice for improving a company's design department.

1.3 Investigation plan

The thesis is structured into six chapters, each serving a distinct purpose in answering both the objectives and research questions, as detailed in Table 1.

Table 1. *Synthesis of the research structure*

Research question: Within the product-led growth methodology, what are the key factors that stimulate active collaboration between product designers and data analysts during the design process?					
Main goal: Understand how the relationship between data analysts and product designers happens in companies led by product growth.					
Chapter 1 Introduction	Chapter 2 Literature review	Chapter 3 Research	Chapter 4 Findings and results	Chapter 5 Discussion	Chapter 6 Conclusion
<i>Content</i>	<i>Content</i>	<i>Content</i>	<i>Content</i>	<i>Content</i>	<i>Content</i>
<ul style="list-style-type: none"> - Context and problem identification; - Research framework; - Research questions; - Research goals; and - Investigation plan. 	<ul style="list-style-type: none"> - Methodological procedures; - Chapter structure; - Stages and evolution of the research objective. 	<ul style="list-style-type: none"> - Methodology; - Data collection; - Samples details. 	<ul style="list-style-type: none"> Online survey results. 	<ul style="list-style-type: none"> - Interpretation of online survey results; - Comparison with existing literature; - Theoretical implications of the integration within product-led growth companies; - Strategic considerations for the product design process; - Contribution to existing knowledge. 	<ul style="list-style-type: none"> - Objectives achieved; - Research questions answered; - Study limitations; - Recommendations for future research.

Table 1. *Synthesis of the research structure - Continuation*

Research question: Within the product-led growth methodology, what are the key factors that stimulate active collaboration between product designers and data analysts during the design process?					
Main goal: Understand how the relationship between data analysts and product designers happens in companies led by product growth.					
Chapter 1 Introduction	Chapter 2 Literature review	Chapter 3 Research	Chapter 4 Findings and results	Chapter 5 Discussion	Chapter 6 Conclusion
<i>Research sub-questions</i>	<i>Research sub-questions</i>	<i>Research sub-questions</i>	<i>Research sub-questions</i>	<i>Research sub-questions</i>	<i>Research sub-questions</i>
N/A	<ul style="list-style-type: none"> - What are the common and distinct tasks performed by data analysts and product designers during the design request? - What are the benefits and challenges of integrating data analysis into product design decisions? - How do emerging technologies, such as artificial intelligence, affect the roles and responsibilities of data analysts and product designers? - What are the current and future trends in data analysis and product design within the product-led growth framework? 	What are the benefits and challenges of integrating data analysis into product design decisions?	N/A	N/A	N/A

Table 1. *Synthesis of the research structure - Continuation*

Research question: Within the product-led growth methodology, what are the key factors that stimulate active collaboration between product designers and data analysts during the design process?					
Main goal: Understand how the relationship between data analysts and product designers happens in companies led by product growth.					
Chapter 1 Introduction	Chapter 2 Literature review	Chapter 3 Research	Chapter 4 Findings and results	Chapter 5 Discussion	Chapter 6 Conclusion
<i>Specific objectives</i>	<i>Specific objectives</i>	<i>Specific objectives</i>	<i>Specific objectives</i>	<i>Specific objectives</i>	<i>Specific objectives</i>
N/A	<ul style="list-style-type: none"> - Investigate the tasks and activities that data analysts and product designers undertake to assist in the user-centered design process. - Explore how companies can integrate data analysis into product design decisions. - Understand the benefits and challenges of incorporating data analysis in the design process. - Identify approaches in which data analysts can more effectively support design problems or opportunities. 	N/A	<ul style="list-style-type: none"> - Investigate the tasks and activities that data analysts and product designers undertake to assist in the user-centered design process. - Explore how companies can integrate data analysis into product design decisions. - Understand the benefits and challenges of incorporating data analysis in the design process. - Gather feedback on the skills and tools that can enhance the collaboration between product designer and data analyst. - Identify approaches in which data analysts can more effectively support design problems or opportunities. - Gather insights from participants regarding the potential fusion of data and design departments, as well as expected trends in collaboration. 	N/A	N/A

Table 1. *Synthesis of the research structure - Continuation*

Research question: Within the product-led growth methodology, what are the key factors that stimulate active collaboration between product designers and data analysts during the design process?					
Main goal: Provide strategic insights to enhance product design processes and improve design experiences through data analysis.					
Chapter 1 Introduction	Chapter 2 Literature review	Chapter 3 Research	Chapter 4 Findings and results	Chapter 5 Discussion	Chapter 6 Conclusion
<i>Data collection methods and tools</i>	<i>Data collection methods and tools</i>	<i>Data collection methods and tools</i>	<i>Data collection methods and tools</i>	<i>Data collection methods and tools</i>	<i>Data collection methods and tools</i>
N/A	N/A	N/A	<ul style="list-style-type: none"> - Mixed-method approach for online survey; - Google Forms to deliver the survey across Slack channels and LinkedIn groups; - Google Sheets to clean, transform, and visualize data. 	N/A	N/A

The first chapter 1, introduction, sets the stage by establishing the context and identifying the problem. It discusses the connection between product design and data analysis and addresses the opportunities from their interaction in the context of product-led growth methodology. The research framework, questions, and goals are outlined to provide a roadmap for the thesis.

The subsequent chapter, literature review, delves into the existing literature on product design, data, and data analysis. It introduces the concept of a user-centered design process, data analysis process, and the methodology underpinning product-led growth methodology, providing actionable advice for transitioning from a traditional to a product-led growth model. This chapter also addresses common challenges encountered during this transition and describes specific activities in data analysis and product design that contribute to product success. It ends with examples of trends that can influence the trajectory of data and product design teams in product-led growth companies.

Chapter 3, research, details the research methodology, exploring both qualitative and quantitative research methods used in the study, with a focus on statistical and thematic analyses. The process of collecting data from a sample of forty-one respondents is explained, detailing the data sources, collection methods, and the reasoning behind these choices.

Moving forward, chapter 4, findings and results, presents the findings of an online survey consisting of fourteen questions, both multiple-choice and open-ended. It includes response rates, respondent demographics, and key insights derived from the survey data.

Proceeding to Chapter 5, the Discussion section provides the implications and significance of the findings from the online survey. It compares and contrasts the survey results with the theories and findings discussed in the literature review. The chapter explores how the insights can contribute to a better product-led growth approach.

Chapter 6, the conclusion, interprets the research findings related to the research questions and objectives, situating them within the study's scope. It emphasizes contributions to existing knowledge, acknowledges study limitations, and proposes future research directions.

Chapter 2 - Literature review

2.1 Interconnection among topics

We initiate our exploration with the product-led growth methodology, outlining its concept and key strategies. This model guides us toward fostering a product-led growth mindset, which enables organizations to have their departments powered by product strategies.

Then we transition to product design, where we explore its nature, emphasizing the importance of a user-centered design process within product-led growth companies. This understanding lays the groundwork for comprehending the product design process, which remains a central theme throughout our study.

Next, we introduce the basic concepts of data and data analysis within the digital landscape. We explain these fundamentals for product-led growth companies, emphasizing that a data-driven structure serves as the core fuel for developing and ensuring the success of products.

Moving forward, we explore what is needed for companies to embrace a product-led growth model, when to adopt it, and what to do to overcome some key business challenges.

Our journey continues with activities that bridge data analysis and product design, exploring how integrating these activities lead to more effective design decisions. This represents the pinnacle of our research, shifting our focus toward understanding the intricate relationship between the roles of product designers and data analysts within the product-led growth model.

Finally, we explore the impact of emerging technologies, such as artificial intelligence, on both data analysis and product design. These technologies not only redefine roles but also present new opportunities and challenges. Staying updated with trends in these fields is vital for companies to make better design decisions.

By exploring these six topics in-depth, we aim to provide insights to further enhance the integration between data and design teams, and consequently boost product success rates.

2.2 Fundamentals of product-led growth

Product-led growth is a business methodology, a way of organizing the business in which the product is the largest driver of growth (*What is product-led growth?*, n.d.). It is an initiative

that fosters a unified alignment across all teams, from engineering to sales and marketing, with the product leading the way for sustainable and scalable business growth.

Bush (2019), a book author and founder of ProductLed³, which is a coaching and consulting firm, reinforces this concept by stating that every team in the business influences the product. For instance, the marketing team strategizes ways to keep customers interested and engaged with the product. The sales team focuses on how the product can identify prospects for them. Similarly, the customer success team strives to create a product that not only meets but exceeds the customers' success metrics. By aligning every team's objectives with the product, the company cultivates a culture committed to providing sustained value to its customers.

To complement such statement, Perri (2023b), a book author and founder of Product Institute⁴, an online learning hub, compares the role of a product manager in a product-led growth organization to that of an executive chef in a kitchen. In her presentation at the La Product Conf⁵ event in Paris last year, she elaborated on this analogy. She stated that just as an executive chef orchestrates all the different parts of a kitchen to create a great dining experience, a product manager, who is the voice of the product, needs to bring together all the different teams in an organization to create a great product experience. She further explained that sales, marketing, design, and engineering teams are like individual cooks, each with their skills and specialties.

In her perspective, the product manager plays a role similar to an executive chef. The product manager brings all team members together, sets the vision for the product - much like a chef deciding on a dish - and ensures everyone works in harmony to bring this vision to life. The final product is comparable to the dish that customers - the diners - get to experience. Just as a top-notch dish requires all the cooks to work in unison, an outstanding product also demands all teams within an organization to collaborate effectively.

From a comparative standpoint, PLG Collective (n.d.), a community-driven resource made for product managers, explains that product-led growth functions like a prism, as presented in Figure 2:

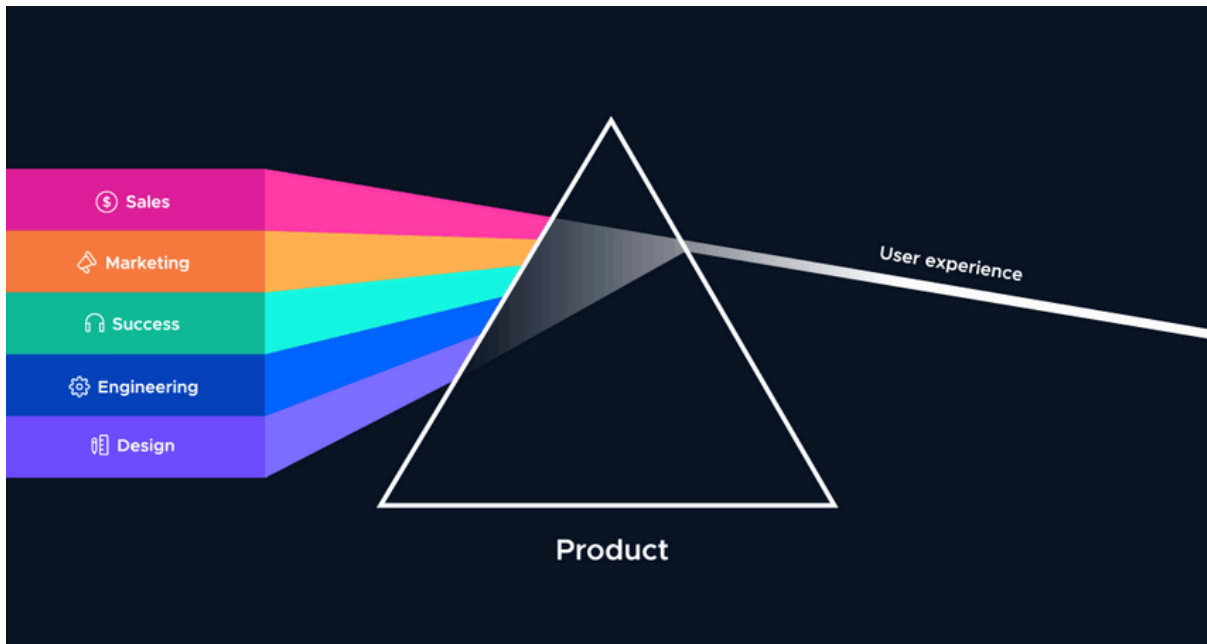
³ <https://www.productled.org/>

⁴ <https://productinstitute.com/>

⁵ <https://www.laproductconf.com/>

The different colors are all different teams - marketing, sales, CS, design, engineering - that normally operate on different wavelengths. Instead of separating them, the product-led prism brings these teams together. Their combined wavelengths form the bright, focused light of the user's experience (para. 12).

Figure 2. Prism of product-led growth, adapted from PLG Collective (n.d.)



On its website, PLG Collective affirms that a well-designed product is usually more than just visually appealing. It tends to be lightweight, user-friendly, and designed to reduce friction. These characteristics embody the essence of a user-centric design approach.

In a video on YouTube presented by the Product Institute, the host, Perri (2023a), had a discussion with Bush about perfecting product-led growth strategies. He emphasized that companies focusing on this model concentrate on a key set of metrics that evaluate the success of the product across all stages of the user journey, including acquisition, engagement, monetization, and expansion.

Figure 3. Phases of product-led growth, adapted from Perri's interview (2023a)



As reported by Bush, the acquisition stage refers to the process of attracting and gaining new customers. The engagement phase refers to creating strategies to keep users active and using

the product's core features. Monetization is about converting engaged users into paying customers. Lastly, expansion relates to encouraging existing customers to use more of the product and inviting others to join (Perri, 2023a).

If we take these stages to the mobile application, for example, the acquisition phase is about attracting users to download and install the app. Metrics such as the number of app downloads⁶ and user registrations⁷ serve as direct measures of acquisition efforts (Olson, 2020).

Following the acquisition, the next step is engagement. This phase involves ensuring that users interact with the app (Bonfiglio, 2017). Metrics such as daily active users⁸, session length⁹, session interval¹⁰, and retention rate¹¹, provide insights into how often and how long users engage with the app.

As users engage with it, monetization opportunities arise. Some users might prefer a basic, free version of the app, while others might be willing to pay for additional features or content (Ramanujam, 2016). The conversion rate¹² and average revenue per user¹³ are some important monetization metrics to take into consideration.

With a base of engaged and paying users, the focus then moves to expansion. This could involve upsells, such as offering existing users additional in-app purchases, or cross-sells, like recommending other apps based on their usage patterns (Olson, 2020). The upsell rate¹⁴ and the cross-sell rate¹⁵ are common metrics used in this phase.

⁶ The count of the total number of times the app has been downloaded from the app store.

⁷ The count of users who have completed the sign-up process or started a trial.

⁸ The daily active users are calculated by counting the unique users who engage with the app in a day.

⁹ The duration of a user's interaction with the app in a single period.

¹⁰ The time between a user's sessions.

¹¹ The percentage of users who return to the app after their first visit.

¹² In this context, it is the percentage of users who upgrade from a free version to a paid version.

¹³ The average revenue per user is calculated by dividing the total revenue by the total number of users.

¹⁴ The percentage of existing users who make additional in-app purchases.

¹⁵ The percentage of users who download or purchase other apps based on their usage patterns.

By analyzing these and many other interrelated product metrics, companies can identify areas of strength and weakness in their product, and make data-driven decisions to enhance the user experience. This could involve refining the onboarding process to improve acquisition, optimizing the user interface to boost engagement, or introducing new features that add value and increase retention (Hoffman & Mares, 2021).

Product-led growth strategies not only adopt specific metrics for measurement but also prioritize self-service. This model empowers customers with the freedom to independently explore, understand, purchase, and use the product, eliminating the necessity for human intervention. This not only leads to cost savings for companies but also contributes to elevated customer satisfaction (Bonfiglio, 2017).

Enhancing customer satisfaction can be achieved by concentrating not only on value but also on market needs. This approach is crucial to product-led growth, which is centered on creating products that effectively address market problems. This philosophy distinctly contrasts with traditional sales-led models, which often place a higher priority on closing deals and generating revenue (Bush, 2023a).

Expanding upon the points mentioned earlier, the product-led growth methodology is more than a part of the customer experience; it is the experience itself. Everything a company does should lead back to the product (Olson, 2020).

In short, the methodology is a win-win for both the company and the customer. It ensures that the customer gets the value they need and the company gets the growth they want. This commitment is demonstrated through the essence for nurturing long-lasting loyalty, allowing satisfied users to become vocal advocates, which further increases growth (Bonfiglio, 2017).

2.3 Product design process applied to product-led growth

Before we discuss the nuances of product design, it is paramount to revisit the fundamental question: *What is a product?* A product is a broad term that encompasses a variety of items. It can refer to tangible goods such as smartphones or perfumes found on store shelves, or to intangible items like software. In this study, we are narrowing our focus to software products, which include services provided by web and mobile applications.

This naturally leads us to the following question: *What exactly does a product designer do?* A product designer is a professional who is part of the product team¹⁶ and oversees the design process within the software development lifecycle. The software development lifecycle is a framework for managing software projects (Leau et al, 2012). It guides the company in maintaining a systematic, disciplined, and quantifiable approach across all stages of the lifecycle, thereby ensuring the delivery of a high-quality end product (Al-Saqqa et al., 2020).

Rather than exploring various product development models such as the waterfall¹⁷, spiral¹⁸, iterative¹⁹, and agile²⁰, this section will focus on articulating the components of a typical software development lifecycle. This life cycle encompasses six phases, as illustrated in Figure 4.

The first phase starts with planning, where project goals and user needs are gathered, forming the software's foundation (Pressman, 2010). This foundation is translated into a blueprint during the design phase, with the architecture, interfaces, and data models taking shape (Sommerville, 2015). The development phase follows, where developers create lines of code that animate these blueprints (McConnell, 2005). The software then enters the testing phase, which uncovers and eliminates imperfections, ensuring a final product (Beizer, 1990).

Following testing, the software transitions into the real world during the deployment phase. This phase includes user training, where users are educated on how to use the software and get support, where ongoing assistance is provided to resolve any issues users may encounter (Brown & Chapin, 2004). The final stage is the maintenance phase, where any discovered issues are addressed and fixed in subsequent releases. The urgency of these fixes depends on

¹⁶ In software companies, the product team is generally composed of various roles. These typically include product managers, developers, product designers, and quality assurance engineers. At times, the team may also consist of data analysts and product marketing managers. However, the precise structure and roles within the team can fluctuate. This variability is influenced by several factors such as the size of the company, the complexity of the product, and the stage of the product's lifecycle.

¹⁷ The waterfall model follows a linear and sequential approach where each phase must be completed before moving on to the next.

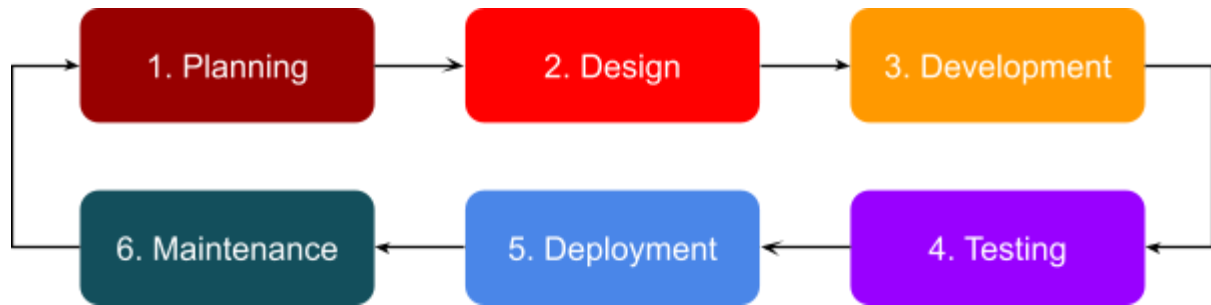
¹⁸ The spiral model combines elements of the waterfall model with a risk-driven process. It emphasizes iterative development and risk management. Each loop of the spiral represents a complete software development cycle.

¹⁹ The iterative model emphasizes incremental progress and continuous feedback. The project is broken down into smaller, more manageable chunks that can be developed, tested, and deployed in shorter time frames.

²⁰ The agile model focuses on process adaptability and customer satisfaction by rapid delivery of working software products.

the severity of the problems. This ensures that the software remains secure and functional over time (Silhavy, 2020).

Figure 4. *Software development lifecycle, adapted from Leau et al. (2012)*



Although the design team’s involvement may vary across different stages, each phase is interconnected and cyclical, playing a crucial role in the engineering of product development.

A key point to underscore about product designers in this process is their distinctive fusion of creative and technical skills, pivotal in molding the product. As articulated by Indeed²¹ (2023), a global employment platform, the role of a product designer extends beyond mere design. They emphasize user research and testing, ensuring that the product is not only aesthetically pleasing but also aligns with user needs and expectations.

This user-centric approach is what sets them apart. Furthermore, their role is highly collaborative. They often work alongside other professionals such as UI/UX designers²², product marketing managers²³, business analysts²⁴, project managers²⁵, and user researchers²⁶.

²¹ <https://www.indeed.com/>

²² User interface and user experience designers work on the design and usability of a product. UI designers focus on the visual elements that users interact with, such as screens, buttons, and icons. UX designers, on the other hand, focus on the entire interaction a user has with a product, aiming to make products functional, accessible, and enjoyable to use.

²³ Product marketing managers work at the intersection of product development, marketing, and sales. Their broad responsibility is to develop and implement a marketing strategy roadmap for a specific product. They interpret market research, oversee the product’s go-to-market strategy, and manage customer response.

²⁴ Business analysts use data to form business insights and recommend changes in their organizations. They identify areas where the organization can increase its efficiency and strengthen business processes. They often work closely with others throughout the business hierarchy to communicate their findings and help implement changes.

²⁵ Project managers organize, plan, and execute projects while working within constraints like budgets and schedules. They define project goals, communicate with stakeholders, and see a project through to its closure.

²⁶ User researchers study target users, including their needs and pain points, so designers have the sharpest possible insights to make the best designs. They use various methods to expose problems and design opportunities and find crucial information to use in their design process.

This teamwork ensures a holistic approach to product design, making sure all aspects of the product are well-coordinated and aligned with the overall product vision²⁷.

Furthermore, product designers are dedicated to improving the product's usability and aligning it with the brand's mission²⁸. This approach to design is detailed in an article titled *What is product design?* by the Interaction Design Foundation²⁹ (n.d.), a globally recognized online design school.

The article explains about the role of product designers in shaping the trajectory of product development, relying on a user-centered design framework, as demonstrated in Figure 5. This framework places users and their needs at the forefront of each stage of the design process.

The journey begins with the research phase. Here, the design team embarks on a comprehensive exploration to understand the needs, preferences, and behaviors of the users. They employ various techniques such as interviews, surveys, and observations to gather data, immersing themselves in the user's environment (Pratt, 2012).

Armed with these insights, the design team moves into the requirements phase. During this stage, they identify the problems and challenges they aim to solve for the users (Knight, 2018). The findings from the research phase serve as a guiding light, steering the design process in the right direction.

Once the path is clearly defined, the team transitions into the design phase. This is where creativity meets strategy. The team develops wireframes³⁰, mockups³¹, and prototypes³² that address the users' needs and challenges (Klein, 2016; Pratt, 2012; Kraft, 2012).

²⁷ A product vision answers the fundamental question of why the company is creating a product and what the company hopes to accomplish with it in the future.

²⁸ A brand mission communicates a brand's purpose, objectives, and how it plans to serve its audience. It gives an idea of what the business does and what impact it wants to make.

²⁹ <https://www.interaction-design.org/>

³⁰ Wireframes are basic, two-dimensional layouts of a webpage or app. They provide an overview of the structure and functionality, but without any design elements like colors or graphics.

³¹ Mockups are more detailed than wireframes. They include design elements and give a visual representation of the product, but they are not interactive.

³² Prototypes are interactive versions of the product. They are used for testing the functionality and user experience before the final product is developed, in addition to verifying ideas and assumptions. They give stakeholders a clear picture of how the final product will function.

Following this, designers initiate the evaluation phase. This is when the designs are put to the test with actual users to identify usability issues and areas for improvement. The designers employ various testing methodologies during this phase (Lowdermilk, 2013).

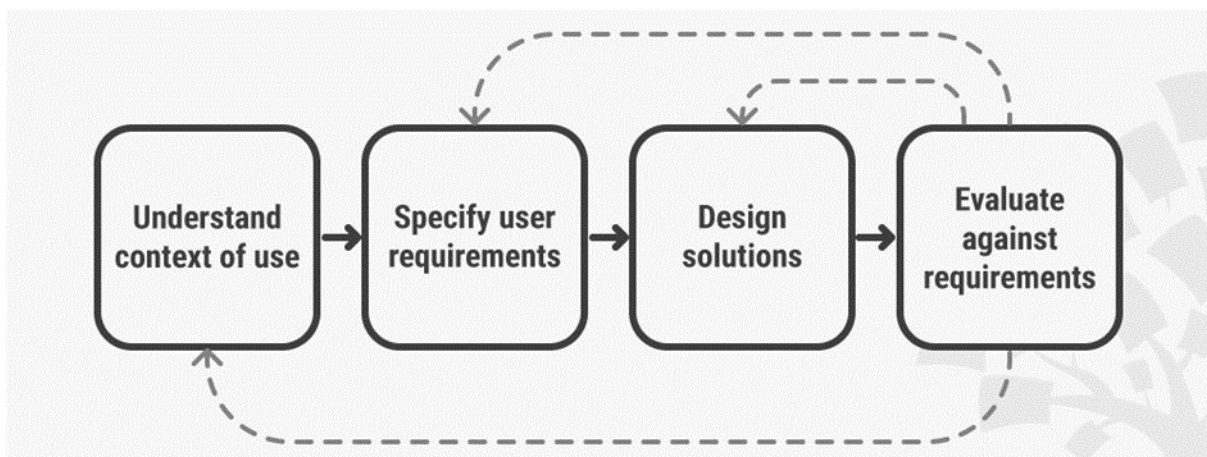
One such methodology is usability testing, which involves observing the ease of use of a design with a group of users. This method serves as a benchmark for user-friendliness (Pratt & Nunes, 2012).

Other methodology is A/B testing, a randomized experiment with two variants. This method compares two design elements against each other, helping the design team determine which one performs better (King et al, 2017).

Lastly, there is the heuristic evaluation. In this process, designers follow specific guidelines to assess the usability of a software interface and identify any existing issues. This method effectively pinpoints potential areas of improvement in the design (Lowdermilk, 2013).

Once this evaluation is complete, it marks the end of one cycle in a series of iterative phases. These cycles repeat, each time refining the design based on the evaluation results. This process continues until the results reach a satisfactory level (*What is user centered design?*, n.d.).

Figure 5. Four phases of user-centered design, as described in the article on this topic by Interaction Design Foundation (n.d.)



In the context of the product-led growth methodology, software product is driven by the principle of intuitiveness. This means that the outcome is users interacting with the digital product effortlessly, without the need for manuals. This involves creating interfaces that are

clear, accessible, and responsive, all while maintaining a consistent and empathetic approach throughout the design process (Norman, 2013).

Basically, designing for product-led growth models is about understanding how effectively the design solves a user's problems, how the design delivers a return on investment, and what it contributes to the business in the long run (*The business value of design*, 2018).

As cited by PLG Collective, to create an engaging product experience that can demonstrate its value, product-led growth organizations must deeply understand the user's pain points³³. This understanding emphasizes a well-defined user journey, the removal of these pain points to enhance user experience, and the delivery of designs that are guided more by user goals than merely focusing on product features.

2.4 Data analysis process applied to product-led growth

Understanding the intricacies of data and its role within product-led growth companies is of utmost significance. Before we dive into this topic, let us explain the concept of data. The online version of the Cambridge Dictionary (n.d.) describes it as information, especially facts or numbers, collected to be examined and considered and used to help decision-making or information in an electronic form that can be stored and used by a computer.

In this context, data in its raw form lacks a specific purpose and remains worthless. It only becomes suitable for decision-making after it has been processed or analyzed (Stonebraker, 2020). This is the juncture where a data analyst's role becomes significant.

Data analysts extract meaning from data. They collect, transform, and organize data to conclude, make predictions, and assist managers and leaders in making informed decisions, thereby helping businesses operate more effectively (Nelson, 2023).

³³ User pain points refer to the problems, friction, and bottlenecks users experience during their relationship with a product. For example, problems such as difficulty accessing a website, slow loading times, or confusing navigation menus.

Their core skills involve using data analysis tools such as MySQL³⁴, Excel³⁵, Python³⁶, PowerBI³⁷, Tableau³⁸, Looker³⁹, Salesforce⁴⁰, Google Analytics⁴¹, and R⁴², and pulling data from and publishing data to data warehouses⁴³ like Snowflake⁴⁴, IBM Db2⁴⁵, Amazon Redshift⁴⁶, Google BigQuery⁴⁷, and Microsoft Azure Synapse Analytics⁴⁸. Another common skill of data analysts consists of creating charts and graphs and presenting insights compellingly.

Their role varies significantly across industries. For instance, a business analyst is a data analyst specializing in business, a data scientist focuses on automation and machine learning⁴⁹, and a marketing analyst specializes in marketing insights. Despite the differences, all these roles share a common trait - an analytical mind, knowledge of statistical operations, and, sometimes, industry skills (Berkeley, 2021). In this study, we refer to a data analyst as a professional who works alongside product teams, most likely in the role of a product analyst⁵⁰.

³⁴ <https://www.mysql.com/>

³⁵ <https://www.microsoft.com/en-au/microsoft-365/excel/>

³⁶ <https://www.python.org/>

³⁷ <https://powerbi.microsoft.com/>

³⁸ <https://www.tableau.com/>

³⁹ <https://lookerstudio.google.com/>

⁴⁰ <https://www.salesforce.com/>

⁴¹ <https://analytics.google.com/>

⁴² <https://www.r-project.org/>

⁴³ Data warehouses are central repositories of integrated data from one or more disparate sources.

⁴⁴ <https://www.snowflake.com/en/>

⁴⁵ <https://www.ibm.com/products/db2/>

⁴⁶ <https://aws.amazon.com/redshift/>

⁴⁷ <https://cloud.google.com/bigquery/>

⁴⁸ <https://azure.microsoft.com/en-au/products/synapse-analytics/>

⁴⁹ Machine learning, a subset of artificial intelligence, is centered around the creation of models that learn from data to make predictions or decisions. These models have the unique ability to generalize from data, enabling them to perform tasks without being explicitly programmed to do so.

⁵⁰ A product analyst is a professional who uses data analysis and insights to evaluate and improve the performance of a product.

Within each department, data analysis projects can be approached differently based on their unique data requirements and internal processes. For example, the data department might take the lead on a project, while in other situations, collaboration between departments becomes essential. Despite these variations, the data science workflow, originally outlined by Schutt and O’Neil in 2013, remains consistent. Figure 6 illustrates this workflow, which also applies to data analysis. It is important to understand that the execution of each step in this process can vary, tailored to the specific needs and circumstances of the department or the particular request.

The initial step involves collecting raw data, which can be categorized into numerical and categorical types (*Types of data in statistics: Numerical vs categorical data*, n.d.). Numerical data, also known as quantitative data, represents quantities or counts. For example, it includes discrete data, such as the number of users on a digital platform or the number of downloads for a mobile application, and continuous data, such as the time spent by a user on a digital product or the amount of storage used by a customer on a cloud service⁵¹.

On the other hand, categorical data, also called qualitative data, represents characteristics or attributes. It includes nominal data like the operating system of a user’s device or the payment plan chosen by a customer, and ordinal data that can be ordered or ranked, such as user experience ratings or product versions.

Then data is collected from a variety of sources. The sources and types of data collected can vary greatly depending on the company’s specific needs and focus areas (Nelson, 2023). For instance, a startup might focus on user engagement data and feature usage data. Similarly, an e-commerce platform might prioritize customer purchase history, product views, and cart abandonment data to understand consumer behavior.

Once collected, the data must be processed or organized for analysis (Provost & Fawcett, 2013). This may involve placing data into rows and columns in a table format for further analysis, often through a spreadsheet⁵².

⁵¹ Cloud service is a term that refers to a wide range of services delivered on demand to companies and customers over the internet.

⁵² A spreadsheet is a digital application designed for the organization, analysis, and storage of data in tabular form.

Once data is processed and organized, it may not be ready for analysis right away. It may be incomplete, contain duplicates, or even have errors. This requires the need for data cleaning (Sammut & Webb, 2017). After the datasets⁵³ are cleaned, .i.e., once the data is correct, consistent, and usable, they are then ready for analysis. At this stage, data analysts may apply a variety of techniques, collectively referred to as exploratory data analysis (Turkey, 1977).

These techniques assist in deciphering the messages within the data. Interestingly, data exploration can sometimes uncover further issues, leading to more data cleaning or even additional data requests. To facilitate comprehension, analysts can employ descriptive statistics⁵⁴ such as the average or median (Bulman & Osborn, 1989). These statistics provide a summary view of the data, offering insights into its structure and characteristics.

Depending on the task performed, algorithms and models may be applied to the data to identify relationships among the variables, such as correlation⁵⁵ or causation⁵⁶ (Kulkarni et al., 2023). In the present study, we use the concept of algorithm as it is understood in the context of computer science. An algorithm is a set of instructions implemented through code that instructs the computer on what it needs to do and how to do it. Whereas, a model is the result obtained when an algorithm is applied to data (O'Neil & Schutt, 2013).

While the data analysis framework proposed by Schutt and O'Neil (2013) is indeed relevant for performing data analysis tasks, the section that discusses algorithms and models may not be directly applicable to the roles and responsibilities of a data analyst. That being said, we will not be covering this subject further.

The next step of the data analysis process involves contributing to the data team, which includes roles such as data scientists and data engineers, to create data products within the

⁵³ A dataset refers to a collection of data, which can be structured, as seen in tables or spreadsheets, or unstructured, such as text or data derived from audio or visual files.

⁵⁴ Descriptive statistics are a fundamental aspect of data analysis, providing a succinct summary of a given data sample. They primarily focus on two aspects: measures of central tendency and measures of dispersion. Measures of central tendency, such as the mean, provide an average value for the data set, offering a snapshot of the typical value. On the other hand, measures of dispersion, like the standard deviation, provide insights into the spread or variability of the data. These measures collectively provide a comprehensive overview of the data's overall distribution and characteristics. By employing these statistical tools, one can effectively interpret and understand the underlying patterns within the data.

⁵⁵ This refers to a statistical relationship between two variables. If one variable changes, the other tends to change too.

⁵⁶This means that a change in one variable directly causes a change in another variable. In other words, there is a cause-and-effect relationship.

organization. A data product is a high-quality, ready-to-use set of data that people across an organization can easily access and share (Desai et al., 2022).

This data can then be utilized for various purposes, including analyzing the link between groups of data, such as a customer data product⁵⁷ and a financial data product⁵⁸, for example.

The final phase of data analysis involves the communication of findings and the sharing of created visuals. This phase, known as data storytelling, is where data analysts utilize visualization techniques to convey their insights. These techniques aim to improve the clarity and speed of information delivery, integrating data into the decision-making process.

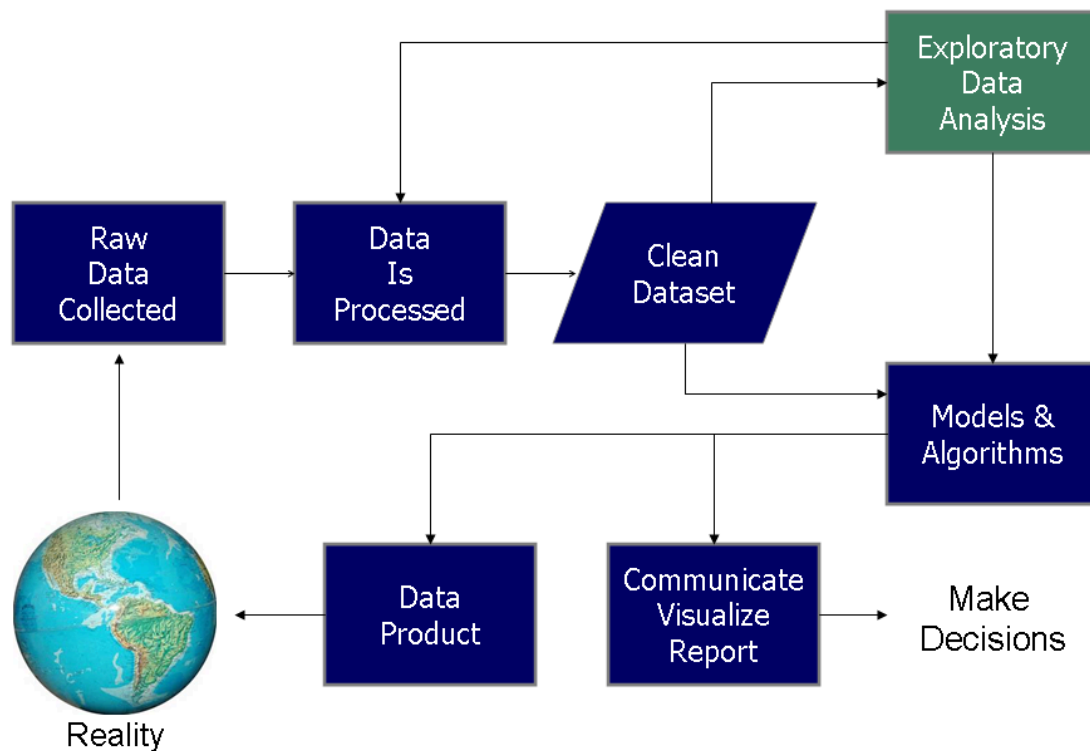
Data storytelling, as described by Starbuck (2023), is the transformation of complex data into an understandable and interpretable narrative. It presents data as more than just numbers on a page, but as a narrative that tells a story.

Taking this a step further, by weaving a story around visuals, analysts can identify trends, raise pertinent questions, and guide decision-makers toward informed conclusions. In practical terms, the adoption of data storytelling extends beyond aesthetics, serving as a tool to communicate with various audiences (Boyles, 2022). For instance, within product departments, these audiences could range from stakeholders like product designers who make a request, to product managers, ensuring that the insights from the data are effectively communicated.

⁵⁷ This could be a database that contains customer information such as demographics, purchase history, online behavior, and social media activity. It could also include data from a Customer Relationship Management system.

⁵⁸ This could be a financial report that provides an in-depth view of a company's financial status over a specific period. It could encompass documents such as balance sheet, income statement, and statement of cash flows.

Figure 6. *Process of data analysis, adapted from O'Neil and Schutt (2013)*



In today's digital age, data has become an invaluable asset. Recognizing its importance and the inherent challenges it presents, Eurostat (2023), the statistical office of the European Union, has set two main goals for small and medium enterprises to become more digital by 2030. The first goal is that over ninety percent of these companies should reach a basic level of digital intensity by utilizing digital technologies in their operations. The second goal is that seventy-five percent of the European companies should adopt advanced digital solutions such as cloud computing, data management, and artificial intelligence.

From a product-led growth perspective, an effective way to navigate this flood of data is to strategically employ relevant metrics and analytics. Metrics are defined as quantitative measurements that assess business performance and represent raw, unprocessed data (Milani,

2019). These metrics provide concrete numbers. Examples include active users⁵⁹, churn rate⁶⁰, and customer acquisition cost⁶¹.

On the other hand, analytics is about interpretation. It involves using metrics and their trends to facilitate decision-making. Some examples consist of gaining insights into consumer behavior, market trends, and product performance (Shah, 2023).

Both metrics and analytics are important in product-led growth methodology as they serve as quantifiable measurements that reflect a company's performance in achieving its objectives, and data teams are essential in this process, as they manage these data resources.

In fact, data experts play a significant role in understanding product analytics. According to the consulting firm Product Led Alliance (2022), data analysts gather and transform user-level data into insights, all to reveal customer behavior, improve customer engagement, and enhance the entire customer experience (p. 10).

For example, in the app landscape, this means identifying when accounts are nearing their plan's usage limits, when an account shows increased interest, and when accounts reach product milestones, indicating that they are obtaining value from the product.

With this in mind, metrics and analytics can provide product teams with trends in user behaviors and segmentation patterns to deliver a more personalized experience. This is where the concepts of product-led growth and data-driven organizations become closely linked. As companies strive to understand their customers and deliver more value, they turn to data to guide their decisions and strategies more often. This shows how the increasing reliance on data and data analysis is shaping the way product-led growth companies operate and compete.

⁵⁹ This metric counts the number of unique users who engage with a website or application within a particular time. It includes daily active users and monthly active users, and is typically used to measure the level of engagement for a particular software product.

⁶⁰ Also known as the rate of attrition or customer churn, this is the rate at which customers stop doing business with a company. It is most commonly expressed as the percentage of service subscribers who discontinue their subscriptions within a given period. A high churn rate could adversely affect profits and impede growth.

⁶¹ It measures how much an organization spends to acquire new customers. It includes all program and marketing spend, salaries, commissions, bonuses, and overhead associated with attracting new customers and converting them into customers.

2.5 Becoming a product-led growth company

Embracing a product-led growth methodology is a complex task that presents numerous challenges. In an interview on YouTube with Softr⁶², a software-as-a-service company, the host Hakobyan (2023) discusses these challenges with Bush. According to Bush, the challenges range from the need for cultural transformation within the organization to ensuring that all stakeholders understand and are aligned with the model.

One significant hurdle is the transition from a sales-focused culture to a product-centric one. This shift can meet resistance, particularly from individuals who are deeply ingrained in traditional sales methods and may be reluctant to change (Sarfati, 2023).

To overcome this resistance, it is important to understand the three main challenges that product-led growth faces. Firstly, alignment across all departments on shared success metrics is essential to prevent conflicts and inefficiencies. Secondly, as companies scale, they should plan and invest in infrastructure and resources to sustain growth and meet increased demand. Lastly, product-led growth requires adaptability to feedback and market changes, and rigid processes can impede this. Awareness of these roadblocks allows companies to address them proactively and optimize their product-led growth potential (Fracolli, 2023).

Product-led growth, however, is not always the key to growth. Elena Verna, a growth and data leader at Dropbox⁶³, discussed this topic with Kretsch (2021) from Netlify⁶⁴, a company known for website hosting. Verna emphasized that product-led growth strategies should align with the company's needs. She cited Monday.com⁶⁵, a project management software, as a successful example of using marketing strategies during the acquisition phase and transitioning to a product-led growth strategy for customer retention and monetization afterwards. According to Verna, this combined approach not only broadens the customer base but also maintains their engagement with the platform, leading to revenue generation as they find value in it.

⁶² <https://www.softtr.io/>

⁶³ <https://www.dropbox.com/>

⁶⁴ <https://www.netlify.com/>

⁶⁵ <https://monday.com/>

While product-led growth might not be the perfect strategy for every business, its effectiveness is significant and certainly merits attention. In an episode of Lenny's Podcast⁶⁶, the host and angel investor Rachitsky (2022) discussed the ideal growth model for acquisition, retention, and monetization of customers with Verna. She stressed that these strategies can be achieved by product-led, marketing-led⁶⁷, or sales-led models. Furthermore, these strategies can be implemented individually or in combination, depending on the specific needs and context of the business.

As a rule of thumb, product-led growth encourages customers to try a product before purchasing it (Bush, 2023a). This approach inherently requires a substantial emphasis on self-service. For instance, Agrawal (2023), the founder of Infobrandz⁶⁸, an agency specializing in infographic design, explains in a 2023 Forbes⁶⁹ article how to create a self-service strategy. He suggests refining the onboarding process, providing sufficient documentation, designing intuitive tutorials, and ensuring easy access to support resources.

Atlassian⁷⁰, for instance, is a company that embodies a well-structured onboarding process for new users, which includes a ninety-day plan and an employee onboarding template. In terms of documentation, Atlassian provides resources for its products, including a variety of templates and a guide for creating technical documentation in Confluence⁷¹. They also offer a range of tutorials that cater to different user levels, covering topics such as learning agile⁷² with Jira Software⁷³, developing with Connect⁷⁴ on Confluence Cloud⁷⁵, and using the Jira

⁶⁶ <https://www.lennyspodcast.com/>

⁶⁷ Marketing-led growth is a strategy that relies on marketing initiatives as the primary force driving product success. Companies that adopt a marketing-led approach focus on showcasing the value of their products in their communications with existing and prospective customers. This strategy helps increase brand awareness and visibility in the market. It also enables companies to gain a better understanding of their customers' pain points, needs, and preferences.

⁶⁸ <https://infobrandz.com/>

⁶⁹ <http://www.forbes.com/>

⁷⁰ <https://www.atlassian.com/>

⁷¹ <https://www.atlassian.com/software/confluence/>

⁷² It involves breaking down a project into small, manageable units known as sprints. After each sprint, teams reflect on the process and make necessary adjustments for the next sprint.

⁷³ <https://www.atlassian.com/software/jira>

⁷⁴ <https://bitbucket.org/atlassian/atlassian-connect-express/src/master/>

⁷⁵ Confluence Cloud is a collaborative workspace that helps teams create, organize, and share content online.

REST API⁷⁶. Lastly, Atlassian has a robust support system in place. Their support page⁷⁷ offers resources, including community help, technical documentation, and training.

These strategies are effective for attracting and onboarding customers. However, additional efforts are necessary to retain them in the long term. One key to customer retention is the implementation of customer feedback loops. These loops enhance and improve a product based on user reviews, opinions, and suggestions (Mehta & Murphy, 2016). This strategy empowers companies to harness UX research and data analysis, resulting in the consistent refinement of their products and the strengthening of customer relationships.

Transitioning to a product-led growth methodology inherently brings about certain risks that businesses need to proactively address. For example, reassessing pricing and revenue models, including the potential adoption of subscription-based plans, can impact the business as a whole. Choosing the wrong subscription model can put the business at risk (Bush, 2023c).

Another challenge perceived through the adoption of product-led growth methodology involves the strategy aligned with a solid data management system to track and monitor product metrics in regular basis (*The 7 most important metrics for product management*, 2023).

By overcoming these obstacles, organizations are more likely to amplify their customer base. However, this expansion also brings about a diverse array of customer needs. This variety, in turn, intensifies the level of customer expectations.

KPMG (2023), a multinational business advisory firm, informed in its report last year that customers consistently seek enhanced experiences. To meet these escalating expectations, companies need to continuously innovate and adapt. This is no different for companies transitioning to product-led growth, as their evolution ensures their offerings remain relevant and valuable to their customers.

To meet their expectations, Agrawal suggests that companies should also invest in research and development to maintain team agility. Furthermore, he emphasizes the importance of adopting continuous A/B testing to identify what resonates with users. Through such actions,

⁷⁶ <https://developer.atlassian.com/cloud/jira/platform/rest/v3/intro/>

⁷⁷ <https://support.atlassian.com/>

companies can enhance their user experience and pave the way for attaining over sixty percent in average revenue per user (Solomons, n.d.).

The success of a product-led growth strategy is closely tied to customer success, which is seen as a reflection of business success. This requires companies to have a deep understanding of their ideal customers, their objectives, and ways to improve their product experience. The strategy's effectiveness, however, depends on the company's clear understanding of its current business stage. Any uncertainty about their position or target market could potentially undermine the strategy. Clarity about these aspects is essential for companies to increase product success rates.

2.6 The bridge to product success

The dynamic field of data analysis and product design is a hub of interconnected activities that can vary from company to company. One such activity is the analysis of A/B testing results to identify design variations, a concept discussed by Siroker (2015). Data analysts are an important point of contact for collaborating with product designers by analyzing metrics such as bounce rate⁷⁸, session duration⁷⁹, and conversion rate⁸⁰ for each version of the design. This collaboration helps determine which design leads to better user retention⁸¹.

Furthermore, these analysts can gain insights into user behavior by analyzing user feedback (Benyon, 2019). An e-commerce platform like Amazon⁸², for example, allows the company to obtain customer reviews and ratings to understand how users perceive its product. By looking at common keywords in reviews, ratings for different product categories, and feedback on the user interface, data analysts can inform design improvements that enhance the user experience.

⁷⁸ The percentage of visitors who leave after viewing only one page.

⁷⁹ The length of time a user spends on your site in one visit.

⁸⁰ The percentage of users who complete a desired action, like making a purchase.

⁸¹ The percentage of first-time users who return to the website.

⁸² <https://www.amazon.com/>

Another key aspect is the identification of user pain points and the development of user flows⁸³ (Hurff, 2015). Consider a mobile app like Uber⁸⁴, where users frequently encounter issues with a specific feature, such as navigating through the app's menu. Data analysts would analyze user behavior data to identify the root cause of this issue, and product designers would brainstorm a user-friendly solution to enhance the navigation experience.

Defining target audiences is another area where data analysis and product design intersect (Levy, 2015). Various types of data can be analyzed to achieve this, including demographic data, which consists of statistical information relating to the population and particular groups within it.

Another type is psychographic data, which refers to data about consumers' personality traits, values, attitudes, interests, and lifestyles (Visocky O'Grady & Visocky O'Grady, 2017). It provides a more in-depth understanding of the consumer as an individual, going beyond basic demographic data to reveal more about their personal preferences and behaviors.

The third type is behavioral data, which is information about how consumers behave (Hunt, 2014). This includes data on purchasing behavior, usage patterns, and interactions with products. To illustrate how these types of data are used, consider a fitness app like Fitbit⁸⁵. The app analyzes workout history, user demographics, and app usage patterns to understand the preferences and behaviors of its most engaged users. This information then informs the design of personalized workout plans catering to this target audience. In this way, the app is not only meeting the needs of its users but also enhancing their experience by providing a service that is tailored to their individual needs and preferences. This is a prime example of how data analysis and product design excel.

The intersection of data analysis and product design extends even further. It ranges from delineating success metrics and identifying factors that contribute to user engagement (Sauro, 2015), to analyzing data related to user interactions for user journey maps⁸⁶ (Kalbach, 2020).

⁸³ User flow refers to the path a user takes to complete a certain task within a product. This path includes the journey from the entry point, like login, to the task completion, like creating a profile.

⁸⁴ <https://www.uber.com/>

⁸⁵ <https://www.fitbit.com/>

⁸⁶ A user journey map is a visual tool that outlines a user's experience with a product. It captures each stage of interaction, from initial awareness to complete engagement. This map includes user actions, thoughts, emotions, and touchpoints. It helps teams understand the user's perspective, identify pain points, and highlight opportunities for improvement.

Another activity involves data privacy and compliance with regulations, which safeguard against unauthorized data collection, fraudulent practices, and biases. This represents a commitment to transparency, and such commitment builds trust with users (*Designing and building AI products and services*, 2023).

This trust is a bridge to the next activity: feature prioritization (Varma, 2015). By analyzing data, companies are equipped to discover which features resonate most with users. Alongside UX researchers, data analysts can test hypotheses about user behavior, ensuring that products are designed effectively. It is from these designs and the insights gained from feature prioritization that user-centric designs emerge (Levy, 2015).

Once the designs have been created, they serve as a starting point for new opportunities. User engagement is monitored through various methods such as surveys, interviews, facial expression analysis, speech analysis, and web analytics⁸⁷. These methods can highlight areas that need improvement or suggest the development of new features. This process is a cycle of iteration and refinement, driven by both data analysis and user research.

The effectiveness of these refinements can be measured by comparing user behavior before and after implementation, and historical data can demonstrate how user engagement metrics assess the impact of a new feature release.

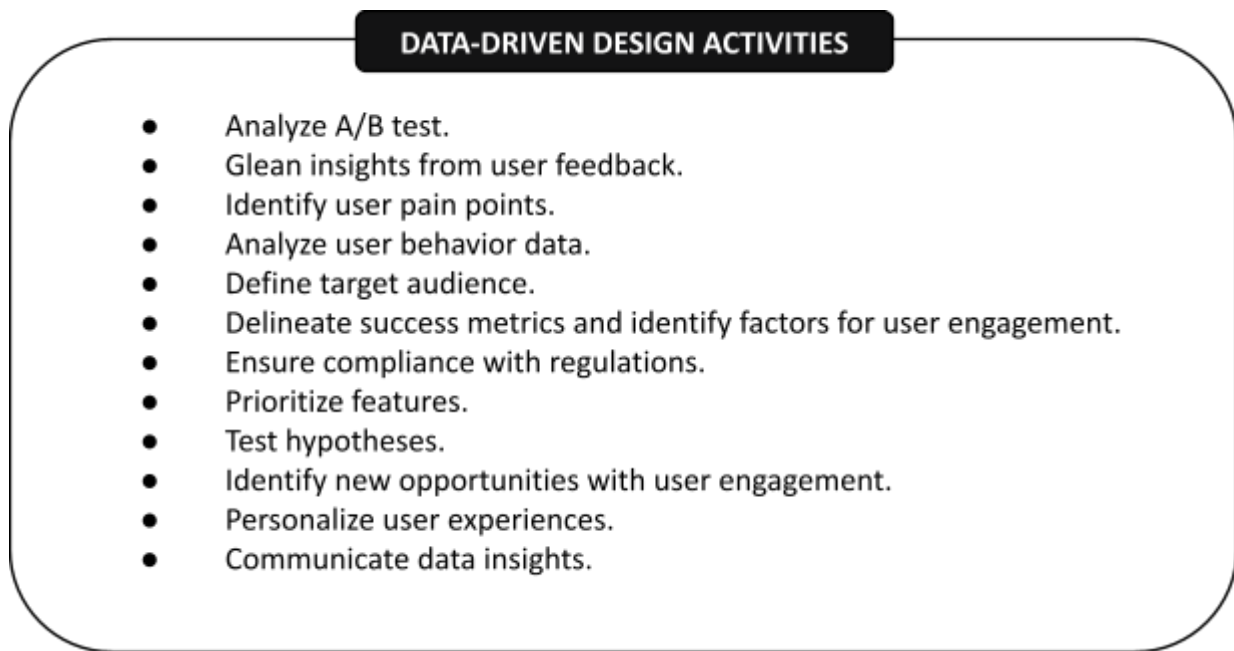
These assessments often lead to the personalization of user experiences, designing the product to individual user needs by analyzing user preferences and goals. This process transforms insights from measuring design changes into meaningful user experiences (Levy, 2015; Kimmel, 2016).

Finally, these insights are conveyed through data storytelling. Dykes (2019) emphasizes the importance of narrative in communicating data insights for informed design decisions.

In Figure 7, we offer a visual representation of the twelve specific activities that were mentioned earlier. While these activities provide insight into their joint work, it is important to acknowledge that this figure does not capture all possible outcomes that could arise from their collaboration.

⁸⁷ This method includes metrics like the time spent on a site and the frequency of return visits.

Figure 7. *Activities in data-driven design*



Within the framework of product-led growth, maintaining a balanced intersection of these activities is essential. An overemphasis on data might lead to products that lack user-friendliness, while an excessive focus on design could result in products without data-driven insights.

2.7 Data-driven design trends

Data analysis and product design are becoming increasingly central to product development, significantly influencing product-led growth strategies. A key aspect that may be contributing to these growth strategies is the implementation of artificial intelligence.

Artificial intelligence is not just an emerging aspect, but a valuable resource for designers. It is considered their superpower, as cited by Armstrong (2021). This superpower has the potential to forge stronger connection between product designers and data analysts.

For example, artificial intelligence tools have the potential to analyze large amounts of user behavior data and identify complex patterns and trends. These tools can generate in-app recommendations tailored to users' needs, thereby enhancing the personalization of the app.

Supporting this, Nvidia (n.d.), a global company known for its graphical processing technologies for computers and smartphones, reports that an intelligent recommendation system for digital products can deliver an average increase of twenty-three percent in

conversion rates. This statistic showcases the significant direct impact artificial intelligence can have on user preferences.

In the context of data analysis, augmented analytics⁸⁸ (Skyrius, 2021) has been gaining attention due to its capability to automatically analyze large datasets and identify trends, outliers, and patterns. This technology can enable data analysts to share customized reports with product managers through their analytics platform. For instance, these reports can be triggered when a tracked result deviates beyond the acceptable standard deviation⁸⁹.

Predictive analytics, for example, is being utilized in platforms such as Microsoft Advertising⁹⁰ and Google Ads⁹¹, which provide real-time recommendations to clients. This technology uses artificial intelligence to analyze past performance and current trends, then offers tips on how to improve campaigns. These suggestions can cover a range of topics, from ads and keywords to budgeting. Clients have the choice to either follow these tips or ignore them. The more they use it, the more useful the advice becomes.

Alongside augmented and predictive analytics, ethical data handling and a commitment to secure user privacy (Taal, 2021) are emerging trends that go hand in hand. This might involve transparently communicating data usage practices, obtaining user consent before data collection or utilization, maintaining privacy standards, and compliance with the General Data Protection Regulation in Europe.

Other trends include a series of artificial intelligence chat companions, such as Copilot⁹², capable of completing a wide range of tasks across Microsoft's products. Copilot can answer questions in natural language, analyze content, customize settings, and troubleshoot issues (Nadella, 2023).

⁸⁸ Augmented analytics is a system that employs artificial intelligence to analyze data and deliver insights. It can be seen in various applications, such as a shopping website's recommendation system, which proposes products by analyzing previous user interactions.

⁸⁹ The standard deviation is a measure of the amount of variation or dispersion of a set of values. It tells us, on average, how far each value lies from the mean.

⁹⁰ <https://ads.microsoft.com/>

⁹¹ <https://ads.google.com/>

⁹² <https://copilot.microsoft.com/>

Similarly, Gemini⁹³, which is Google’s chat companion, can understand the world around us and process various types of input or output. It is not limited to text, but also includes code, audio, images, and video (Hassabis, 2023).

Gemini has been evolving day by day. Its integration with the cloud data warehouse BigQuery and the data visualization platform Looker can now automate data analysis. The artificial intelligence identifies patterns, suggests improvements, writes SQL or Python code, visualizes data, and synchronizes multiple databases.

Figma⁹⁴ (2023), a web-based graphics editing and user interface design application, is also making strides. Noah Levin, the vice president of design, has announced that in this new era of artificial intelligence, “the possibilities are endless, not just for design but across the entire product development process” (para. 5). Tools like Diagram⁹⁵ and a hundred more plugins have the potential to transform every part of the product development process.

In 2023, Felix Lee (2023), co-founder of ADPList⁹⁶, interviewed Jakob Nielsen, a user experience pioneer and co-founder of the Nielsen Norman Group⁹⁷. Nielsen highlighted that the year was marked by significant advancements in artificial intelligence. However, he indicated that we are just scratching the surface of its potential, comparing the technology to a mental forklift that enhances our capabilities. He further stated that the deployment of artificial intelligence platforms led to an increase in productivity by over thirty percent.

Several other artificial intelligence platforms have gained recognition for their capabilities. Platforms such as Midjourney⁹⁸, DALL-E 3⁹⁹, Lumiere¹⁰⁰, Pika¹⁰¹, Vidu¹⁰², and Generated

⁹³ <https://deepmind.google/technologies/gemini/>

⁹⁴ <https://www.figma.com/>

⁹⁵ <https://www.figma.com/community/plugin/1228771876010363761/ai-diagram-maker/>

⁹⁶ <https://adplist.org/>

⁹⁷ <https://www.nngroup.com/>

⁹⁸ <https://www.midjourney.com/>

⁹⁹ <https://openai.com/dall-e-3/>

¹⁰⁰ <https://lumiere-video.github.io/>

¹⁰¹ <https://pika.art/>

¹⁰² <https://www.vidu.io/>

Photos¹⁰³ are noted for their ability to accelerate the creation of artistic elements and realistic photos. Meanwhile, platforms like Uizard¹⁰⁴ and Bubble¹⁰⁵ have the capacity to develop websites or apps in minutes. Additional tools, including the font generator Fontjoy¹⁰⁶ and the multimedia editing tool Adobe Firefly¹⁰⁷, provide designers with an expanded range of creative possibilities.

By keeping up with these and other new trends, data analysts and product designers can collaborate more effectively within a product-led growth model. This can lead to enhanced information and idea sharing, improved workflow between their teams, and strengthened core skills within each department.

¹⁰³ <https://generated.photos/>

¹⁰⁴ <https://uizard.io/>

¹⁰⁵ <https://bubble.io/>

¹⁰⁶ <https://fontjoy.com/>

¹⁰⁷ <https://www.adobe.com/au/products/firefly.html?>

Chapter 3 - Research

3.1 Methodology

We utilized both statistical and thematic analysis in our research methodology. According to Shneiderman (2016), statistical analysis is used to describe, summarize, and interpret data. Thematic analysis, as cited by Braun and Clarke (2012), is a “method for systematically identifying, organizing, and offering insight into patterns of meaning - themes” within qualitative data (p. 57).

The rationale behind incorporating statistical analysis was to generate charts and graphs that provide a visual representation of the data and facilitate the identification of patterns, trends, and correlations. Thematic analysis, on the other hand, was instrumental in capturing participants’ opinions.

We conducted our research with voluntary participation, maintaining the confidentiality of all participant identities. This approach ensured participant privacy, enhancing the reliability of our data collection.

3.2 Data collection

Our research methodology incorporated a balanced mix of both qualitative and quantitative methods. This was achieved through the execution of a survey, an instrument described by Don Dillman (2011) as a “method for collecting data to gain insight about people and their thoughts and behaviors” (p. 25).

Subsequently, we developed a questionnaire consisting of fourteen questions. An in-depth explanation of these questions can be found in *Appendix A* for further clarification. This methodology facilitated the collection of data, thereby laying the groundwork for our analysis.

The questionnaire consisted of a combination of multiple-choice and open-ended questions. The multiple-choice questions were designed to gather precise, quantifiable data. Conversely, the open-ended questions provided participants the opportunity to share their views.

We chose LinkedIn¹⁰⁸ and Slack¹⁰⁹, both professional platforms, as our primary sources for data collection, as shown in Table 2. These platforms attract a professional audience, making them appropriate for collecting industry-specific data. Our survey targeted individuals in roles such as data analysts or product designers, or those with a solid understanding of the product-led growth methodology.

Table 2. *Distribution channels for data collection*

LinkedIn	Slack
About data analysis (5,696 members) ¹¹⁰ .	Product-led growth hub (927 members) ¹¹⁵ .
Python, data analysis, Tableau, PowerBI, SQL, data science, statistics, business analytics, AI & ML (21,685 members) ¹¹¹ .	Product-led alliance (10,450 members) ¹¹⁶ .
Business analyst professional - BA, analysis, data analyst, data scientist (718,718 members) ¹¹² .	MindtheProduct (66,998 members) ¹¹⁷ .
The product nomad (3,846 members) ¹¹³ .	
Figma product community (108,312 members) ¹¹⁴ .	

We conducted our research from July 10 to September 6, 2023, utilizing Google Forms¹¹⁸ for survey design and distribution. This tool provides real-time response collection and analysis. Additionally, we used Google Sheets¹¹⁹ to create graphs and charts.

3.3 Sample details

Fink (2003) describes a sample as a “miniature version of the population it represents - identical in nature, but smaller in size” (p. 1). For this research, a total of forty-one responses

¹⁰⁸ <https://www.linkedin.com/>

¹⁰⁹ <https://slack.com/>

¹¹⁰ <https://www.linkedin.com/groups/8156839/>

¹¹¹ <https://www.linkedin.com/groups/7043467/>

¹¹² <https://www.linkedin.com/groups/60878/>

¹¹³ <https://www.linkedin.com/groups/8984314/>

¹¹⁴ <https://www.linkedin.com/groups/12527405/>

¹¹⁵ <https://productledhub.com/slack-community/>

¹¹⁶ <https://www.productledalliance.com/join-the-pla-slack-community/>

¹¹⁷ <https://www.mindtheproduct.com/product-management-slack-community/>

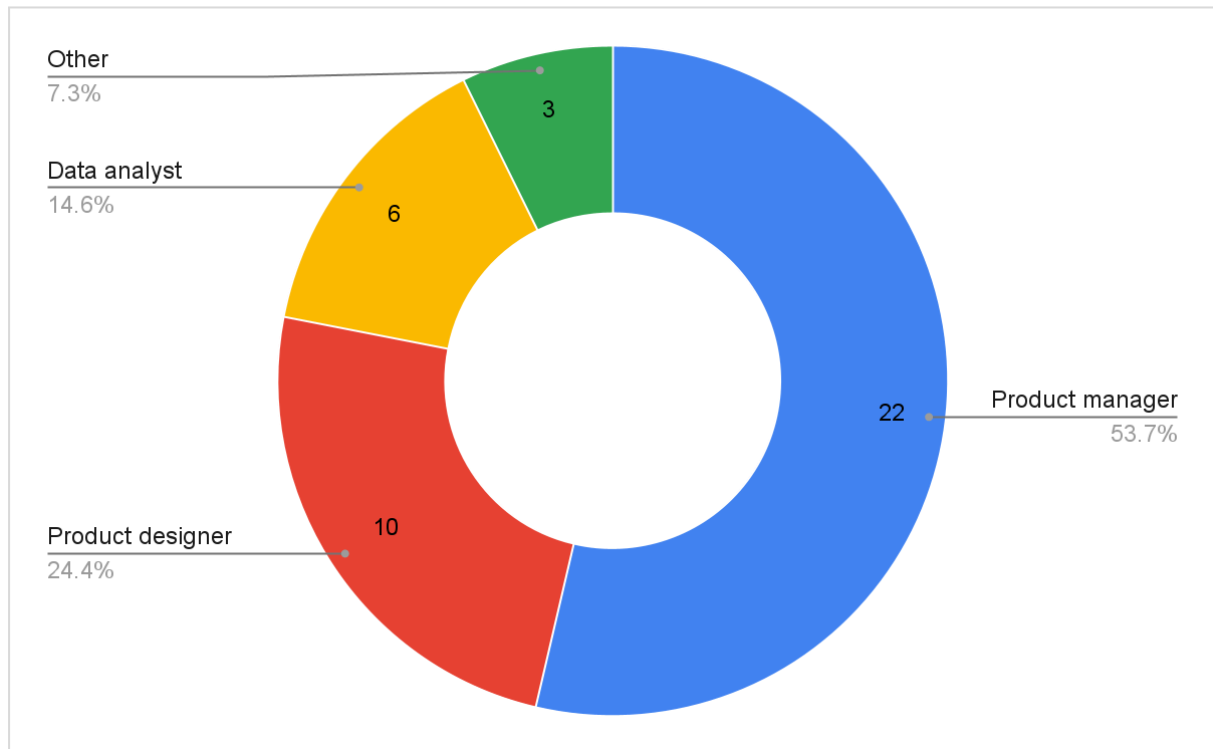
¹¹⁸ <https://www.google.com/forms/about/>

¹¹⁹ <https://www.google.com/sheets/about/>

were collected, as demonstrated in Figure 8. This constituted our sample size. The roles of the respondents included product managers, product designers, data analysts, and others.

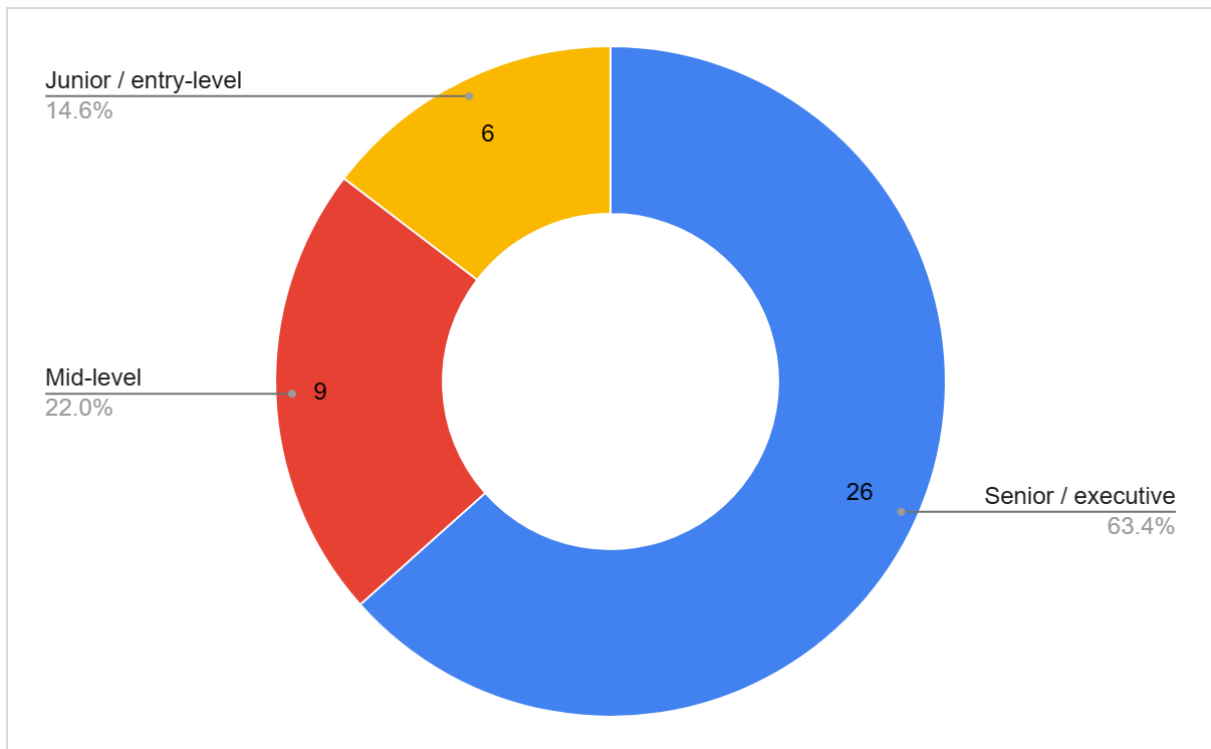
Within the data analyst category, we incorporated roles such as strategists and analysts, business analysts, and product analysts. The other category encompassed roles such as chief executive officers, user experience researchers, and customer experience managers.

Figure 8. Role



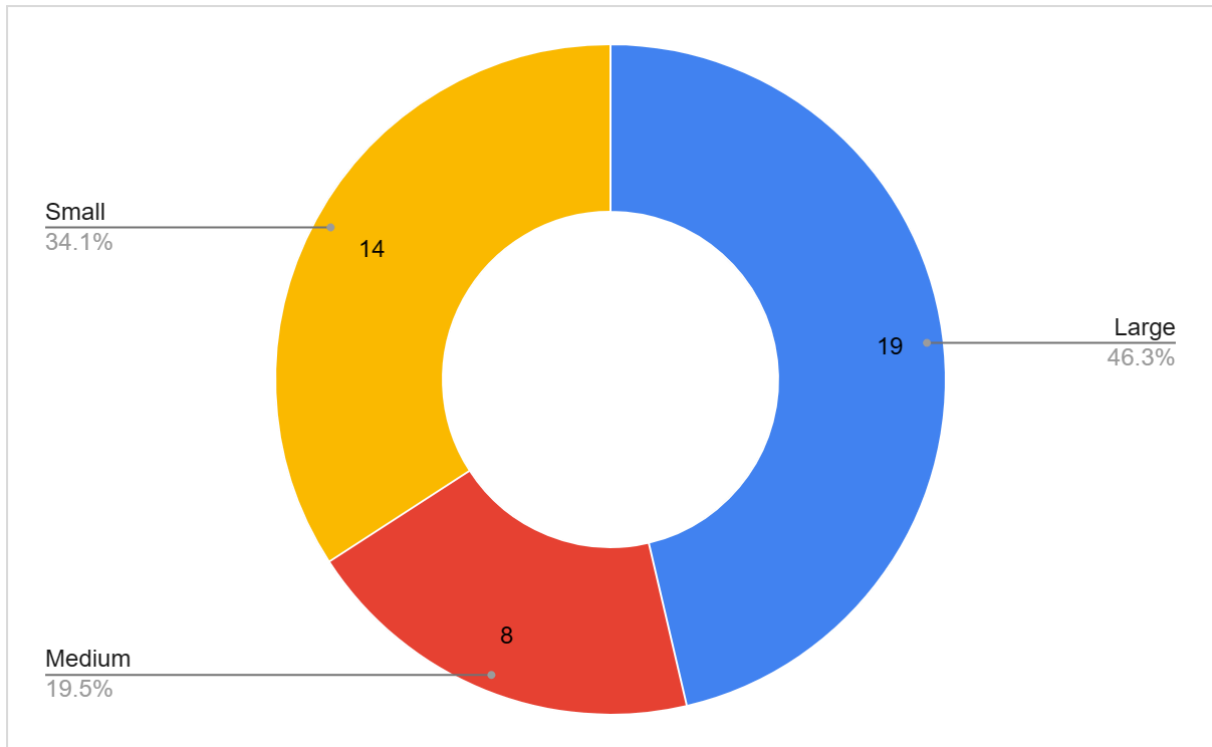
A significant portion of the responses, almost three-quarters, were from senior and executive positions, as shown in Figure 9.

Figure 9. *Level of seniority*



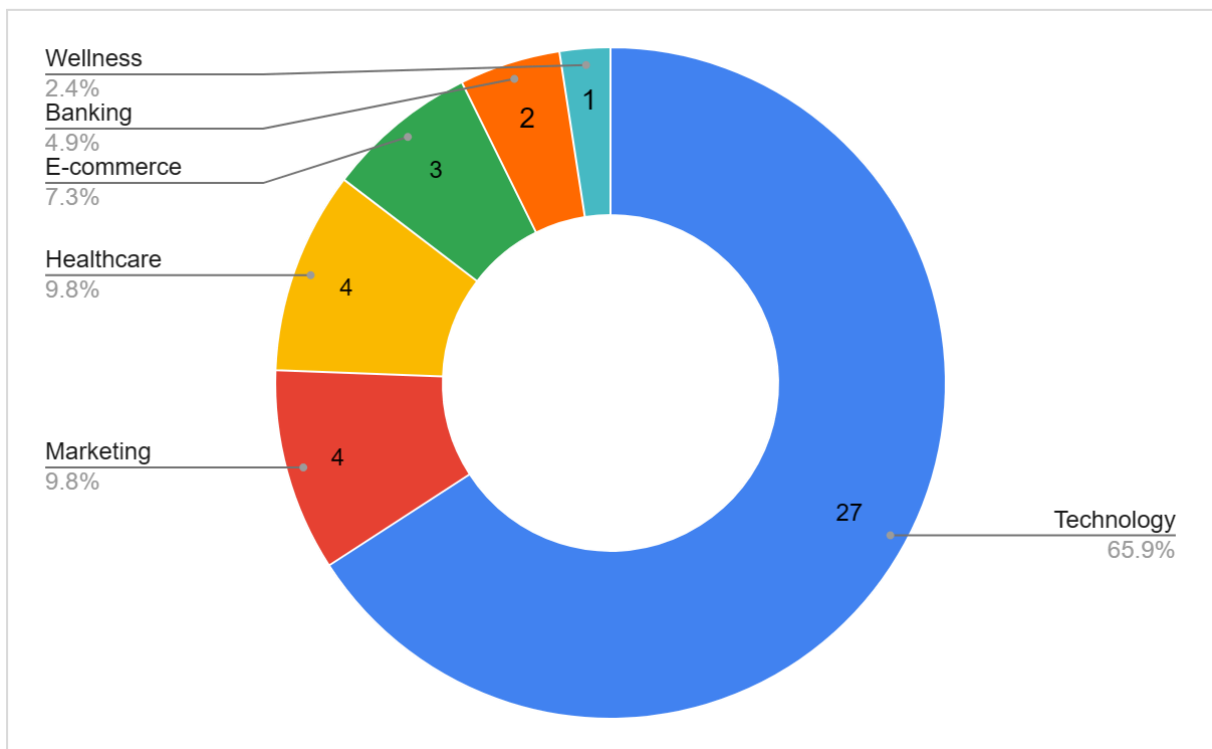
Approximately half of the participants in the study were from large-sized companies, as shown in Figure 10. We classified the companies into three categories: small with one to fifty employees, medium with fifty-one to two hundred and fifty employees, and large with more than two hundred and fifty-one employees.

Figure 10. Size



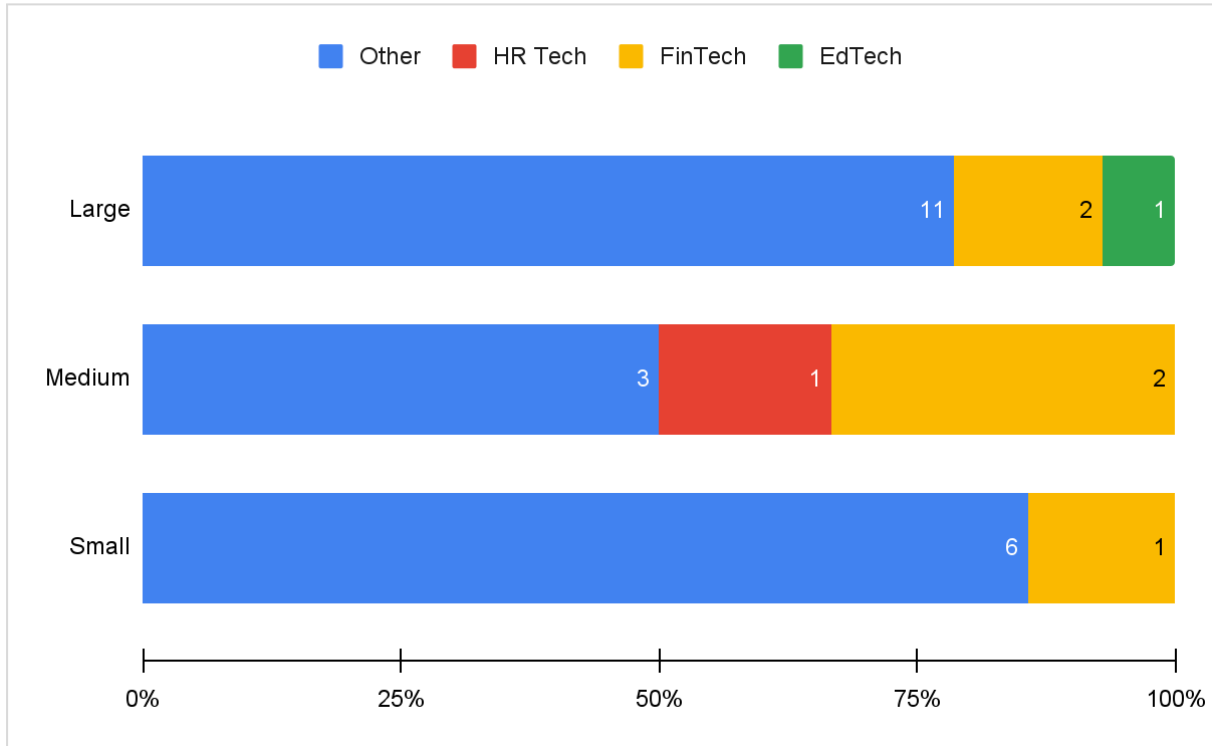
Almost three-quarters were primarily from the technology sector, as illustrated in Figure 11.

Figure 11. Sector



We categorized the tech sector in four sub-sectors: HR Tech, FinTech, EdTech, and Other. From this particular sector, seventy-four percent of the responses fell into the other category, as delineated in Figure 12.

Figure 12. *Tech sub-sectors by company size*



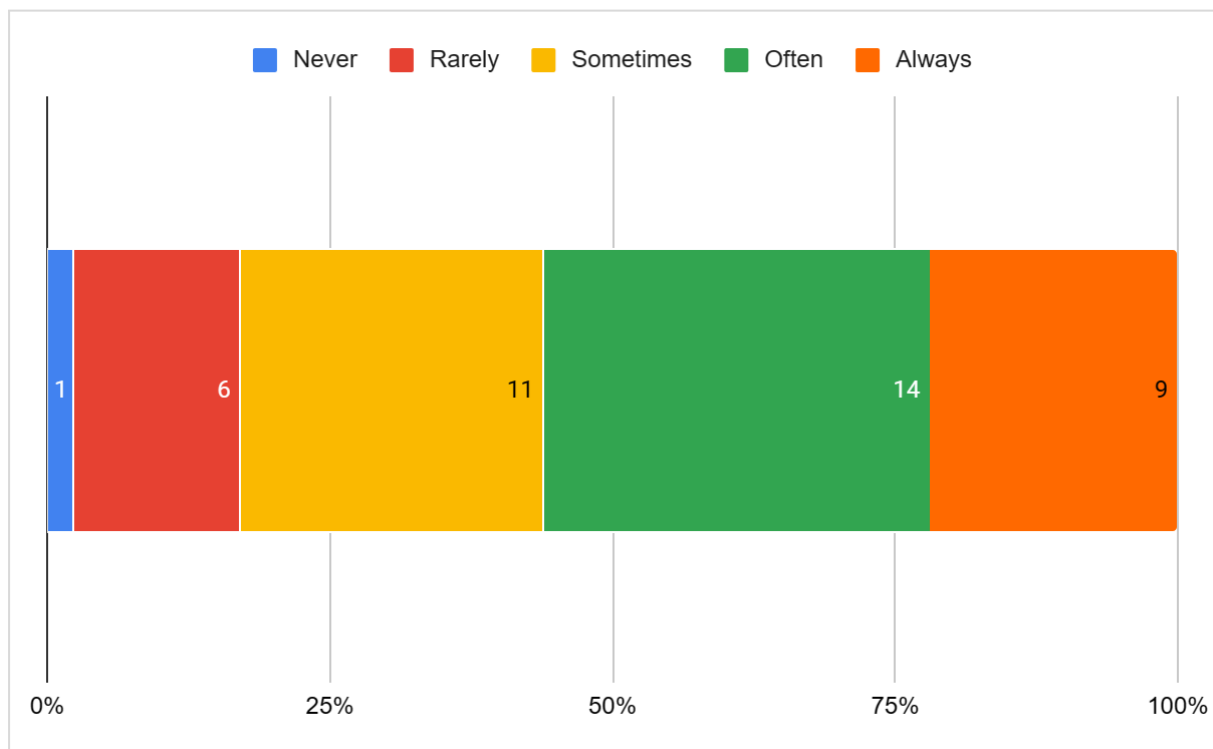
From the sample provided, we observed a concentration of respondents in the role of product managers, with the technology industry being the most well-represented. This data not only validates the significance of the product-led growth methodology, but also demonstrates its familiarity and importance within the tech industry.

Chapter 4 - Findings and results

When asked about the frequency of data analysis to guide decisions in product design, eighteen respondents, i.e., forty-four percent, revealed that their companies did not consistently follow this approach, as shown in Figure 13. This group includes those who never use data analysis, those who use it rarely, and those who sometimes depend on it for their design choices.

The fact that a significant proportion of companies do not regularly apply data analysis in their design process could indicate a lack of awareness or understanding of the benefits of this integration, or possibly a shortage of resources or skills necessary to effectively analyze and interpret product and design data. This situation presents an opportunity for increased education and training in data analysis within the design team.

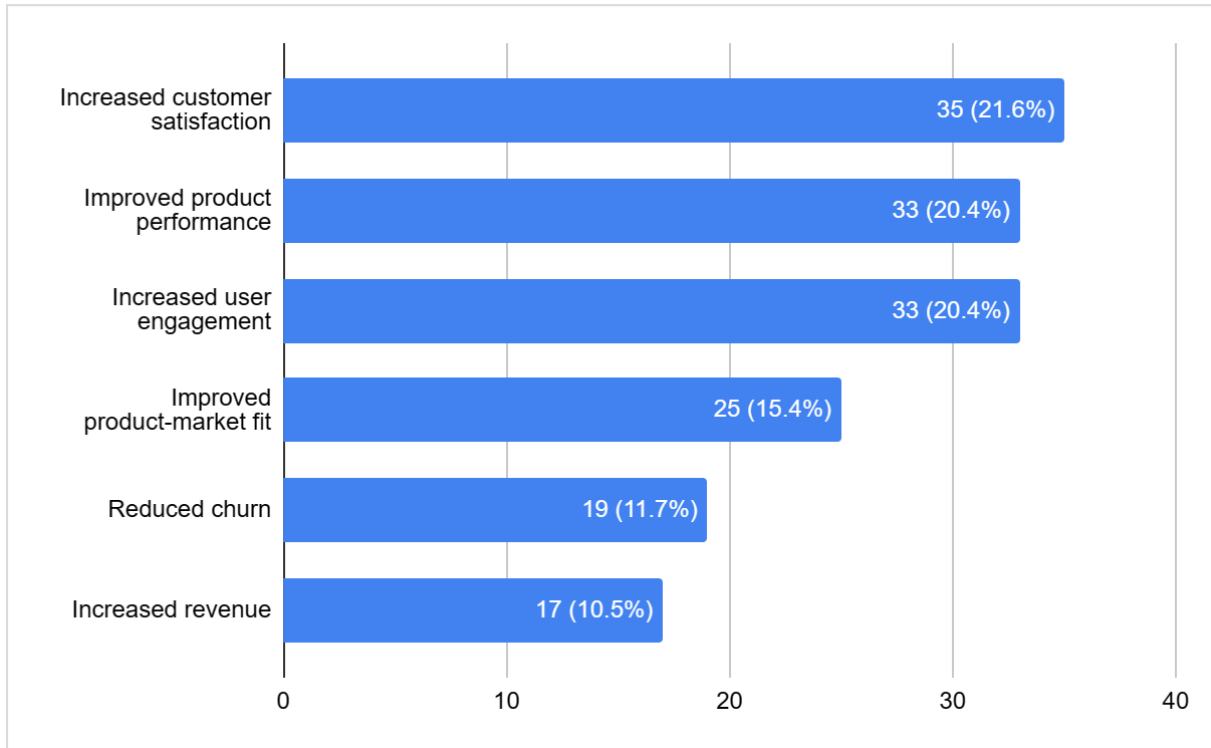
Figure 13. Use of data analysis in the product design process



When asked about the benefits of implementing data analysis into design processes, which is visually depicted in Figure 14, respondents indicated that customer satisfaction emerge as the most significant benefit, followed by improved product performance and increased user engagement. To support these findings, a participant pointed out that when a company integrates data analysis into product design, it fosters team alignment and commitment.

Another participant emphasized that this integration leads to project outcomes that are relevant and effective.

Figure 14. *Benefits of using data analysis in the product design process*

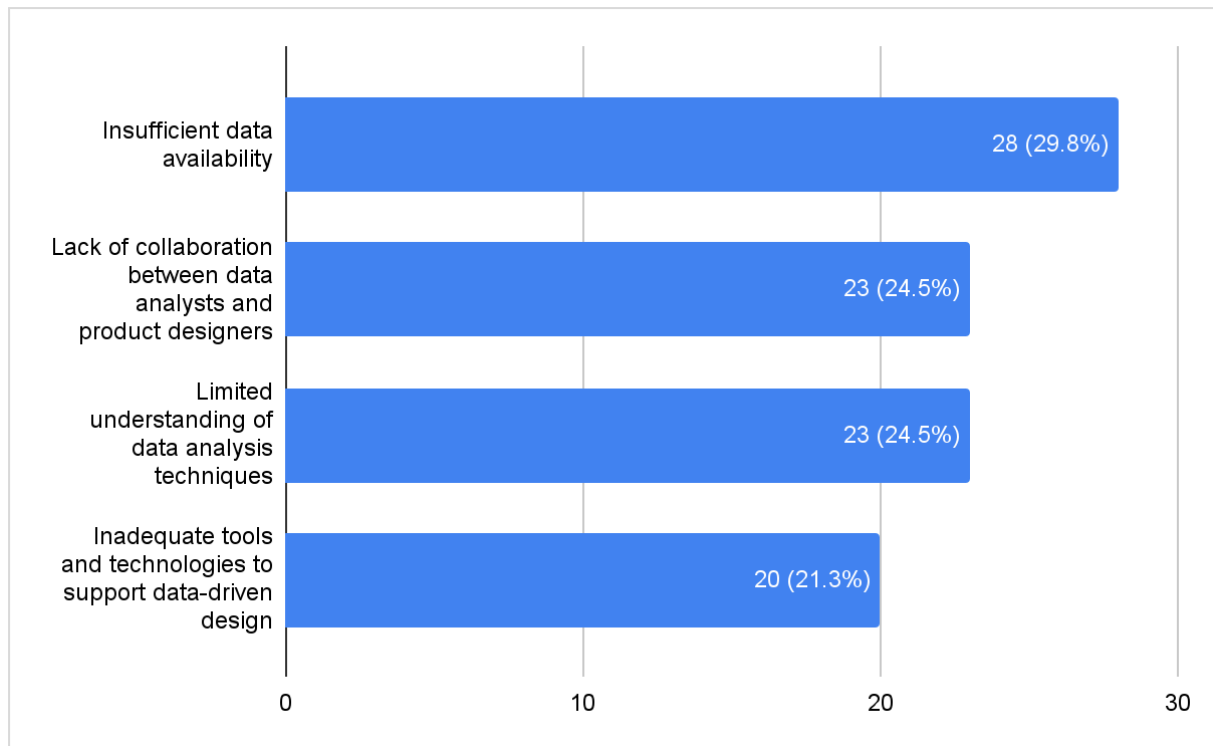


When asked about the challenges they face when integrating data analysis into the product design process, the most significant obstacle that emerged (as illustrated in Figure 15) is data availability. This leads us to assume that companies are not fully accessing, relying on, and using data throughout the product development lifecycle.

From the responses, one participant mentioned that the successful integration of data analysis within design teams depends on the company's dedication to a data culture and its uniform application across all departments. This participant asserted that while designers do not need to become data analysts, they should have enough data literacy to independently explore data.

Another participant raised two main issues. The first is the insufficiency of consumer data, which can lead to gaps in creating solutions that do not fully meet consumer needs. The second is the inconsistency in available consumer data, which can complicate the design process and make it hard to draw accurate conclusions. These issues made us wonder about the complexities of integrating data analysis and product design work.

Figure 15. *Challenges in implementing data analysis in product design*



When asked about the key to effective collaboration, participants highlighted the critical role of ongoing data analysis across various touchpoints in the product development lifecycle. By integrating data analysis into the design process, designers can ensure that their deliverables align with business objectives and contribute to informed decision-making.

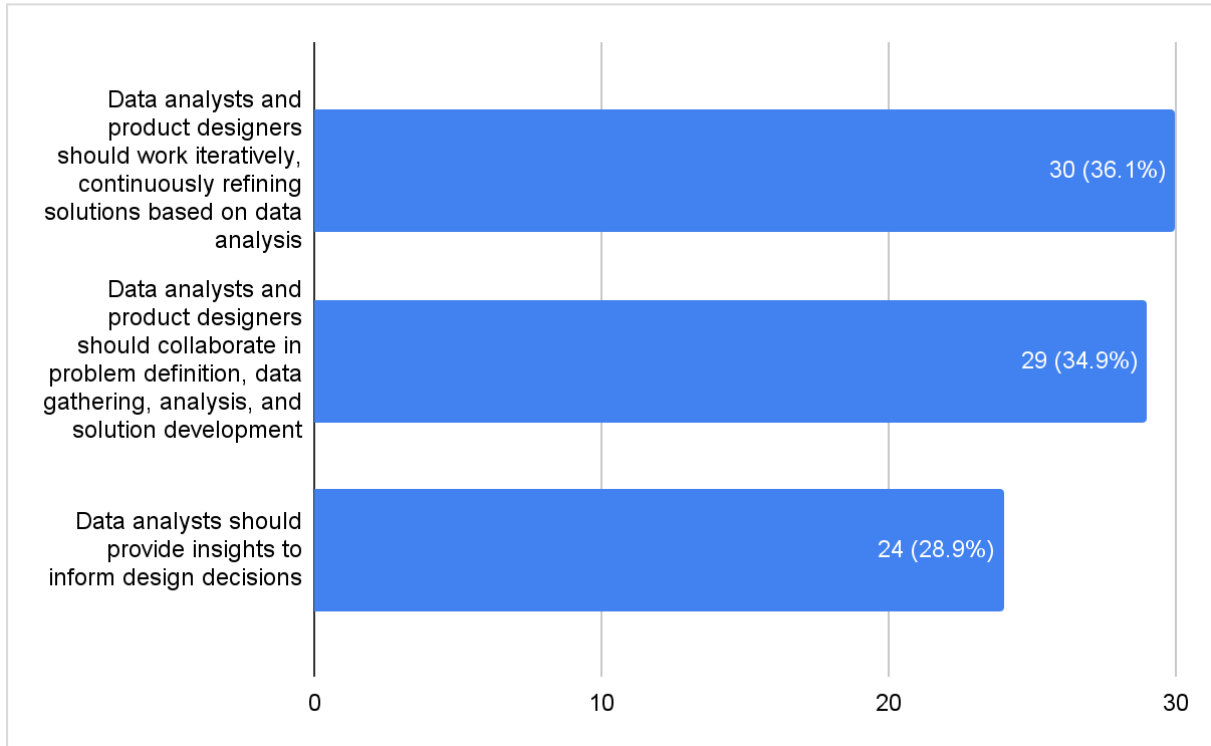
One respondent specifically mentioned that understanding and testing product ideas can significantly improve teamwork. For instance, consider a hypothesis that introducing a certain feature could boost user interaction within a specific time frame. By validating this hypothesis with data and creating preliminary product versions, both product designers and data analysts can enhance their collaboration.

In addition, AI platforms like ChatGPT¹²⁰ plays a crucial role in enhancing efficiency during the initial stages of product design. By automating various tasks, such as generating content for product descriptions, website texts, and app texts, ChatGPT reduces task completion time. Furthermore, it has the capability to generate innovative ideas and design concepts based on given parameters, fostering creativity and innovation.

¹²⁰ <https://chat.openai.com/>

Notably, artificial intelligence excels not only in handling large datasets and extracting useful information but also in predicting future trends using past data. This suggests that anyone can potentially perform data analysis effectively when utilizing this tool.

Figure 16. *Expectations for effective collaboration*



When asked about the essential skills required for a data-driven design approach, as presented in Figure 17, the participants proposed that the two pillars of success should encompass the ability to collaborate effectively and proficiency in user research.

To supplement these responses, one participant shared their opinion that a designer should use platforms that assist in tracking analytics and creating custom reports. According to them, the required skillset should include data analysis for forming hypotheses, integrating quantitative and qualitative data for idea validation, and planning a minimum viable product¹²¹ with a focus on hypothesis testing¹²².

Another participant underscored that the skills needed for these two roles should include the ability to ask the right questions. This means not just asking questions for no reason, but

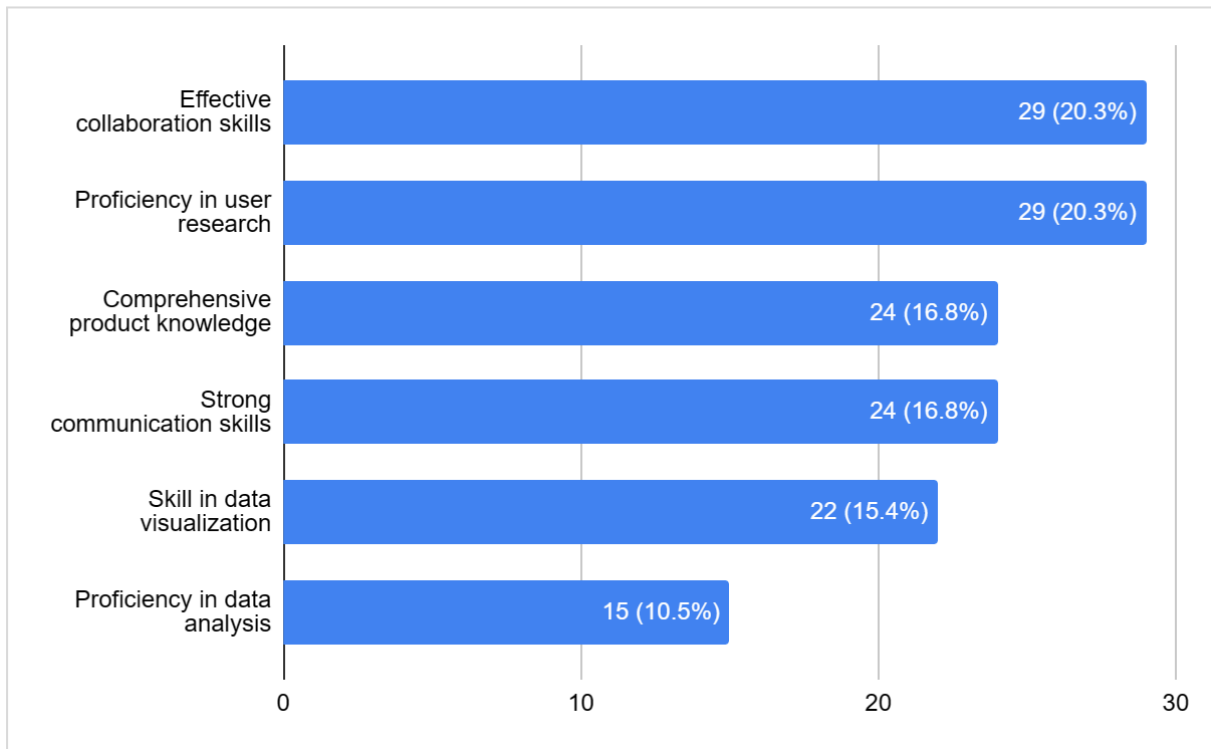
¹²¹ A minimum viable product is the simplest version of a product that can still be released to gather insights about its potential success. It serves as a trial run for a product idea.

¹²² It refers to testing an assumption stated in a hypothesis to draw conclusions about a population parameter or a population probability.

Carefully raising questions that can bring out more detailed information or resolutions, identify what users need, and help shape the path of the design process.

Meanwhile, a third participant reinforced the role of product designers in translating graphs and charts into data storytelling. This participant mentioned that product designers need to be adept at interpreting datasets and transforming them into engaging, understandable narratives.

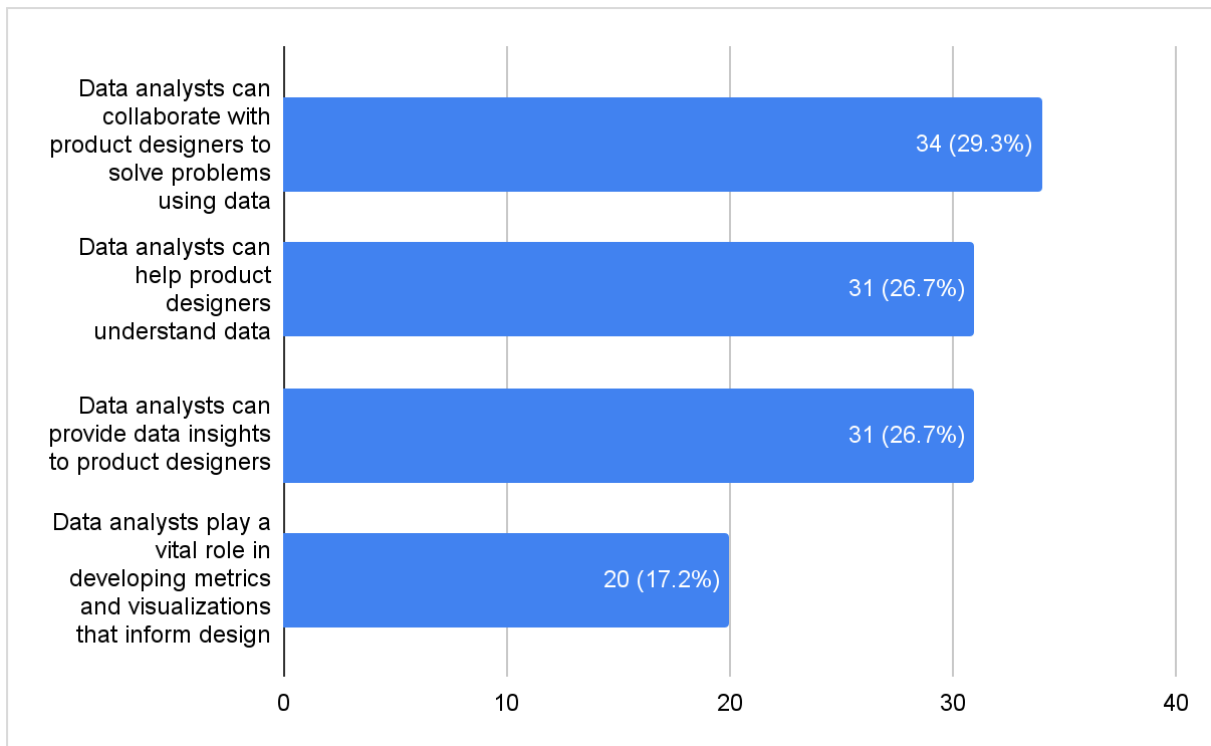
Figure 17. *Essential skills required for a data-driven design approach*



In our exploration of how data analysts can best support product designers, as specified in Figure 18, the respondents mentioned that data analysts can help them solve design challenges.

Building on this response, and in conjunction with helping designers understand data, it becomes advantageous to have analysts involved during design ideation, prototyping, testing, and development phases. Their proactive involvement, combined with their ability to assist product designers in comprehending data, ensures adherence to the principle of insights first, design second.

Figure 18. *Ways data analysts can support product designers*



When asked about the tools or technologies they believed would enhance their collaboration, as depicted in Figure 19, they mentioned product analytics as the pivotal factor.

Analyzing how users engage with a product enables product teams to track, visualize, and analyze user engagement and behavior data. By gathering insights from this data, design teams can create better design systems¹²³.

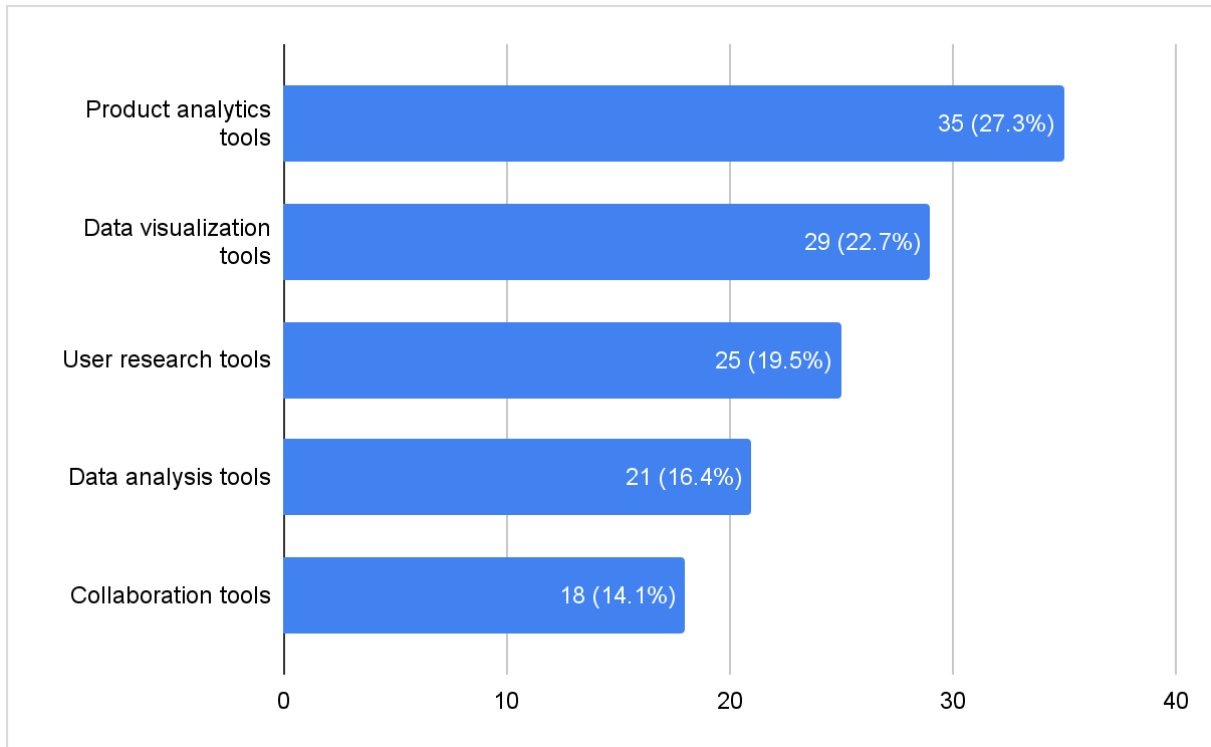
Platforms such as Google Analytics, which track website traffic, Mixpanel¹²⁴, which allows tracking of user interactions with web and mobile applications, and Amplitude¹²⁵, a platform that helps companies run experiments and identify user journeys and conversion funnels, can be advantageous during this product discovery phase.

¹²³ A design system acts as a blueprint for creating consistent digital products. It provides reusable components, guidelines, and standards to maintain a unified look and feel across different parts of a product.

¹²⁴ <https://mixpanel.com/>

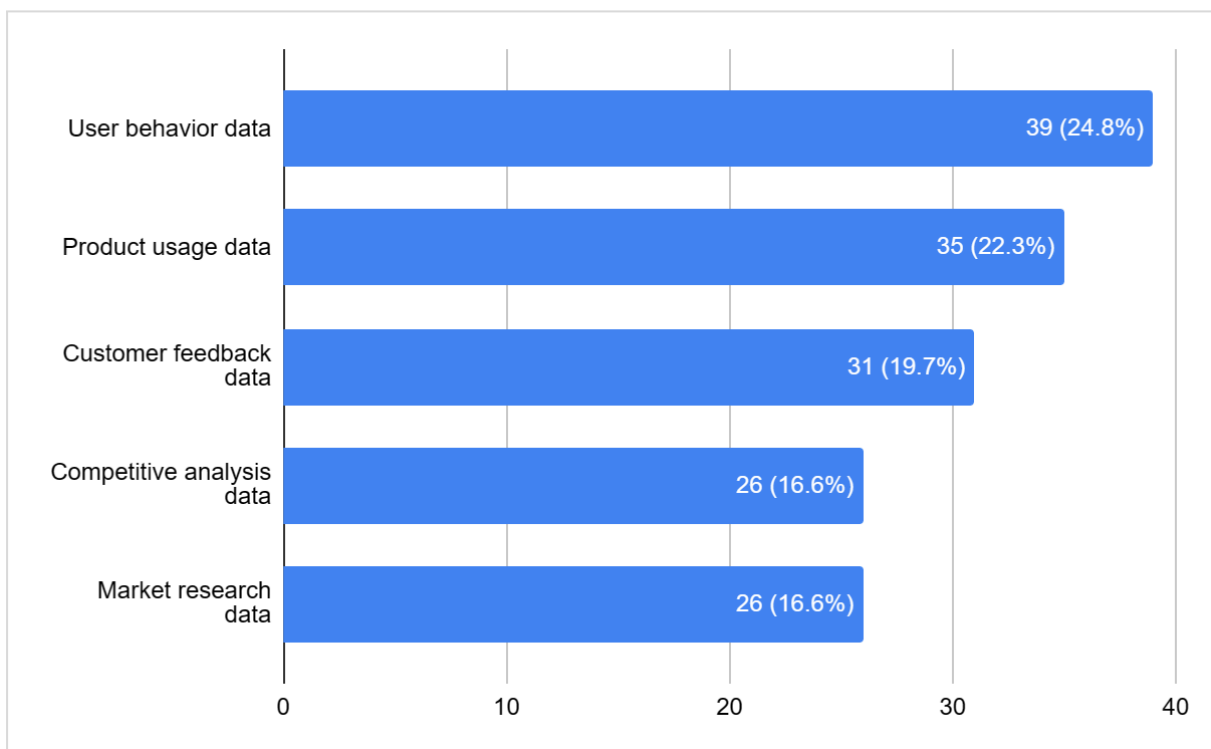
¹²⁵ <https://amplitude.com/>

Figure 19. *Tools that improve their collaboration*



When asked about the types of data that are valuable for product designers to make better decisions, respondents indicated that user behavior is considered to have the most significant impact on the design process.

Figure 20. *Data types that improve design workflow*



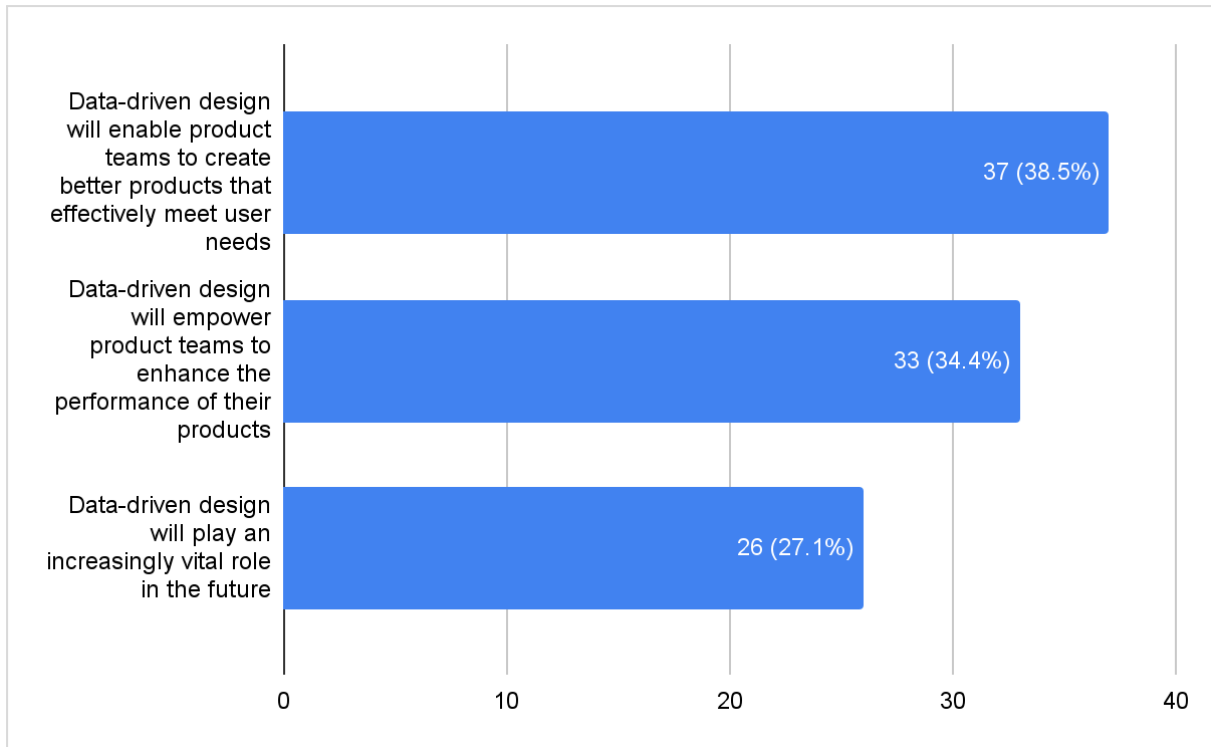
When asked to provide recommendations regarding integration, as outlined in Table 3, participants proposed that effective collaboration between data analysts and designers is essential. By starting data collection early, using both quantitative and qualitative data, iteratively improving designs, validating changes through real user data, and promoting collaboration between data analysts, designers, and stakeholders, design teams can enhance decision-making processes. Additionally, monitoring user behavior, leveraging artificial intelligence for tailored experiences, and adding plugins or widgets associated with data visualizations within design platforms like Figma all contribute to successful data-driven design workflow.

Table 3. *Key insights into integrating data analysis and product design*

Participant	Recommendations
1	Start data collection early in the prototype phase. Use both quantitative and qualitative data for insights. Utilize data to improve designs iteratively. Validate design changes through real user data and A/B testing; Promote collaboration between data analysts, designers, and stakeholders.
2	Monitor user behavior and leverage artificial intelligence for tailored product experiences.
3	Incorporate data strategically throughout the product design process to enhance decision-making at each step.
4	Conduct user research.
5	Leverage data analytics to inform and enhance product design decisions.
6	Integrate a widget or plugin within design tools like Figma, allowing designers to access and visualize select data directly.

Lastly, when asked about the future impact of integrating data analysis into the design process, as shown in Figure 21, the respondents said that such integration would lead to better products.

Figure 21. *Opinions about the future of data-driven design*



In summary, when designing with the user’s perspective in mind, product designers need not only a solid understanding of data but also the skill to transform those insights into impactful user experiences. Additionally, data analysts should actively participate in all stages of product development and design. This collaborative approach ensures that decisions are informed by both quantitative and qualitative data, leading to more effective and user-centric design solutions.

Chapter 5 - Discussion

In our study, we found that approximately half of the organizations recognize the pivotal role of data-driven design and have actively integrated data analysis into their design processes. However, this integration often remains constrained. To fully unleash the potential of data, companies should prioritize collaboration between their design and data teams, cultivate a data-centric culture, and adopt a user-centered design approach.

The role of data analysts can significantly vary based on an organization's size and structure. In smaller companies or startups, product managers or developers may easily assume data analyst responsibilities. Conversely, larger organizations often maintain dedicated data teams that work across departments, specializing in analyzing and interpreting complex data sources.

As new technologies like artificial intelligence emerge, data analysis becomes a fundamental skill for every member of the product team. To maximize this integration, companies should create customer interaction loops, actively seek feedback, and respond promptly - ideally in real-time. These practices significantly enhance product performance, leading to increased user satisfaction and engagement.

However, scaling within the product-led growth methodology presents challenges. Companies lacking a significant North Star metric may struggle to develop robust product strategies and may lack adequate analytics. Understanding available data, interpreting and organizing it, and regular communication through reporting and data storytelling are essential principles for integrating data-driven insights into decision-making processes.

Linking data analysis with product design can be complex due to differing work paces in both areas. The design team's delivery rate is often perceived as slower compared to the fast-paced nature of data analysis. This speed difference can hinder collaboration between data analysts and product designers during ideation, execution, and monitoring. While having a data analyst exclusively within the design team seems impractical, the rise of artificial intelligence and intuitive no-code platforms may make this fusion more plausible.

A key insight from our study is that the product-led growth methodology is a powerful business approach. However, it is not universally applicable. The try-before-you-buy approach works well for self-service acquisition and simplified monetization models but requires increased marketing and research spending, which may not align with companies relying on sales representatives.

To enhance product quality and performance, departments should automate data analysis processes, simplify user touchpoints, overcome data privacy challenges, and identify innovative opportunities within existing designs.

As we enter the era of AI-powered products, we are paving the way for self-evolving solutions. These products learn from user interactions, adapt to preferences, and continually improve. Imagine a future where a software product, developed by a company we will call FutureX, detects user disinterest and explores competitors' apps. Alerts, derived from behavioral data, inform data analysts about pain points, struggling features, and signs of user abandonment. Reports are generated, shared with the design team, and used to create A/B tests - all in real-time.

In the near future, a new breed of professionals known as data product designers will likely gain prominence. These individuals will play an important role in blending both data analysis and product design skills, signaling the next phase for design teams. As technology, data, and design converge, product-led growth may also transform, continuing to be a driving force for products to thrive.

Chapter 6 - Conclusion

6.1 Contributions

The main objective of this thesis was to understand how the relationship between data analysts and product designers happens in companies led by product growth. We reached this goal by providing an exploration of this relationship, discussing various aspects including the challenges, benefits, collaboration strategies, and emerging trends in their combined workflow.

To arrive at this conclusion, we answered the main research question, which was: *Within the product-led growth methodology, what are the key factors that stimulate active collaboration between product designers and data analysts during the design process?*

In the product-led growth methodology, active collaboration between product designers and data analysts is stimulated by data-driven decision-making, user experience optimization, continuous improvement through experiments, cross-functional collaboration, and the utilization of data analytics tools. Together, these factors ensure the product meets user needs and drives growth, creating a self-sustaining growth engine.

Six specific objectives contributed to the achievement of the main objective. The first one was to investigate the tasks and activities that data analysts and product designers undertake to assist in the user-centered design process. It was recognized that these roles should be involved in a continuous iterative process, utilizing data as the primary source for solving design challenges.

The second specific objective was to investigate the integration of data analysis into product design decisions. The research presented the significance of utilizing product-led growth strategies to solidify this integration. Strategies may vary from generating a substantial data-design workload aligned with product metrics and analytics to the creation of regular reports shared with product designers.

The third specific objective focused on understanding the advantages and challenges of integrating data analysis into the design process. The findings presented the benefits of this integration, emphasizing its potential to enhance user satisfaction, engagement, and overall

product performance. It also recognized obstacles, with the lack of data accessibility being a significant barrier.

The fourth specific objective was to collect feedback on the skills and tools that could foster collaboration between product designers and data analysts. The responses indicated that the primary skillset for effective collaboration includes familiarity with artificial intelligence, clear communication, and a shared understanding of product analytics.

The fifth specific objective was to identify approaches in which data analysts can more effectively support design challenges. One particular way is by involving them in everything from the ideation to the implementation stages.

The sixth and final specific objective aimed to collect participant insights on the potential merging of data and design departments, along with anticipated trends in their collaboration. Participants provided perspectives on this fusion to likely occur, foreseeing improved collaboration through the use of emerging technologies.

To arrive at these answers, each specific objective was guided by a corresponding research sub-question. The first sub-question addressed the common and distinct tasks performed by data analysts and product designers when completing a design request. However, we could not fully answer this question as the research did not concentrate on analyzing separate tasks. Instead, we provided an explanation of the integration of twelve tasks that benefit the data-design workflow. These tasks include analyzing A/B tests, gleaning insights from user feedback, identifying user pain points, analyzing user behavior data, defining the target audience, delineating success metrics and identifying factors for user engagement, ensuring compliance with regulations, prioritizing features, testing hypotheses, identifying new opportunities with user engagement, personalizing user experiences, and communicating data insights.

The second sub-question investigated the perceptions of data analysts and product designers regarding the impact of data analysis on design decisions. In response to this question, the benefits of such integration can be viewed as a catalyst. By consistently analyzing user data and feedback, companies can gain a profound understanding of their customers needs.

The third sub-question addressed how roles within design teams measure and evaluate the impact of data analysis. In essence, data analysis ensures that development efforts are

directed toward areas that have the most significant impact. It serves as a valuable source for the design team to experiment with and test additional product and feature ideas.

The fourth sub-question sought feedback on the skills that data analysts and product designers need to cultivate to enhance their collaboration. Essential skillsets include product management, strategic design, UX research, and proficiency in programming languages. Additionally, understanding each other's roles, enhancing communication channels, and gaining product knowledge are also important.

The fifth sub-question examined the impact of emerging technologies on these roles. It was identified that in today's evolution any individual can now embody elements of both product design and data analysis with the help of artificial intelligence.

The sixth and final sub-question referred to the current and future trends in data and design departments. The research provided an overview of trends, including the rise of augmented analytics, predictive analytics, and self-evolving products. These trends should enable individuals to broaden their skills and become more versatile, while they continue to specialize in their respective fields.

6.2 Limitations and new research directions

In the rapidly changing landscape of product-led growth, it is essential to stay updated with the latest trends. Despite its recent emergence potentially limiting the extent of thorough academic studies, readers can acquire more knowledge by investigating materials from intersecting topics, such as data science, customer experience design, product marketing, sales-led growth, customer success management, and cloud-based software models.

As our survey revealed a challenge related to clarifying the role of data analysis within design processes, the absence of a clear explanation could have led respondents toward personal biases, potentially increasing our margin of error. For example, biases could have emerged from interpreting the integration of data with product design, rather than integrating data analysis with product design. Additionally, there might have been biases arising from associating data analysts with UX researchers due to their intertwined tasks.

While reading this study, readers might have wondered if there is a difference between user-centered design and product design. Interestingly, these design disciplines often intersect, despite their distinction in literature. Regardless of their differences, both product

designers and data analysts require a profound understanding of the user and a commitment to creating a product that meets their needs.

Misunderstandings about the integration of data and design departments have led us to question whether there are tech companies that lack concrete product and design metrics. This suggests that there might be a significant number of organizations not fully aware of how design and data can work harmoniously together.

Since half of the responses came from product managers, the results might have introduced biases as well. Having product managers speaking on behalf of product designers and data analysts might have contributed to a lack of specificity regarding the roles' expertise, potentially leading to misconceptions.

One flaw in this research was the questionnaire. It consisted of broad questions, leading to a lack of thorough answers. The trustworthiness of the results could have taken a different route if we had created a distinct survey for each profession.

Our findings also revealed that the product-led growth methodology is likely to vary depending on factors such as company size, industry, and business phase. To explore this further, we suggest conducting future research to investigate if there is a significant correlation between these elements.

To maximize the benefits of the product-led growth methodology, we recommend conducting case studies. These studies can practically demonstrate the methodology in real-world scenarios, offering concrete insights across different companies.

For instance, some case studies could investigate aspects such as communication tools, check-in structures, joint problem-solving sessions, cross-disciplinary training, and project retrospectives. Such an approach would enrich existing knowledge and offer valuable insights for future research in data-driven design.

In addition, we identified a potential gap related to both service and service design. Although marketing distinguishes between products and services, these boundaries often blur, especially in the realm of software products. This overlap extends to product design and service design as well. Product design focuses on creating digital solutions, while service design aims to enhance customer experiences by refining processes and interactions associated with the software product.

Despite these distinctions, we chose not to explore this aspect in our literature review. However, it is worth noting that the outcomes of product design and service design are comparable. From a product-led growth perspective, a well-designed software product inherently delivers excellent service to its users. While we did not include this point, readers might have found supplementary educational content valuable.

In conclusion, our research opens up new avenues for further exploration in the field of product-led growth methodology. A logical next step could involve conducting interviews with companies that have successfully adopted data-driven design strategies. Such interviews would encourage discussions on how to efficiently synchronize design and data analysis activities at each stage of the customer journey.

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Appendix - Questionnaire

Title: Integrating data analysis and product design

Introduction: Welcome to our research study! This questionnaire focuses on integrating data analysis into the product design process, specifically within the product-led growth approach. We are interested in gathering insights from individuals actively involved in product design, who have experience with data analysis and are familiar with the concept of product-led growth.

The 3-minute survey explores your familiarity with integrating data analysis, past experiences using data analysis for design decisions, potential benefits, challenges, collaboration between data analysts and product designers, required skills, valuable data types, and willingness to adopt data analysis in the design process.

Your participation is valuable in helping us understand how data analysis can enhance product design in a product-led growth environment. Your responses will remain confidential and anonymous. Thank you for your participation!

Questions:

1. *What is your role in the product design process?*

- Product Manager
- Product Designer
- Data Analyst
- Other _____

2. *What is the size of your organization?*

- Small (1-50 employees)
- Medium (51-250 employees)
- Large (251+ employees)

3. *What is your level of seniority in the product design process?*

- Junior/Entry-level
- Mid-level
- Senior/Executive

4. *What sector does your company operate in?*

- Technology
- E-commerce
- FinTech
- Healthcare and Pharmaceuticals
- Marketing and Advertising
- Other _____

5. *How often do you use data to inform design decisions?*

- 1 (Never)
- 2 (Rarely)
- 3 (Sometimes)
- 4 (Often)
- 5 (Always)

6. *What are some potential benefits of integrating data analysis into the product design process? Please select all that apply:*

- Increased user engagement
- Improved product performance
- Reduced churn
- Increased revenue
- Improved product-market fit
- Increased customer satisfaction
- Other _____

7. *Which of the following challenges or barriers do you see in adopting data analysis in product design teams? Please select all that apply:*

- Insufficient data availability
- Limited understanding of data analysis techniques
- Lack of collaboration between data analysts and product designers
- Inadequate tools and technologies to support data-driven design
- Other _____

8. *How do you envision the collaboration between data analysts and product designers?*

- Data analysts should provide insights to inform design decisions
- Data analysts and product designers should collaborate in problem definition, data gathering, analysis, and solution development
- Data analysts and product designers should work iteratively, continuously refining solutions based on data analysis
- Other _____

9. *Which of the following skills or knowledge do you believe are essential for product designers to effectively utilize data analysis? Please select all that apply:*

- Proficiency in data analysis
- Skill in data visualization
- Strong communication skills
- Effective collaboration skills
- Comprehensive product knowledge
- Proficiency in user research
- Other _____

10. *How can data analysts best support product designers? Please select all that apply:*

- Data analysts can provide data insights to product designers
- Data analysts can help product designers understand data
- Data analysts can collaborate with product designers to solve problems using data
- Data analysts play a vital role in developing metrics and visualizations that inform design decisions
- Other _____

11. *Which specific tools or technologies do you believe would enhance the workflow between data and design teams? Please select all that apply:*

- Data visualization tools
- Collaboration tools
- Data analysis tools
- Product analytics tools
- User research tools
- Other _____

12. Which types of data do you believe would be valuable for product designers to make informed design decisions? Please select all that apply:

- User behavior data
- Product usage data
- Customer feedback data
- Market research data
- Competitive analysis data
- Other _____

13. What are the future implications of data-driven design? Please select all that apply:

- Data-driven design will play an increasingly vital role in the future.
- Data-driven design will enable product teams to create better products that effectively meet user needs.
- Data-driven design will empower product teams to enhance the performance of their products.
- Other...

14. Please share any additional thoughts, insights, or suggestions you have regarding the integration of data and design teams. Is there anything else you would like to add that hasn't been covered in the questionnaire?
